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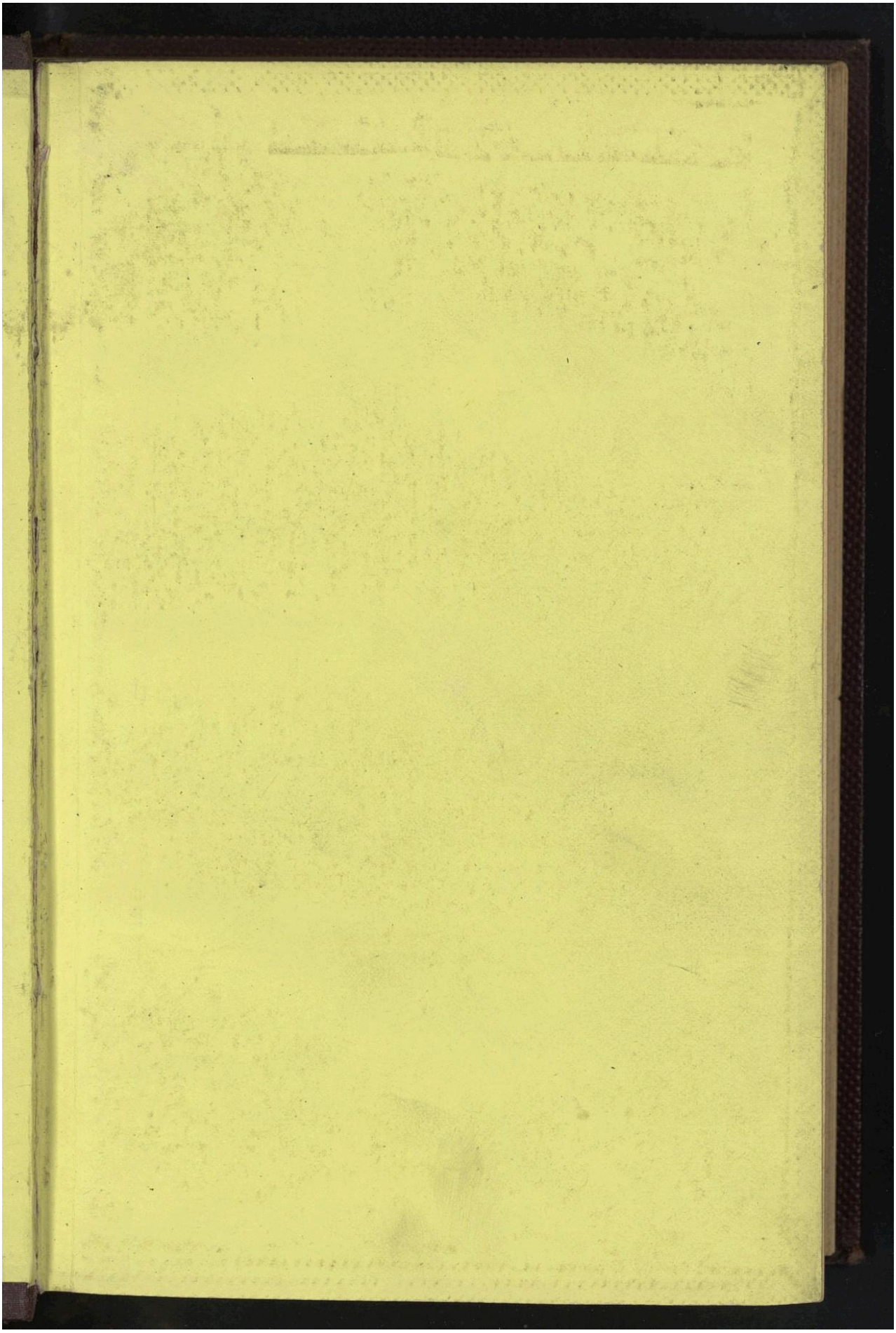

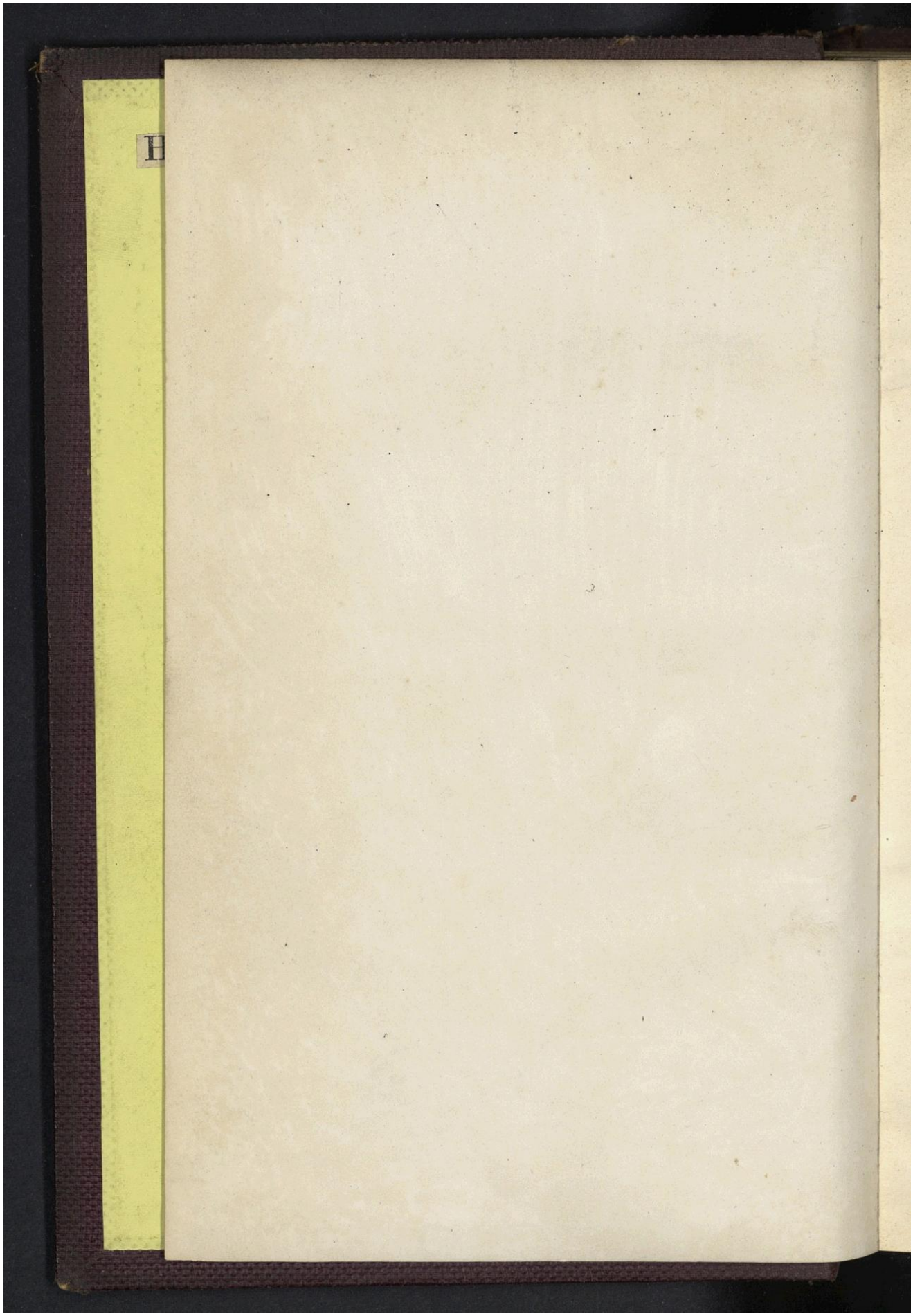

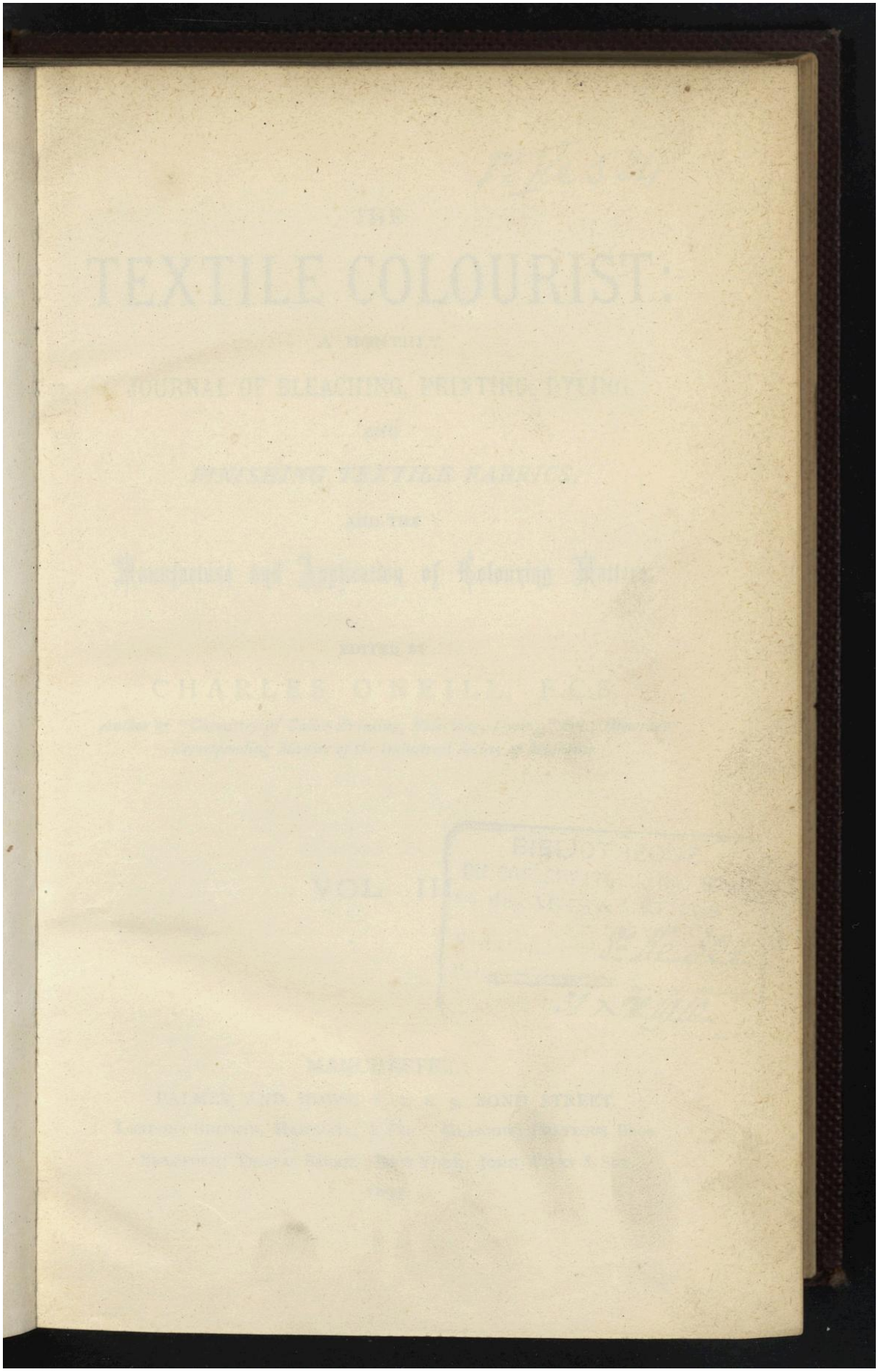

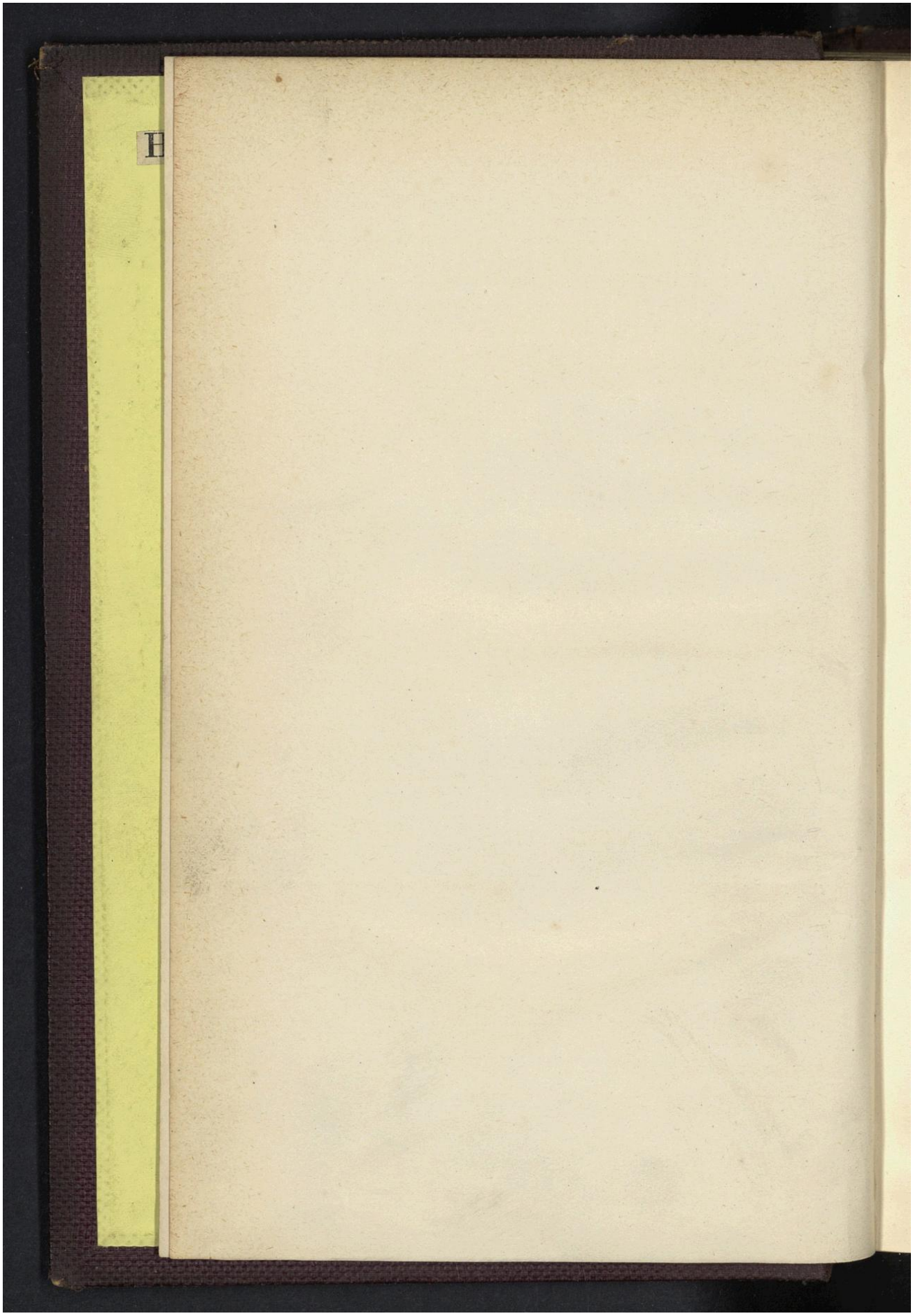

THE

TEXTILE COLOURIST:

A MONTHLY

JOURNAL OF BLEACHING, PRINTING, DYEING,

AND

FINISHING TEXTILE FABRICS,

AND THE

Manufacture and Application of Colouring Matters.

EDITED BY

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THE TEXTILE COLOURIST.

No. 13.] JANUARY, 1877. [Vol. III.

AT the commencement of the second year of publication of the *Textile Colourist* it seems not inappropriate, and it may be even expected, that the Editor should make some personal communication to his readers.

Let him in the first place cordially thank the numerous subscribers who at the outset responded so readily to his applications, and by their assistance encouraged him to proceed with his novel venture.

So many of the subscribers are themselves practically occupied in the business of Bleaching, Dyeing, and Printing, and are so familiar with the most technical details of their art, that it would be presumption to assume that they stood in any actual need of such a publication. Their support of it may be fairly ascribed to the desire to see such a serial in existence for the good it may do to the younger and less experienced, who are either engaged in the trade or preparing themselves for some position in it.

It is believed that these may have received during the past year a sufficient statement of the progress that has been made in the various departments of their art, at home and abroad, with a fairly comprehensive reproduction and translation of the most important papers and publications which have appeared in connection with it.

This, at any rate, is what has been aimed at by the Editor,

others must judge if the intention has been accomplished, or the promises at first held out fulfilled.

An attempt has been made in the selected matter to combine the practically useful with articles of what may be called archæological interest. It was assumed that beyond the mere detail of processes and receipts which could be applied in manufacture, there existed a cultivated taste which could appreciate the history of the art and an account of the earlier literature upon the subject, hence the various retrospective reviews of old books, which it is proposed to continue.

The Editor does not see that for the coming year he can promise any considerable alteration or improvement upon the later numbers of this publication, but he would be glad to receive suggestions from those in the trade who think the Journal could be made more useful to its readers.

It is intended to add illustrations to the Specifications of Patents when required, and efforts are being made to obtain descriptions of Foreign Patents, of which the titles only have hitherto been given.

The Supplement upon the Practice and Principles of Calico Printing, Bleaching, Dyeing, etc., is intended to be completed within the current year.

Manchester, January 1st, 1877.

1. *Materials for a History of Textile Colouring, No. 4.**

AFTER the acetic fermentation, a putrid fermentation would set in, which, if permitted to develope itself, would make the cloth black and tender. The first experiments recorded by Dr. Home are for the purpose of ascertaining whether the steeping was best done (1) in pure water alone, (2) in water and bran, or (3) in old ley; various experiments did not completely agree, but on the whole, the ley took out the greatest weight of matter; very little seems to depend upon fermentation. In using the ley from ashes, such as the Muscovy ashes, which do not wholly dissolve in water, it is shewn that serious errors might arise from the common practice of drawing and using the ley direct from the top of the ashes,—some portions would be stronger and of a different composition to other portions; it is recommended to draw off the ley and mix it in a separate vessel. We incidentally find Dr. Home carefully determining the specific gravity of the leys, by the very accurate method of weighing a piece of glass immersed in them; he speaks also of a "proof ball" as being in practical use to test the strength of leys.

With regard to the theory of the use of alkalies in bleaching we have the following:—

"We shall see in some experiments which follow on the natural effects of these ashes, that one effect they have on cloth, is the diminishing of its weight, and that their whitening power is equal to their weakening power. Hence arises the probability, that these leys act by removing somewhat from the cloth, and that the loss of this substance is the cause of whiteness. . . . . There are various and different opinions with regard to the operation of these salts: that they act by altering the internal texture of the cloth, or by separating the mucilaginous parts from the rest, or by extracting the oil which is laid up in the cells of the plant. The last is the general

* Continued from vol. ii., p. 303.

opinion or rather conjecture, for none of them deserves any better name, but we may venture to affirm, that it is so without any better title to pre-eminence than what the others have. Alkaline salts dissolve oils, therefore these salts dissolve the cellular oil of the cloth, is all the foundation which this theory has to rest upon ; too slight when unsupported by experiment to be relied upon."

The author then proceeded to make experiments to get to know the real use and action of alkalies, not without hoping that, at the same time, he would learn something useful about the medicinal qualities of them as regarded their use as lithontripetic medicines, they having the same effect on the human calculus as upon cloth. His first experiment was upon unbleached beeswax, which he found lost weight as well as colour by exposing to air, light, and water, and he seems to think that the loss was owing to the escape of some inflammable substance. But not finding much analogy between beeswax and linen cloth, he left it to work upon the spent leys; from these he separated the organic matter by treating with acids, and found it to be of an oleaginous nature. A curious remark occurs, shewing that some of the differences between neutral fat and fatty acids were then known. "That it dissolves in spirits of wine is not a certain argument of its differing from expressed oils; because these, when joined to alkaline salts, and recovered again by acids, become soluble in spirit of wine." However, he did not arrive at any definite opinion upon the action of alkalies.

Treating upon the effects of the alternate watering and drying of the bucked cloth, we find our author strongly drawn to his theory of the colouring matter being evaporated in the course of grassing.

"The continual evaporation from the surface of the cloth, shews that the design of the operation is to carry off somewhat remaining after the former process of bucking. This appears likewise from a fact known to all bleachers, that the upper side of cloth, where the evaporation is strongest, attains to a greater degree of whiteness than the under side. But it is placed beyond all doubt by the experiment, where it appears, that cloth turns much lighter by being

exposed to the influence of the sun, air, and winds, though the salts have been washed out of it. What, then, is this substance? As we have discovered in the former section, that the whitening in the operation of bucking depends on the extracting or loosening of the heavy oil and solid particles of the flax, it appears highly probable that the effects of watering and exposition to the sun, air, and winds, are produced by the evaporation of the same substance joined to the salts, with which composite body the cloth is impregnated when exposed on the field. That these salts are in great measure carried off or destroyed appears from the cloth's being allowed to dry up without any danger after the evaporation has gone on for some time. If we can shew that oils and salts, when joined together, are capable of being exhaled in this manner by the heat of the atmosphere, we shall reduce this question to a very great degree of certainty."

That nothing can delude or deceive so much as a favourite hypothesis is here very evident. It is plain that the salts which Dr. Home considers as exhaling had been simply washed off the cloth by the watering. But as an illustration of the absurdities into which the headlong pursuit of experiments to support an opinion may lead an incautious experimenter, the Ex. 9 which follows cannot well be exceeded:—

"Ex. 9. Sept. 10.—I exposed, in a south-west window, ½ oz. of Castile soap, sliced down, and watered. Sept. 14.—When well dried, it weighed but 3 dr. 6 gr. Sept. 22.—It weighed 2 dr. 2 gr. Sept. 24.—It weighed 1 dr. 50 gr. . . . It appears, from this experiment, that soap is so volatile, when watered and exposed to air not very warm, that it loses above the half of its weight in fourteen days.

It seems clear that Dr. Home did not know, or in the heat of his experimenting had forgotten, that Castile soap contains water, and that it was the drying up of the water which caused the loss of weight, and not any volatilization of the solid matter of the soap. How the soap should have appeared to lose so much as half its weight, which is in excess of the quantity of water probably contained in it, is not worth while enquiring into. But this utterly fallacious, even if correctly

reported experiment seems to have confirmed him in his opinion, for he continues:—

"The same must happen to the saponaceous substance formed from the conjunction of the alkaline salts, heavy oil, and earthy particles of the flax. The whole design then, of this operation, which by way of pre-eminence gets the name of *bleaching*, is to carry off by the evaporation of water whatever has been loosened by the former process of bucking."

This theory seems to have been objected to by practical men on what are sufficient grounds, namely, that in March and April when evaporation was slow bleaching was quickest, and that in windy weather evaporation was quick and bleaching was slow; and though Dr. Home does for a moment allow that "this would seem to shew that the sun has some particular influence independent of evaporation," he immediately turns these objections into arguments in support of his theory.

We pass on to the section upon "souring," which opens with the enunciation of a doctrine upon the constitution of alkaline salts, which even with every allowance for the time in which it was written, comes upon a chemist of these days with the effect of a surprise. He says:—

"It is well known to all chymists, and will afterwards appear, that alkaline salts are convertible, by different methods, into absorbent earths. Frequent solution in water, and evaporation of it again, is one of these. This transmutation, then, of these salts, which are not volatilized or washed away, must be continually going on in the cloth under these alternate waterings and dryings of the former process. . . . . Frequent buckings and bleachings load the cloth with this substance. It becomes, then, necessary to take it out. No washing can do that, because earth is not soluble in water. Nothing but acids can remove it. These are attracted by the absorbent earth, join themselves to it, and compose a kind of neutral imperfect salt, which is soluble in water, and therefore easily washed out of the cloth."

As far as regards some kind of ashes which contained lime

or lime salts, this explanation is intelligible, but of course the idea of alkaline salts themselves being converted by any process into earthy salts is long since exploded, and it is even difficult to imagine how it originated. Buttermilk was reckoned the best sour, and then sour infusion of bran and water. With buttermilk sours signs of fermentation with an increase of temperature was observed. The fermentation was at one time thought to be essential to the process, but the most important service rendered by Dr. Home to the art of bleaching was in his demonstrating that fermentation was not a necessity, and that acids which did not produce fermentation were not on that account less suitable for the process. The souring, as before stated, occupied four or five days; when the buttermilk was kept warm the process was expedited so that three days were sufficient. The old bleachers pretended that even the feeble sour bodies of bran and milk should be applied at a regular strength and gradually weakened as the cloth attained to whiteness. Our author says upon this point:—

"I am not of opinion, however, that there is the least danger at any time from too strong a sour. Why they should not be used somewhat sooner than they are I could never see any reason.

What is most wanted in this operation, is, a more expeditious and cheaper method of attaining the same end. As it takes five or six days, it retards the whitening of the cloth considerably; and as bleachers are obliged to send for milk to a great distance it becomes very dear. This last consideration makes them keep it so long, that when used it can have no good effect; perhaps it may have a bad."

In looking about for an economical substitute, our author rejects the vegetable acids, vinegars of various origin, juices of plants, or tartar, because they not only contain "oleaginous particles which would not fail to discolour the cloth," but that also they are, or would speedily, if wanted in great quantities, become too dear. But in the mineral acids he saw no such objection. He says:—

"They are exceedingly cheap, and contain no oil, though many chemists have asserted that they did. I will freely own that, at first, I had no great opinion of their success from two reasons—their want

of all fermentation, which I then looked on as necessary, and their extreme corrosiveness. But the experience of two summers, in two different bleachfields, has convinced me that they will answer all the purposes of the milk and bran sours; nay, in several respects, be much preferable to them. I have seen many pieces of white cloth which had no other sours but those of vitriol, and were as white and strong as those bleached in the common way. . . . The method in which it has been hitherto used is this. The proportion of the oil of vitriol to the water with which it is diluted, is half-an-ounce, or at most three-quarters of the former to a gallon of the latter. . . . . I am of opinion that five hours will do as much with this sour as five days with the common sort. But the cloth can receive no harm in allowing it to remain for some days in the sour, but rather on the contrary, an advantage."

Thus modestly the author treats of the introduction of vitriol sours in bleaching, the first important improvement in the old system of bleaching, and a boon of incalculable value to all bleachers. It was a bold step to try such an acid as vitriol for application to linen. Its well known and dreaded corrosive powers when in the concentrated state would deter any simply practical man from entertaining the least idea of using it; it required the more extended knowledge of one versed in chemistry to have the courage to introduce so formidable, and as it was believed, so dangerous a material; for the author states that he was convinced of its safety before he attempted to introduce it into practice. He shews that for purposes of printing, or "stamping" as it is called, "in order to make linen receive the colour it is steeped in a sour of water and oil of vitriol about fifteen times stronger than they make use of in the bleachfield, for to 100 gallons of water are added 2½ of oil of vitriol. Into this quantity of liquor, made so warm as the hand can just be held in, is put 7 pieces of 28 yards each. The linen remains in and comes out remarkably whiter. The fine cloth often undergoes this operation twice." Attention is drawn to the necessity of mixing the oil of vitriol and water well together. At the end of his observations upon souring, he says: "From both experience and reason, I must

then give it as may opinion, that it would be for the advantage of our linen manufacture to use vitriol in place of milk sours." Nothing of particular interest is found in the remaining remarks, unless it be the final paragraph of this section, shewing what now seems a very simple and obvious improvement.

"The last operation is that of starching and bluing. It often happened that the cloth when exposed to the weather, to be dried after this operation, got rain, which undid all again, and forced the bleacher to a new expense. To remedy this inconvenience, Mr. John Chrystie, some years ago, invented the dry-house, where the cloth may be dried after this operation in any weather. This invention meets with universal approbation."

In the third part Dr. Home treats of the alkaline ashes, and we find the first hint of an alkalimetrical test for them; the acid test was a mixture of 1 part of spirit of nitre, (nitric acid) and 6 parts of water, it is true that the estimation was by the number of *tea-spoonfuls* of acid required to finish the effervescence of a given weight of the ashes, but the principle was there, and the results obtained were reliable. The effervescence was the indication, and our author was doubtful at first of the value of the process, knowing, that not only alkaline salts, but also "absorbent earths" effervesced with acids, and he even includes quick-lime as effervescing with acids. He soon found that the absorbent earths, principally in these cases chalk or lime, neutralized acids as well as the ashes; he suspected that boiling weakened the ashes, and recommended bleachers not to make solutions of them by boiling if they were of such a nature as to dissolve without. It is interesting to read, but it would be tedious to recount at length, the numerous experiments our author made upon the various ashes, in the endeavour to get at some correct knowledge of their constitution; he gives the experiments in detail, and we can see how he was led or misled to various conclusions which we now know to be incorrect. His experiments confirm the deductions of older chemists, and convince him that the basis of the alkaline salts was an earthy body,

and he believed that he proved that it was not a calcareous earth, and that there were some volatile principles joined to this earth, and these together made the alkaline salts; in this theory he conceived he was supported by the writings of such old-world chemists as Junker, Stahl, and Boerhaave, but all the theories of this age of chemistry have long since been superseded by other theories which seem, to us at least, more accordant with facts and truth. Our author, however, was acquainted with the fact that there were two kinds of alkalies, for he says, "the alkaline base of sea salt is found to enjoy some peculiar properties which no other alkaline salt has." He knows the difference between the sulphates and carbonates of potash and soda, and concludes after reciting some more experiments. "It appears then, from these experiments, that alkaline salts prepared in the common way, from different substances, are specifically different, and probably have different effects when taken into the human body; but these effects are so gentle, and so mastered by the alkaline property common to all, that they pass unobserved."

Our author then proceeds to study the question of how the ashes required in bleaching could be manufactured at home. The blue and white pearl ashes are reported as being pure alkaline salts without any considerable mixture of heterogenous bodies and he rightly conjectures they were made by the evaporation of a limpid solution or "lixive." A method of obtaining a purer ash from the native material is described as follows :—

> I was informed by a skilful bleacher in Ireland that he practised a more expeditious way of extracting the salts. He bought the ashes of different vegetables from the commonalty for 9s. a bushel. From these a very strong lye was made, into which dry straw was dipped, until it sucked up all the lye. The straw was afterwards dried and burnt, and gave him salts, which he shewed me, almost as good and pure as the pearl ashes.

This is nothing more than a roundabout method of evaporating a solution to dryness, which Dr. Home, while praising as being expeditious, no doubt perceived, for he says, "I can see

no occasion for bringing the lye into a solid form, as the salts must be again dissolved in water before they can be used." He asks again, why the ashes of fern cannot be used in Scotland. "There is more of it growing on our (Scotch) hills than would serve all our bleachfields. The Irish make great use or it." Kelp, which grows in such abundance on the coasts, and contains a large proportion of salts, would appear the best material for yielding bleachers' ashes, but it was believed to contain something which made the linen yellow after it had attained a fair degree of whiteness, and was only used for coarse cloths. They were the cheapest of all ashes, 2,000 lb. weight being sold for £2. Dr. Home worked long upon kelp ashes but with not much result; they contained a large proportion of common salt and also sulphurets from the reduction of sulphates and were poor in real alkali.

He next comes to the Muscovy ashes, concerning which he says :—

"We have shewn by undoubted experiments, that the greatest part of these ashes consists of lime; and yet we have several acts of parliament which forbid the use of that material under severe penalties. The parliament were in the right to discharge its use upon the disadvantageous reports which were made to them. We shall immediately see, how dangerous a material it is when used improperly, or without the mixture of alkaline salts, which render it safe and more soluble in water. But I'll venture to say, that experiment will not support the prejudice entertained with regard to it, if carried any further. Since bleaching then cannot be carried on without it; for those ashes which contain it are quite necessary in that operation; and since we import them from foreign countries, let these prejudices against it cease, and let us only consider how we may render our own lime as safe as the foreign. If we can do that, the wisdom of the legislature will be as ready to abrogate these acts as they were to make them."

It would be interesting to unearth the acts of parliament which refer to the use of lime in bleaching; they must be looked for in the legislation prior to the year 1756, as is apparent from the above quotation, although in the article

upon bleaching in the ninth edition of the Encyclopædia Britannica it is erroneously stated, that lime was applied in linen bleaching only in 1764, and its use forbidden afterwards; according to the same authority, these acts were not allowed to be inoperative, for it is stated that so lately as 1815, an Irish bleacher was actually prosecuted for using lime. The persistence of a prejudice can scarcely be better illustrated than in the case of lime, for it still exists in ill-informed quarters, where all poor, high dressed, weighted, and damaged cotton or linen cloth is said to have been owing to the use of lime in bleaching. Dr. Home tried numerous experiments upon mixtures of various ashes with lime, boiling them together, roasting, calcining, evaporating, &c. In most cases the final result would be to carbonate the quick lime and whatever caustic alkali was formed at first by the mixture, leaving the ashes weaker and worse than at the commencement. But in one or two cases the alkali was caustified, as when in an experiment he slacked some quick lime with a solution of ashes, but the result seemed to frighten him. He says:—"The composition was so strong that it blistered my tongue if it but touched it." He reduced the strength of the salts, but even when there was only $\frac{1}{32}$ part of the salts in solution it was found strong, and as it would appear this preparation was rejected as dangerous. However, at length he made what he considered a perfect imitation of Muscovy ashes by mixing about 1 part of pearl ash with 4 parts of lime, and apparently taking the clear liquor and evaporating to dryness. Some ashes, thus prepared, were tried by a practical bleacher, Mr. John Chrystie, and reported as quite equal to the best Riga Muscovy blue ashes. It is not to be overlooked in this question that the older chemists thought that the lime or its caustic part entered into the alkali of the ashes and made them caustic, therefore, Home speaks as if the lime used in caustifying the ashes remained in the clear solution and that lime actually came into contact with the cloth. We know now, that when quick lime and solution of either potash or soda ash act upon one another, that no lime remains in solution, and that the so-called causticity is

caused by the lime withdrawing the carbonic acid from the real base of the soda or potash. What Dr. Home sent to his friend Chrystie, as an artificial imitation of Muscovy ashes, was not, as he thought, a mixture or compound of lime and ash, but actually a more or less perfectly caustified ash, either quite free from lime or containing it as inactive carbonate of lime. It is impossible to discover how Dr. Home came to be so certain that the Muscovy ashes were chiefly composed of lime when in fact there is very little lime in them, and that is an accidental impurity. That they were made by means of lime is very probable; they contained a portion of potash in the caustic state and were tolerably free from insoluble matter and inactive neutral salts.

The following account of an experiment upon bleaching linen with lime alone was sufficient to confirm all the prejudices against this material; we give it in full, premising that another experiment performed before this one with what is called stone-lime water made the cloth "rather weaker."

"*Ex. 61. Aug. 10th.*—That I might discover what effect oyster-shell lime water would have upon cloth, as it has a stronger power in dissolving the human calculus than stone-lime water, I steeped the same quantity of the same cloth in the same quantity of shell-lime water. *26th:* Remarkably whiter, even more so than the cloth in the stone-lime water, that had been steeped double the time. *28th:* To take out the particles of lime, it was infused for a night in water acidulated with spirit of nitre. When dried it appeared rather whiter than the cloth of the former experiment, and as much weakened. Renewed the shell-lime water. *Sep. 9th:* When washed with soap and water it appeared whiter, but with a yellowish cast. It was much tenderer than the cloth of the former experiment. *21st:* Exceeding white, though with a yellow cast, *but quite rotten. Nov. 11:* No whiter, but very weak."

This experiment covers a space of three months, and seems to prove clearly that long contact with lime water does rot linen cloth. Runge makes the same statement with regard to cotton cloth dipped in clear lime water and exposed

to sunshine; other experimenters contradict these statements, and though it is now quite certain that lime can be safely used as a bleaching agent, there still remains something to clear up as to its possible destructive action upon cloth. Another experiment in which heat was used is worth quoting; in this case the mixture was kept at "a gentle degree of heat, equal to that of the human body."

"*Ex. 72. Aug. 10th.*—The same quantity of the same cloth was infused in the same quantity of stone-lime water, and that the fire might not soon evaporate the lime two teaspoonfuls of fine slaked lime was added. *14th:* Begins to whiten. *28th:* The cloth not so white as in the last experiment at this time. *Sep. 9th:* This was now the whitest of those stood at the fire, and much more so than the cloth of any of the experiments made without any heat, but is very tender. *21st:* The whitest of the whole, but so tender that it separated with the least force. *Nov. 11th:* The cloth is now so rotten that it has fallen all to pieces in washing it, and can be reduced betwixt the fingers to a powder."

[*To be continued.*]

2. *Programme of Prizes offered by the Industrial Society of Mulhouse for the Year 1877.*

THE following selection from the prize list of the Industrial Society of Mulhouse, will be of interest as shewing what particular points in connection with the arts of Printing, Dyeing, and Bleaching are by this Society considered most worthy of attention; it may form a guide to inventors, indicating what direction may be pursued with a probability of success being followed by reward. The Society gives only medals as prizes, but the inventor, of course, is in no way debarred from seeking the more substantial prizes which a commercially useful result will lead to at the hands of con-

sumers in general. Some of the subjects proposed have only a scientific or theoretical interest, but the majority are for the production of some new or improved material or machine, which, it is believed, would be immediately utilized in the trades.

Medals are offered for :—

(1) The theory of Turkey red dyeing.

(2) The introduction of artificial purpurine into trade.

(3) The preparation of dark madder lakes, red or purple.

(4) An effective substitute for egg albumen, which can be sold at a lower price.

(5) A colourless blood albumen not becoming coloured by steaming.

(6) Substantial improvements in bleaching wool and silk.

(7) A process of bleaching which will remove all sizing matters from grey calico without injury to the fibre, at a moderate cost.

(8) An explanation of the use of resins in calico bleaching.

(9) A marking ink for calico which has to be dyed red, chocolate, and other dark colours, and which shall remain visible after all the operations of dyeing.

(10) An account of the behaviour of different kinds of cotton in bleaching and dyeing.

(11) A material serving to blue woollens, which can resist the action of steaming and light.

(12) A mineral red pigment; a dark mineral green; a dark mineral purple; a pigment chocolate; and shades from pearl-grey to wood colour, which can be printed by roller, with albumen for thickening.

(13) A practical and theoretical account of cochineal carmine.

(14) A transparent green colour, fast to light and soap, bright and deep, and not too expensive to be used for printing.

(15) A method of regenerating real indigo upon cloth from its sulphuric solutions.

(16) The production of a new substance as a substitute for sulphate or extract of indigo.

(17) A substitute for indigo.

(18) A method of fixing aniline colours by printing, better than is done by albumen.

(19) An aniline black, soluble in some fluid which can be used for dyeing, and as fast as the present aniline black.

(20) A steam black, equal in intensity and fastness to aniline black, not weakening the cloth, and which can be printed along with other colours, especially albumen colours, without injury to their shade.

(21) An account of the composition of aniline black.

(22) A scarlet-red colour, which can be applied like the aniline colours, and be as fast; not to cost more than a cochineal red.

(23) The production of practical colours from other alkaloids than aniline, toluidine, or naphthylamine.

(24) Increasing the fastness of the artificial colouring matters.

(25) A safe and practical method of developing aniline black immediately after printing without ageing or steaming, and without injuring the cloth, or acting upon the metals used in printing.

(26) A new colour applicable to printing, which shall develope and fix like aniline black, and which shall be as fast as aniline black.

(27) A metallic alloy or other substance for printing doctors, which shall be as hard and elastic as steel, and not give rise to any chemical action in contact with acid colours, or colours containing certain metallic salts.

(30) An account of what are the proper degrees of moisture and temperature at which the decomposition of mordants is most rapidly and advantageously effected.

(31) A new printing machine of not less than eight colours, presenting advantages over those at present in use.

(32) The introduction into Alsace of iron rollers covered with copper by electricity, and which can be used for printing.

(33) A series of new colours with a metallic basis, unchangeable by the action of air and light, adapted to self grounds not fixed by albumen, and which can resist soaping.

(41) The production of carminic acid by synthesis.

(42) The introduction of artificial archil into dyeing.

(43) The production of vermilion red upon calico.

(44) A blue, similar to ultramarine blue in shade and stability, fixed upon cotton by chemical means, without albumen or similar coagulable thickenings.

(45) The production of pipeclay, natural or artificial, in impalpable powder, and free from hard gritty particles, so that it can be used for roller printing.

(46) An account of all the questions concerning the steaming of printed cottons, woollens, and silks.

(47) The synthesis of pseudopurpurine.

(48) The synthesis of any of the natural colouring matters used in the arts.

(49) A medal of the second class, and a sum of 500 francs for the best memoir upon the products of the action of ferricyanide of potassium in alkaline solution upon the principal organic compounds used in calico printing, such as indigo, purpurine, quercitrine, carmine, cochineal, starch, dextrine, gum, gluten, and albumen.

3. *Upon the Greening of Aniline Black.*

A NOTE upon this subject, by Mr. C. F. Brandt, appears in the last publication to hand of the Industrial Society of Mulhouse,* from which we learn that the greening of aniline black can be prevented by simply dyeing it in a weak solution of aniline violet. A black so treated, he says, does not become green, the whites can be easily cleared by chloring, and if it is desired, the goods can be treated with boiling soap without any injury.

The violet which is absorbed by the black can stand a very severe chloring, which seems to prove that the action is something more than a simple brightening of the black. The

* Bulletin Special, p. 441.

quantity of aniline violet required to produce the desired effect is very small and adds very little to the expense of the colour. The author says he communicated this discovery immediately and without waiting to examine into the reasons of the action. He says that he placed a sample of aniline black thus treated into a solution of sulphurous acid, where it remained for ten minutes without becoming green, while the untreated black became green immediately. Further than this it does not appear that the process has been tested, and it remains to be seen if the violet really does protect the black from the gradual greening influence of air and light; if it is found to do so, it will be a remarkable discovery, wholly unexpected, and at first sight highly improbable. Mr. Brandt observes that the method is only applicable to single colour blacks, but that these are just the kinds most subject to become injured by greening, for in styles containing several colours the effect is less perceptible.

4. *Koechlin Frères Process for Preventing the Greening of Aniline Black.**

[This process was written and deposited in a sealed packet with the Industrial Society of Mulhouse, April 9th, 1876. At the request of the writer, it was opened at the meeting held on the 29th of November, 1876, and the matter deemed of so much importance that its publication was ordered at once without the document being previously submitted, as usual, to the Chemical Committee of the Society.]

ANILINE blacks subjected to the action of acid reducing agents, such as sulphurous acid or sulphuretted hydrogen, whether in aqueous solution or in a state of gas, acquire a greenish hue which is caused by their more or less complete change into emeraldine; this substance which is dark blue in its alkaline state becomes green by the slightest trace of acid.

* Moniteur Scientifique (3), vii., p. 81.

There exists a product in a higher state of oxidation than the ordinary aniline black, and which does not become green by reducing agents whether acid or alkaline ; it is obtained in the following manner:—The aniline black is printed, fixed, and raised in the ordinary manner, then submitted in a beck to an acid oxidation at a temperature higher than 167° F. It is then simply soaped and washed.

Among the oxidizing agents which give the best results we may mention the following:—The salts of the peroxide of iron, chromic acid, certain of the more easily decomposable chlorates, as the chlorate of alumina, etc.

The iron solution is prepared with a salt of the peroxide, to which is added one to one and a half times its weight of concentrated sulphuric acid to prevent the iron fixing on the fibre. This solution is used at the rate of 1 to 2 gallons per 1,000 of water, or it may be 1 or 2 quarts for a dye beck containing 6 to 8 pieces. The goods are kept in half an hour at 176° F.

The persalts of iron are not generally met with in trade. The following preparation may be followed :—

Green sulphate of iron, 20 lb.
Water, 6 to 7 gallons.
Bichromate of potash, 5 lb.
Sulphuric acid at 169°, 15 to 18 lb.

Dissolve the sulphate of iron in the water and add the other ingredients. The above proportion of water must be employed on account of the heating of the mixture by the sulphuric acid and the sparing solubility of the persulphate of iron.

For the black and orange style, chromic acid may be used, taking from 10 oz. to 13 oz. for a beck with 6 or 8 pieces (or the same weight of bichromate of potash and 9 oz. measure of sulphuric acid), operating in the same way as with persulphate of iron. The orange must be raised as usual in alkaline chromate.

For black along with fast blue (indigo) there must be a slight excess of protosulphate of iron in the liquor (chromic acid destroys the blue). In the above receipt take only 4 lb. of bichromate instead of 5 lb. for the blue style.

5. *M. Camille Koechlin upon the Greening of Aniline Black.**

WHEN a new colour makes its appearance, it becomes the vogue, and has its day. Aniline black has had a longer day than any other new colour. The stability and beauty of this colour enabled it to be used in such varied and general styles, that, what was formerly considered as mourning, is now accepted as a fashion. Whether it was from the fact of its being a novelty, or because of the simple but somewhat massive designs in which it was first printed, the fact is, that the trade and the wearers were very indulgent to the weak side of this colour, and it was only when it was begun to be printed in fine and lighter designs imitating woven work that complaints arose from all sides. This black, which up to that time, and contrary to the case of other colours, seemed to be improved by wearing and washing ;—this black which was uninjured by all the processes of the works, and resisted high temperatures, acids, and alkalies ;—this black, under certain influences present in the warehouses,—was found subject to become green. It changed under the influences of sulphurous emanations. Wherever coal was burned or gas lights in use, there it suffered. This change in colour, which is of the same nature as that experienced by roses and violets held over burning sulphur matches, is only a passing change, and not a permanent destruction, such as was found to be the case with murexide purple under the same conditions; the injured black could in most cases be restored by a simple soaping ; but this unfortunate tendency and the disagreeable hue the colour took, made it a serious question as to the continued use of a colour which was very useful in calico printing, unless something could be done to restore the confidence of purchasers. The problem before the chemists was how to prevent this greening.

Chemists knew a receipt which gave a black that would not green. It was that in which copper or vanadium was

* Industriel Alsacien, 11 December, 1876, in Moniteur Scientifique.

replaced by red prussiate or other ferricyanide. This colour was discovered by M. H. Cordillot, and put into use at the works of Schwartz-Huguenin, soon after the original discovery of the black; it required a certain amount of steaming after the ageing. This aniline black did not act upon the doctors, it had a less injurious action upon the fibre than any other black, stood steaming, but was expensive and would not keep; it was carelessly let drop at a time when there was no talk about greening of the black.

There were besides aniline black, lakes made with iron, and aniline greys made by direct fixing in a boiling bath of strong chromate of potash, also the naphthylamine chocolates made by the same process, and which did not shew any sign of change by atmospheric influences. Lastly, the practice followed by some English houses of padding the black in bleaching powder solution, between the ageing and the washing.

The exceptional property of the red prussiate black naturally would suggest the trying of the action of red prussiate upon the common blacks already fixed. In alkaline solution, which acts so powerfully upon many organic matters, the red prussiate acted much the same as bleaching powder; the black became reddish, but was still liable to greening. It was not the same however if the hydroferricyanic acid was used. The reaction then became identical with that of the steamed Prussian black. M. Jeanmaire who proposed this process did not succeed in making it practical on account of the formation of a blue deposit upon the cloth. He tried another ferric compound, the acid nitrate of iron. The end was accomplished, the blacks so treated could not be turned green.

The aniline black developed by simple ageing is therefore in an incomplete state. This fact made clear, nitrate of iron was not only the body which could be used. Other chemists used chromic acid; strong solution of chromates between ageing and washing; the chloro-chlorate of alumina; agents which were useful in cases where the black was combined with catechu, chrome yellow, or madder red.

When this process of Koechlin Frères began to be known, MM. Dupuis and Durand simultaneously added nitrites. These compounds do not require so high a temperature, and have no injurious action upon the other colours which may be in the design. This valuable property induced MM. Durand, and Huguenin of Bâle, to manufacture for sale a substance of their own, the sulph-azotic acid, which had been used by M. Guinon, of the firm of Guinon, Marnas, and Bonet, of Lyons, more than forty years ago for fixing catechu.

In acquiring the power of resistance to greening the black at the same time attains its finest condition, for the maximum of oxidation is the maximum of intensity of colour. It loses the purplish shade which it sometimes had, which may in fact injure the appearance of the black by impoverishing it, unless the colour is sufficiently intense to begin with, or if the fixing agent has not been employed at the proper strength. It is best to add the oxidizing agent by portions at a time, especially if indigo colours enter into the style.

In becoming invulnerable to greening influences, the black does not cease to be still sensitive and to shew other effects of the actions of acids and alkalies. These actions, however, only consist in giving a more or less reddish hue to the black; there is no need to fear any greening.

The processes which MM. Koechlin Brothers have described in their sealed packet, the history of which I have hastily sketched, have been used by them for more than a year. The prints which they sent to the Exhibition will confirm this. In conclusion, these processes do not consist in a receipt for an unchangeable black, but in the fact of rendering all aniline blacks, or blacks from analogous alkaloids, incapable of becoming green.

6. *Experiments upon the Application of Anthraviolet.**

BY M. N. POTIER.

UNDER the name of Anthraviolet, Messrs. Gauhe & Co., manufacturers of artificial alizarine at Barmen and Eitorf, have sent us a new colouring matter derived from anthracene, the most characteristic property of which is to give a violet colour with alumina mordants.

There are two qualities of it in trade, having different shades, the blue anthraviolet and the red anthraviolet. Both are in the state of watery paste, which though only containing 5 per cent. of solid matter are much thicker than alizarine pastes at 10 per cent.; the water obtained from the paste is coloured slightly pink, neutral to test paper and contains no salts. Both qualities have a purplish black colour in the moist state; when dried they constitute a very friable mass of a black chocolate colour, with a yellow reflection.

Upon subliming either quality in a tube, there is condensations of the vapours upon the sides, which appear at first as a violet-coloured liquid, which afterwards solidifies in fine crystals flattened, striated, and transparent when not very thick, and shewing a reddish-chocolate colour. The substance is partially decomposed by heating, after ignition there is nothing left but some light ashes without taste.

Anthraviolet dissolves slowly in water, but only communicates to it a bright red-violet colour; heating facilitates the solution but does not increase the colour. Chloroform, ether, spirits of turpentine, benzine, and especially the fat oils, dissolve it in greater quantity than water, but less than alcohol, the solution in which is very dark and resembles in colour a reddish aniline purple.

With acetic acid a tolerably dark reddish-violet solution

* Bull. de la Soc. Ind. de Rouen, iv., p. 373.

can be made. Concentrated hydrochloric acid and sulphuric acid at 50° Tw. dissolve the anthraviolet with an olive colour, the addition of water precipitates it again in its original state; an excess of water dissolves a portion and acquires a reddish-violet colour. Dry anthraviolet is very soluble in concentrated sulphuric acid, giving a dark green solution, which is precipitated by addition of water.

It is readily dissolved by caustic soda, which becomes coloured of a blue-violet hue, the red variety giving a colour nearly the same as alizarine, while the blue variety gives a still bluer shade than alizarine.

The blue anthraviolet can be separated into different parts by fractional treatment with water and alcohol as solvents; at first there dissolves a small quantity of a fugitive red-violet colouring matter, then the true colouring matter, having a fine violet colour, while a considerable residue is insoluble in alcohol, cold water, and most other solvents except caustic soda; it is slightly soluble in boiling water, and dyes woollen of a clear grey colour, which resists the action of chemical agents; but it does not dye up with alumina mordants and is not fixed by steaming.

By the same treatment the red anthraviolet yields first a dull claret red, then the pure colouring matter without leaving any residue.

Anthraviolet dyes wool easily without the intervention of any mordant; shades from violet to a dark violet-chocolate are obtained. In trying to obtain medium shades upon wool by partially exhausting the dye bath, it was found that the presence of tartaric acid served no useful purpose; this acid only acts favourably when it is desired to obtain dark colours by using an excess of colouring matter. Silk and cotton prepared with albumen are also dyed in the same way, but the colours are neither so dark nor so bright.

Mordants of pure alumina upon cotton give by dyeing reddish violets which with strong mordants have a tendency towards chocolate; weak alumina mordants are very little coloured by dyeing. Iron mordants dye up grey shades of a

rusty hue which have no value. Cotton mordanted with stannic acid and tannin does not dye up.

Anthraviolet dyes printed mordants best when pure water is employed, any trace of lime in the water in the state of bicarbonate is injurious, the same may be said concerning the presence of any organic or mineral matter. Water containing bicarbonate of lime should be accurately neutralized by oxalic or acetic acid, the latter acid is to be preferred because a slight excess is less injurious.

The dyeing takes place slowly; it commences about 140° F. and the bath should be carried on to boiling, at which degree it must be kept a considerable time in order to obtain shades of fair depth. The difficulty with which this substance dyes mordants shews any inequality or defect in the printing or fixing of the mordant in a very marked manner; the whites are much stained, but can be partially cleared by boiling water which also purifies somewhat the dyed colours.

By passing the dyed cloth in acetic acid it is temporarily brightened; but by washing even in distilled water the effect is destroyed. The usual materials and treatments applied for clearing whites and brightening dyed colours are useless; bran, soap, and various styles of chloring destroy the colours, and that very quickly if the temperature is high.

The colouring matter in the mordanted cloth is not displaced by dyeing it up again with alizarine or nitro-alizarine; these colouring matters enter into the mordants which are always very imperfectly saturated with the anthraviolet.

Alumina mordants treated as for Turkey red, dye up violet shades somewhat faster, but of a similar hue to ordinary mordants. For these mordants a slight addition of acetic acid to the dye liquor is found beneficial.

Applied as a steam colour upon calico with alumina mordants the blue anthraviolet gives purples of a slightly reddish hue which remind one of the old soaped madder purple, but they are somewhat brighter; the shade corresponds with the *second blue violet* of Chevreul's first chromatic circle and to the *third blue violet* in the paler shades. The red anthraviolet gives a still redder shade of purple which is of no value.

Gum thickenings, similar to alizarine pink are the most suitable for this color; they give the purest colors but they have scarcely half the intensity of the pinks made with the same weight of dry matter and of mordant.

The best mordant is pure acetate of alumina; the mixtures with nitrate of alumina, nitrate of lime, or acetate of lime do not answer so well. The addition of arsenite of alumina gives a somewhat darker colour, but it is less bright and more reddish. The addition of tin salt does not affect the shade.

Upon wool the same colours give redder shades somewhat faster than upon cotton.

Iron mordants give no better results by steaming than by dyeing; the violets produced are dull, loose, and with a reddish shade.

By using aceto-nitrate of chromium instead of acetate of alumina, a dark grey can be obtained upon cotton which has double the intensity of the violet; by treatment with boiling soap the shade becomes lighter, leaving a purplish grey extremely stable, and resisting the action of acids and alkalies. This colour, especially when made from the blue anthraviolet, seems capable of being profitably employed.

During the steaming of the anthraviolet colours a part of the colouring matter volatilizes the same as with alizarine, but the whites are cleared by washing. A prolonged steaming gives more intensity to dark colours but it is injurious to light colours.

The steam violets should be washed off cold to avoid staining the white; warm water with chalk and other similar additions changes the colour considerably. The chromium grey, however, is not influenced by these operations.

The most remarkable character of anthraviolet purple upon cloth is its indifference to the action of acids; it remains red purple in presence of all the organic acids, and hydrochloric acid at 20° Tw. It requires fuming hydrochloric acid to turn it yellow, and then the colour is restored when water is added; another characteristic reaction is the splendid violet-blue colour which it developes when brought in contact with caustic soda.

The colours yielded by anthraviolet with alumina, whether by dyeing or steaming, are unfortunately very loose; the colour obtained by dyeing oiled cotton which is the most stable of all is far inferior in respect of fastness to the purple from alizarine of the same depth; the anthraviolet colours are destroyed by weak and cold solutions of soap, alkali, or bleaching powder, which scarcely touch alizarine purple; the action of air upon these colours is not so destructive as upon the aniline purples. Although acids do not change the hue, they eventually dissolve both it and the mordant, which are then washed away by water.

Upon wool the colours are about as fast as the aniline purple, but very much inferior in brightness.

These experiments were made under the direction of M. G. Witz, who has been kind enough to examine the principal results.

7. *Nitroalizarin and Amidalizarin.*

IN the December (1876) number of the Journal of the Chemical Society, Mr. W. H. Perkin gives an account of his experiments upon the acetyl and nitro-derivatives of alizarin. The paper is accompanied by a specimen of print dyed with nitroalizarin. The print is a four coloured design printed in black (or chocolate), resist red, purple, and acid, then covered and padded with purple. The red is a bright orange coloured shade, short of depth. The purples are inferior and foxy, and the white is bad. The black, or chocolate appears underdyed. It seems probable that nitroalizarin could yield better colours than those shewn in this illustration.

The amidalizarin is described as giving purple colours with alumina mordants, and with iron a bluish or steel like colour It is possibly the same compound described in the preceding paper in this Journal as anthraviolet. Mr. Perkin does not

say anything about the comparitive stability of the colours yielded by these new materials. It is remarked that in dyeing with nitroalizarin, a small percentage of chalk in the dye bath is very useful. Both these substances dye well without the use of mordants, the nitroalizarin giving a golden yellow, and the amidalizarin giving a good crimson colour.

The methods of obtaining these colouring matters from alizarin appear to be too costly, and the results in dyeing too inferior to permit the hope of them becoming useful commercial products.

*8. M. Michel de Vinant on Dyeing, Printing, and Bleaching.**

WE continue our extracts from the practical treatise of M. Vinant by giving some of his receipts for dyeing dark compound shades from the same standard liquors as given on p. 211, vol. ii. of "The Textile Colourist," the preceding receipts having been for the lighter class of colours.

Catechu Brown, No. 37.

Pad twice in the No. 2 standard; two hours afterwards pass without pressure or nip in No. 3 standard; leave two hours and wash.

Darker Catechu Brown, No. 38.

Pad twice in No. 2 standard; two hours afterwards pass without pressure or nip through No. 4 standard; leave two hours and wash.

Olive Catechu Shade, No. 39.

Pad twice through No. 1 standard; two hours afterwards pass through No. 4 standard; leave two hours and wash.

Dark Yellowish Catechu Brown, No. 40.

Pad in the No. 1 standard; two hours afterwards pass through No. 5 standard; leave for two hours and wash.

* Continued from p. 216, vol. ii.

Dark Grey, No. 41.

1 part No. 2 standard.
1 part No. 7 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours and wash.

Dark Pearl Grey, No. 42.

1 part No. 2 standard.
1 part No. 7 standard.

Pad twice; leave two hours, and pass into No. 2 standard; leave again two hours and wash.

Slate Grey, No. 43.

2 parts No. 8 standard.
1 part No. 1 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours and wash.

Dark Feuille Mort, No. 44.

3 parts No. 9 standard.
1 part No. 2 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours, and wash.

Smoke Grey, No. 45.

1 part No. 2 standard.
1 part No. 12 standard.
1 part No. 10 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours and wash.

Olive Dead Leaf Shade, No. 46.

1 part No. 12 standard.
1 part No. 2 standard.
1 part No. 10 standard.

Pad twice; two hours afterwards pass into No. 3 standard; leave for two hours and wash.

Feuille Mort (Dead Leaf), No. 47.

1 part No. 2 standard.
3 parts No. 10 standard.
1 part No. 12 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours and wash.

Iron Grey, No. 48.

3 parts No. 13 standard.
1 part No. 2 standard.
1 part No. 7 standard.

Pad twice; two hours afterwards pass into No. 3 standard; leave two hours and wash.

Grey Green, No. 49.

3 parts No. 9 standard.
1 part No. 12 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours and wash.

Yellow Olive, No. 50.

Pad in the No. 2 standard; two hours afterwards pass into No. 4 standard; leave two hours and wash.

Dark Grey, No. 51.

4 parts No. 13 standard.
1 part No. 12 standard.

Pad twice; two hours afterwards pass into No. 4 standard; leave two hours and wash. By first passing into acetate of iron and rinsing, then passing into Grey, No. 51, and again into No. 4 standard, and by using some logwood, iron liquor, and fat in the finishing starch, a fine black may be obtained.

Turkey Red Dyeing.—We transcribe the process for Turkey red as given by M. Vinant that it may be compared with the various other processes for the same colour which have lately appeared in this Journal. It does not appear from anything said by our author that he had a practical acquaintance with this branch of dyeing, neither does he say how or from where the process was obtained, it must, therefore, be taken simply for what it may be worth.

The goods to be dyed are only once boiled off in alkali to cleanse them. The drugs for 100 lb. of colour are:—

40 lb. oil in winter and 35 lb. in summer.
12 lb. potash in winter and 10 lb. in summer.
7 lb. gall nuts.
20 lb. alum.
200 lb. madder, and for each,
3¼ lb. sumach.

Say for a weight of cloth equal to 250 lb. there are required

100 lb. of oil.
100 lb. potash solution at 25° (B?).

The oil is used at twice; for the first oiling 60 lb., and for the second 40 lb. In the first oiling there is employed 48 lb. of cow dung, which is placed in a vat and mixed with hot water, to which is added 6 lb. of of the potash solution.

Twenty-four hours afterwards, when the dung is well mixed up or diffused in the liquor, it is passed through a sieve in order to mix it with the oil. The oil being added, when it is well mixed and throws up a strong scum the whole is sieved.

The first time 60 lb. of the potash is employed, and for the second time 40 lb. The solution is put into a bath and mixed with warm water until at 10° B.; both the potash and the oil should be at the same temperature of about 70° F. When the oil is ready, warm water is added and the whole mixed up with a besom for a quarter of an hour. Then the potash is added, taking care to keep back 6 lb. to see if there is enough of liquor.

2½ lb. cotton takes up 5 lb. of the oil bath, and consequently 50 lb. cotton will take up 100 lb. The goods receive two oil baths and eight weak (clair) baths, that is in all ten baths. They are each time dried in the cool air, or what is better, exposed on the field; finally they are hung up in stoves hot and dry, and exposed for an hour to a temperature of 122° F.

The treatment is the same for all the ten operations. The weak baths (clair) above consist of warm water at 70° F. At first the oil baths are used and then the weak baths, which gradually become charged with matter until they may mark more than 8° B., then some warm solution of potash should be added, but at 8° B. the weak baths are in a good state. The pieces are placed in a vat containing warm water and are trodden down piece by piece by a couple of operatives and left to steep twelve hours. They are then squeezed and passed again singly into warm water, afterwards washed in

the wheels for five minutes, rinsed in running water, squeezed again, and dried cool, afterwards placed in a stove heated to 86° F. for an hour.

Galling.—The galls are boiled with water for half an hour and then sieved and made up into a sufficient quantity of solution for the pieces. The 250 lb. of calico would require 200 lb. of the liquor, or 11½ lb. of gall and 300 lb. of water. The excess of the gall liquor expressed is preserved to use up with the sumach liquor. The galled pieces are hung up in the air to dry, and then in a warm room at 86° F. The pieces are twice galled.

The excess of gall liquor is boiled with the sumach for an hour, the pieces passing again, dried cool, and stoved at 86° F.

Aluming.—Clean out the same pan and fill with pure water, taking about 20 gallons for the 250 lb. calico; heat to boiling and add 30 lb. of pure alum, stir until quite dissolved and neutralize by adding 4 lb. of the potash at 25° B., put the alum liquor into the vat; the solution should mark 8° B. The goods are twice padded in it and dried the same as after galling and remain three days, and are then passed into water at 86° F. containing 3 lb. of ground chalk. The pieces are given five ends in the chalky water, the bath being freshened up with ½ lb. of ground chalk for every 25 lb. cloth. As much as 150 lb. of cloth may be passed in this manner, after which the liquor should be run off. The pieces are then well washed.

Dyeing.—For dyeing take the quantity of madder and sumach given, and for 50 lb. calico about 4 lb. of ox blood. Dye up in two hours and a half to the boiling point, and boil for one hour, making in all three and a half hours in the dyeing.

First Brightening.—For the same quantity of calico take 3 lb. soap, 2½ lb. potash, and about 2½ oz. of tin crystals. Put the soap and the potash in the boiler, dissolve the tin crystals in warm water and neutralize with a little of the potash at 25° B., or until it ceases to effervesce. The pieces are boiled for five hours and then well washed.

Second Brightening.—Take again 3 lb. soap and ½ lb.

potash and dissolve in hot water; and dissolve also 4 oz. of tin crystals in 4 lb. warm water; neutralize by adding potash at 25° until effervescence has ceased.

This quantity is for 75 lb. calico, which is again boiled for five hours, washed well, and the goods spread upon the grass. In winter, instead of grassing the goods are chlored.

For chrome yellow discharge the lightest pieces are selected; for blocking other colours in, the darkest pieces are taken.

The pans used for boiling with soap hold each 25 pieces about 30 to 33 yards long. They should be packed by an experienced workman so that they may be open and not in ropes. The pans are capable of being firmly closed and provided with a valve; they are worked at 248° F.

The writer remarks that as fastness of colour is now a secondary consideration in Turkey reds, and brightness the principal aim, madder is replaced by garancine, 1 lb. of the latter being used instead of 2½ lb. of the former. At the time of the publication of this book artificial alizarine had scarcely got into use for dyeing. For garancine the quantity of soap and other materials for the brightening is only half that required for madder.

It is very important in washing Turkey reds that they should not be roughly handled or beaten. The quality of the oil employed is important, inferior colours being frequently caused by the use of adulterated oil.

As a finish for Turkey red cloth the following may be used:—

1 gallon water.
3½ lb. gum.
2½ lb. olive oil.

Mix well up and dilute with water according to the amount of finish required to be put on.

Dyeing of Moleskin.—We conclude this part of M. Vinant's work by giving some of his receipts for dyeing moleskins and other heavy kinds of cotton goods chiefly intended for trouserings. The shades are of the brown, grey, or mixed class, and are often dyed upon cloth which has been printed with some

simple design in black, or the cloth may be printed after dyeing. The black mostly used is a common steam black, but aniline black is preferable on account of its fastness. These trouserings are much used by the labouring classes in summer on the continent.

Standards for Moleskin Dyeing.

No. 1 Standard.—50 gallons water—1¼ lb. sulphate of copper—40 lbs. brown catechu. Boil for half an hour; use the clear, which should be at 8° Tw.

No. 2 Standard.—100 gallons of warm water—5 lb. bichromate of potash.

No. 3 Standard.—20 gallons warm water—3 lb. acetate of lead. This standard should be freshened up with ½ lb. of acetate of lead for each piece passed through.

No. 4 Standard.—20 gallons water at 120° F.—6 lb. sulphate of iron—1½ lb. sulphate of copper.

No. 5, or Logwood Standard.—10 gallons of water—5 lb. logwood. Boil together for four hours; use the clear.

No. 6 Standard.—Sapan wood liquor at 14° Tw.

No. 7 Standard.—Berry liquor at 14° Tw.

No. 8, or Tragacanth Standard.—10 gallons hot water—5 lb. of tragacanth in powder. Leave together four or five days.

No. 9 Standard.—5 gallons of water—dissolve 2 lb. alum in powder—8 lb. iron liquor at 20° Tw.

No. 10 Standard.—15 gallons water—dissolve 2 lb. alum—when cold add 8 lb. iron liquor at 20° Tw.

No. 11 Standard.—10 gallons water—dissolve 2 lb. alum—when cold add 8 lb. iron liquor at 20°.

No. 12 Standard.—2 gallons water—dissolve 1 lb. sulphate of iron. Use the clear liquor.

No. 1 Shade.

8 gallons boiling water.
6 lb. catechu standard No. 1.
1 lb. No. 5 standard at 14° Tw.
1 lb. No. 10 standard at 4° Tw.

Pass through three times; two hours afterwards pass through No. 3 standard; leave one hour and wash.

No. 2 Shade.

14 gallons boiling water.
12 lb. No. 5 standard at 8° Tw.
2 lb. No. 5 standard at 14° Tw.
2 lb. No. 10 standard at 7° Tw.

Pass through three times; leave two hours and pass through No. 3 standard; wash.

No. 3 Shade.

20 gallons No. 1 standard.
30 gallons boiling water.
5 lb. No. 10 standard at 5° Tw.
5 lb. No. 5 standard at 3½° Tw.

Pass through three times; then pass throngh No. 3 standard; wash for five minutes.

No. 4 Shade.

48 gallons No. 1 standard at 8° Tw.
20 gallons boiling water.
4 lb. No. 9 standard at 22° Tw.
3 lb. No. 5 standard at 14° Tw.
2 lb. No. 10 standard at 7° Tw.

Pass through three times; then through No. 3 standard and wash.

No. 5 Shade.

8 gallons No. 1 standard.
10 gallons boiling water.
2 lb. No. 9 standard at 5° Tw.
2 lb. No. 5 standard at 3½° Tw.
2 lb. No. 10 standard at 1½° Tw.

It is not necessary to further multiply examples of the mixtures of the standards by which an expert workman can produce a great number of shades.

9. *Upon Silk Printing.**

THE bleaching having been accomplished by treating the goods with hot solution of soap and then sulphuring, the next process is the preparation.

* Abridged from the work of M. D. Kœppelin upon this subject.

Preparation or Mordanting.—This operation has for its end the combining of certain metallic elements with the silk, which have the property of developing the colouring matters of the dyewoods used in the colours. The salts of tin are now admitted as possessing this property in the highest degree; they give also more brightness to Prussian blues and it is a combination of the ferrocyanides of iron with those of tin which produce royal blues or French blues.

Mordanting with alumina salts for steam colours is at this day entirely abandoned, and we speak only of the tin salts.

In a wooden vat, capable of holding 70 to 80 gallons, dissolve

25 lb. cream of tartar.
7½ lb. of bichloride of tin.

Raise the temperature of the whole to between 120° and 140° F. by means of a leaden steam pipe ; copper steam piping must be avoided for it causes the production of black stains upon the stuff which cannot be removed. About 300 foulards at a time can be placed in this solution in which they must be regularly moved about by means of a wince for the space of an hour ; they are then drained upon a stillage placed higher than the vat; afterwards washed and evenly dried upon steam drums, which is preferable to hanging them up to dry, since in the latter way it is difficult to avoid creases forming in the goods. Goods dried by hanging require to be ironed with a hot iron before printing to take out the creases.

As many as 15,000 to 20,000 foulards may be mordanted in the same vat, but it must be strengthened or freshened up for every 300 fresh foulards with say

2 lb. of cream of tartar,
1¼ to 1½ lb. of bichloride of tin,

keeping up the quantity of water to the original level.

This preparing liquor should mark from 4° to 5° Tw., and must throughout be kept up to this strength by adding salts in the proportions indicated more or less as may be required, but not departing from the relative quantities of tartar and tin solution.

Upon the proper management of this preparation depends in a great degree the success of the after processes.

When the foulards are to have a white ground or a light coloured ground, the preparation should be done cold, *i.e.*, at about 60° to 70° F. In this case the foulards are simply immersed in the tin and tartar solution for four or five hours, moving them now and then so as to ensure an equal degree of contact with the liquor.

For goods which are to have dark blue and dark green grounds, and also browns and blacks, the temperature of the preparation must be raised to 140°. By employing this higher temperature more tin is fixed upon the stuff, and the colours are obtained fuller and brighter. Those foulards which are intended for fine and fancy designs and which must have a perfectly white ground are not mordanted at all before printing.

It sometimes happens after the mordanting bath has been in use for a time, that it becomes turbid and deposits oxide of tin; in this case the clear liquor must be drawn off, and the vat well cleaned out, for it is an indispensable point to have the liquor quite clear and transparent.

Printing.—The process of printing by block, does not call for much explanation, as it is carried on in nearly the same manner as in printing calico or woollens. It is the practice in some places to use a piece of calico between the silk and the table blanket which travels on with the printed piece, in others the blanket is covered by a piece of waxed or waterproof cloth so that the colours pressed through the silk may not soil the blanket. The calico piece, though more costly, gives the best results, and is especially to be preferred when the printing room is in a low or damp place, as it is more effectual in preventing the colours running when they do not dry quickly enough, and also the possibility of "marking off."

In printing a design of several colours by block, the printer first puts on the black or brown, which serves for boundage; next the dark green, red, the dark purple, the dark wood colours, and the light blue; that is, all the dark colours, the light blue being an exception, it being printed before the

dark. Afterwards the simpler bright colours are printed, then the paler colours, such as pink, violet, green, light wood shades; then the dark blue. The ground colour is put on last.

To obtain a full colour in the grounds and the stronger parts of the design, the black is applied twice in those places.

With regard to the sieve cloths used to furnish colour to the blocks, experience dictates the following treatment: those in use for light shades should be washed every two days; those serving for orange made from Persian berries, as well as those for royal blue, should be washed every day. The sieve cloths in use for red and black should never be washed. These colours are better and fuller when furnished by a cloth which has been in use for a considerable time, and is well saturated with colour. When it is necessary to replace the old cloths, the new ones should be well saturated with colour, and not put into use until they have been soaked with it for two days. The same precaution should be observed with regard to the sieve cloths for browns, dark purples, and dark greens; they should not be washed more than once a month, and should be prepared for use two days before they are wanted.

The tables for printing silk warps for producing chené silks, are from 13 to 16 yards long, and provided with combs or reeds and rollers, to keep the warp in a proper position, and all the threads as much as possible in the same state of tension. This printing requires peculiar care and skill to secure good results, as also the subsequent operations of fixing the colours and drying the warps, for as it is known these go back to the weaver, who then puts in the weft. The effect produced by the weft threads partly hiding the coloured warp, is to shew the design with a peculiar broken, softened, and altogether novel aspect. When it is intended to weave in transverse stripes of satin or velvet in the silk, spaces are reserved for that purpose before printing, and very rich effects may be so obtained.

In machine printing, whether by plate, Perrotine, or ordinary roller, the same colours are used as with block, with

slight changes, care must be taken that the drying apparatus is kept at a much lower temperature than for other goods, in fact if the silk is heated beyond 90° F. the acids and acid salts which are present in the colours injure the tissue. The greatest care, therefore, must be bestowed upon this point, but still the colours must be dried rapidly enough to prevent any chance of them running; the printer must attend closely to the drying of the goods.

Lithographic printing, in one or several colours, is somewhat extensively employed on silk handkerchiefs. The colours employed would appear to be of the pigment class, and fixed by oil or varnish.

Fixing or Steaming.—The steaming is effected either by suspending the goods in a box or vat into which steam is admitted, or else by the system known as the column or tins. The first method may be varied and adapted to any of the known methods or construction of steaming houses or cottages. The plan much used abroad consists essentially in a wooden vat, square or circular, set with its opening upwards, steam is admitted at the bottom, and goods fixed on a frame are lowered into it by rope and pulley, the opening is closed, and the requisite amount of pressure got up; the usual precautions must be taken to prevent wetting by drops of water or condensation of steam upon the fabric itself. The pressure of steam in general is one atmosphere, excepting for red and orange grounds, when it ought not to exceed a quarter of an atmosphere.

Foulards with scarlet, orange, and royal blue grounds are steamed twice, being rehooked upon the frame and reversed; fresh greys are employed each time. The first steaming lasts fifteen minutes and the second twenty minutes.

All other styles of whatever colours are steamed at one operation, allowing them to remain forty-five minutes in the steam.

The steaming by column or tin cylinder is not so certain and regular in its results, and should not be adopted if the means of open steaming are available.

Washing.—The pieces should be first immersed in running

water and left until the thickening of the colours is well softened, and then gently rinsed until all the loose or unfixed colour has been detached and carried away by the stream; a light beating in a machine, or wincing, is sometimes necessary to get the cloth quite clean. An end of the piece being wrung in the hand should not yield any colour after the washing.

The excess of water is expelled by the hydro-extractor, and the pieces are then dried either over the drying tins or by hanging up in a warm room.

Blueing.—The parts not printed upon, and which should be white, are always found to be somewhat tinged by the operations of steaming and washing, it is necessary, therefore, to remedy this defect as far as possible, and for that purpose the pieces are passed full width in a box fitted up with rollers, through water mixed with solutions of ammoniacal cochineal and sulphate of indigo. Sufficient of these two colours is added to give a fine purple colour to the water, but the actual quantity necessary has to be regulated according to the particular circumstances, and can only be learned by experience. A sample of the proper white wanted is kept at hand in a moist state and compared with the goods from time to time, and the strength of the blueing liquid altered as may be required to produce the proper tinge.

Finishing.—The foulards are impregnated either by hand with a sponge or by a padding machine, with a mucilage of gum tragacanth (1½ lb. gum to 6 gallons of water), to which is added a minute proportion of bichloride of tin to communicate a crisp feel to the silk.

The damp pieces are then rapidly dried by passing over heated metal cylinders, and subjected to pressure in a hydraulic press as follows:—They are folded with glazed pasteboard in such a way that a piece of cardboard is between each fold of silk; at the tenth piece of cardboard a plate of cast iron, previously heated to a considerable temperature, is introduced, and the piling continued in that way until the mass is about 5 feet high; the whole is then submitted to hydraulic pressure for ten hours with such a force that the heap is reduced to two-thirds of its original height.

For silk to be dyed in madder the bichloride of tin must not be added, and the metallic drying cylinder is covered with fine calico to protect the red colour from injury by too sharp a heat.

Styles with dark grounds, or those dyed in blue, should have a thinner solution of gum tragacanth than others, because it covers and takes away from the beauty of the colours. For such styles a finishing fluid is used which contains but little or no tragacanth, made with rice water, to which a some fish glue or isinglass may be added.

Madder-dyed silks are best finished or dryed upon a frame; to effect this they are taken in the wet state and hooked upon a framework long enough for a piece of 7 foulards, the piece then dries perfectly even and brilliant. This method is preferable to that of hot drying, because it does not dull the madder colours, and gives the silk more elasticity and softness.

Mordants and various preparations :—

Acetate of Alumina, at 10° Tw.

Alum, 70 lb.
Water, 20 gallons.
Acetate of lead, 60 lb.

Put the alum, well broken up, into a wooden tub which can hold 30 gallons, then pour upon it the 20 gallons of water at a boiling heat, stir up with a wooden spade until it is dissolved, and add the acetate of lead, keep stirring for half an hour, so as to secure thorough decomposition of the salts.

[*To be continued.*]

NEW BOOK.

A Treatise upon Washing Machines employed in Bleaching and Calico Printing, by Jos. Dépierre.

[Sur les machines a laver employées dans le blanchiment, etc. Rouen : J. Lecerf, imprimeur, 1876.]

THIS little work of 84 pp. letterpress and 23 pp. of lithographic illustrations, has come to hand too late for a detailed

notice in the current number of this Journal. The author's name will be known to our readers as an active member of the Industrial Society of Rouen and a contributor to the Journal of that Society. We find that this treatise has been "couronné" with a gold medal of 500 francs value, by the Industrial and Commercial Society of the Seine-Inferieur, and upon glancing at the illustrations, we see that the author has treated of all the principal washing machines, old and new. Next month we shall give a more detailed notice of the book.

10. Abridgments of Complete Specifications of Patents Recently Published.

A.D. 1867, February 17th.—No. 670.

FIRTH, JOSEPH. "Improved Apparatus for use in Dyeing Fabrics Indigo Blue."

"This invention relates to dyeing fabrics indigo blue, and it consists in an apparatus for passing the fabrics through the indigo vat.

"By means of the apparatus of my invention a perfect evenness of color is ensured, and one or several pieces may be passed through the vat at once at a uniform speed, regulated according to the weight and substance of the goods and the condition of the vat. Moreover by my invention the damage or deterioration to which the goods are liable by the method now practiced is entirely avoided.

"The apparatus is portable so as to be readily transferred from one vat to another; it is adapted to carry on the operation of woading (*i.e.*, dyeing fabrics blue preparatory to being dyed black) during the process of dyeing indigo blue as hereafter described.

"The apparatus consists of one or more sets of cylinders disposed horizontally in two tiers at the upper and lower

parts of a suitable frame which stands in the vat. The upper tier is some inches beneath the surface of the liquor in the vat, and the lower tier is at such a distance from the bottom of the vat as to leave sufficient space for the sediment deposited in the vat during the fermentation of the indigo. The upper tier of cylinders is driven by worm and spur gearing from a main shaft provided with cones for changing the speed of the cylinders. The goods are carried through the vat in a zig-zag direction, passing round a cylinder of the upper and lower tiers alternately, and finally through a pair of squeezing rolls, by which the surplus liquor is expressed and returned to the vat. When the apparatus comprises two or more sets, each set consists of a large and small cylinder, the large being in, say, the upper tier, and the smaller ones in the lower tier, the cylinders of the next set being reversed (that is to say, the small ones being in the upper tier and the larger ones in the lower tier, and placed directly beneath those of the preceding set, so that the fabric carried by the one set will zig-zag parallel or nearly so with the fabric carried by the other set, and so on for a greater number of pieces by means of additional sets of cylinders of suitable diameter similarly disposed.

"The lower tier of cylinders are carried by a frame or rails made vertically adjustable by a rack and pinion gear, or otherwise, in order to regulate the height of the lower tier in the vat and the distance from the upper tier, and to enable the lower tier to be raised bodily out of the way when it is necessary to stir the vat.

"The cylinders are constructed to carry goods one piece at a time, of any weight, and of full width (say 72 inches wide), without folding; or two pieces of goods of half that width may be passed through at once side by side upon the same cylinders, or goods of 14 oz. to the yard and under may be passed through in two or more plys or thicknesses at once upon the same cylinders, instead of each piece passing round a separate set of cylinders, thereby doubling the quantity of goods dyed.

"The operation of woading is carried on independently of the dyeing, the fabric being carried through the upper portion

of the vat in the space between the upper tier of cylinders and the surface of the liquor by means of cylinders suitably disposed."

There are two drawings to illustrate this apparatus, the first of which we reproduce, and which is described by the specification as follows :—

"The figure represents a longitudinal section of the apparatus provided with a single set of cylinders; it is shown as fitted in the indigo vat A. The apparatus is constructed with an upper and a lower frame to carry the two tiers of cylinders. The upper frame consists of two side frames B braced together by suitable cross bars, and in which the upper tier of cylinders is mounted. The lower frame C consists merely of two loose rails, one at either side, connected to the upper frame B at each side of the apparatus by a rack rod D geared with a pinion E, and guided by a flanged roller F mounted on frame B. The pinions E are both fixed on a cross shaft G mounted in the frame B, so as to be operated simultaneously by means of a winch handle on shaft G to raise or lower the frame C in the vat, the frame C sliding up and down in vertical guides H fixed to the sides or ends of the vat A. The apparatus is supported in the vat by the ends of the frames B resting on the edge of the vat or on bearers fixed therein, as shown or otherwise. I is the upper tier of cylinders, and I^1 the lower tier, mounted in bearings in the frames B and C respectively. In this arrangement the cylinders I^1 may or may not be of the same diameter as the cylinders I. The journal of each of the cylinders I is prolonged through the frame B at one end only, and on it is keyed a gear wheel L represented by the dotted circles, the wheels L of all the cylinders being geared together by intermediate gear wheels M mounted on pivots or studs fixed to one of the side frames B. The cylinders I are driven from the main shaft N by a worm O gearing with a worm wheel U cast in one with or fixed to the gear wheel P, which in turn gears with another wheel Q gearing with the wheels L of two of the cylinders, as shown, the wheels P and Q being also mounted on studs fixed to side frame B. It will however be understood that

this gearing may be varied if greater power is required to drive the rolls S. The shaft N is mounted in uprights rising from the same side frame B, and is driven from an overhead shaft by a belt running on cones for varying the speed at which the cylinders are driven. R, R, represents the fabric passing through the vat, two pieces at a time, over the same cylinders. The fabric or fabrics first pass over a roller or rail at the edge of the vat, and then round a cylinder of the upper and lower tier alternately, as shown, and finally between a pair of squeezing rolls S, S, of which the lower one is driven from the wheel P by gear wheels at one end, as shown, and the upper one is mounted in vertically sliding bearings, and is pressed down on the lower one by weights or springs in order to express the excess of dye liquor and return it to the vat. The two rolls S are geared together at the opposite end to that at which the lower roll is driven, by gear wheels (not shown) having long teeth to admit of the rising movement of the upper roll. The fabrics pass from the rolls S to a folding frame T of any suitable or known construction which may be driven by a connecting rod from the upper roll S; W represents a piece of goods being woaded (or dyed blue previous to being dyed black). It is carried by rollers V mounted in frames B above the upper tier of cylinders I, and just beneath the surface of the liquor in the vat, being kept separate from the other goods until it arrives at the squeezing rolls S, through which it passes with the other goods, and may or may not be folded separately by the folding frame T. The fabric W is drawn through the vat by the rotation of the squeezing rolls S, S.

"The entire apparatus which it will be seen is complete in itself may be conveniently raised out of the vat and transferred to another by means of a tackle attached to a carriage running on rails overhead.

"The frames I prefer to construct of wood or iron, and the cylinders may be constructed of the same material or of zinc, copper, tin, or brass, and may be made hollow. The cylinders are of sufficient length to carry the full width of the fabric without folding, and they are covered with a coarsely woven

cotton fabric or other fabric of open texture which will not receive the die.

"By the employment of my Invention the fabric is caused to receive the dye better and more quickly than under the present system, and absolute uniformity of colour is ensured.

"The speed at which the fabric to be dyed is carried through the vat may vary from 1 to 10 yards per minute according to the shade desired and the substance of the fabric. The gearing by which the upper tier of cylinders (other than the two end ones nearest the squeezing rolls) are driven the one from the other might be omitted with certain kinds of fabrics."

A.D. 1876, March 18th.—No. 1174.

MATHER, WILLIAM. "Improvements in Apparatus for Steaming and Ageing Printed Fabrics." This invention relates to certain improvements in the apparatus for which letters patent were granted to William Mather, in conjunction with Honoré François Adolphe Cordillot, on the 9th day of February, 1875, Number 479.*

"In the specification of the said patent, three heated rollers are shewn in a closed chamber which is heated by steam, and the fabrics, after passing around the said rollers, are deposited in a waggon, which, after remaining a certain time in the closed steaming chamber, is removed. I have found that by increasing the number of the heated rollers the waggons may be dispensed with and the same result obtained in a much shorter time."

The complete specification is accompanied by two sheets of drawings; we have given a copy of the first sheet, which suffices to give an idea of the improvements and general nature of the apparatus.

"The Fig. is a longitudinal sectional elevation of my improved apparatus for steaming and ageing printed fabrics; *a*, *a*, is a closed steaming chamber made of brick or other suitable material, and *b* is a steam jacket forming the roof thereof. The sides and ends of the jacket are supported on balls to allow for expansion and contraction, and there are flanges all round which dip into troughs to form a water

* See Textile Colourist, vol. i., pp. 50, 106.

joint. *d* is a perforated pipe placed near the floor of the steaming chamber *a*, and this pipe is supplied with moist steam from the steam saturator *p*; this saturator is similar to that described in the specification of the patent before referred to. The steam from the boiler is supplied to the saturator by the pipes *o*, the lower arm of which is perforated, and the moist steam is conveyed to the pipe *d* by the pipes *q*. The steam entering the chamber *a* is simply a vapour without pressure, having only to supply moisture to the fabrics; the heat is supplied by the steam chest *b*, and heated rollers *j*, *j*, which are made by preference of copper, corresponding to the rollers *j*, in the patent before referred to. These heated rollers are driven by a strap or band from the countershaft *c*, which strap or band gives motion to a pulley on the shaft *f*. The rollers *j* are all connected together by intermediate wheels, as shewn by dotted lines in Fig. 1, or they are driven in any other convenient manner. Immediately below the heated rollers *j*, *j*, are the rollers *e*, *e*, and beyond the rollers *j* are the rollers *m*, which are driven by a band from a pulley on the shaft *f*. Between the rollers *m* are the small rollers m^1, and below them are the rollers m^2. Above the perforated pipe *d* are the rollers d^1; all the rollers *e*, *m*, m^1, m^2, and d^1 are made, by preference, of sheet copper, and the ends are left open for the circulation of the steam.

"At each end of the chamber is a steam-tight door, and at the sides are windows, to gain access to the chamber and to examine the progress of the work. The printed fabric is fed into the steaming chamber *a*, between the heated tube, with side flanges i^1, and the roller *h*, then under the steam chest *i*, and then under the guide roller *s*, from whence it passes over the rollers s^1, s^2, s^3, and s^4, placed under the steam chest *b*, from the roller s^4, the fabric descends to the first roller d^1, near the floor of the chamber, it then rises over the first roller *e*, and again descends to the second roller d^1, and so proceeds until it is taken around the first heated roller *j*, from whence it proceeds as shewn by the lines and arrows until it has passed over or under all the heated and other rollers in the chamber *a*, or as many of them as may be required, after

which the fabric, being sufficiently steamed and aged, is conveyed out of the chamber through the aperture at which it entered, and is then taken over the draw roller *t*, and is laid in folds by an ordinary plaiter as shewn at *u*, or it is otherwise disposed of.

"The action of the heated rollers is to partially dry and heat the printed fabric passing around them. The fabric on leaving one roller is thus prepared to absorb the steam in the chamber before it reaches the next heated roller, where the same drying and heating action takes place; and these operations are repeated as many times as may be required to fix the colours on the fabrics.

"The operation of this apparatus being continuous effects a great saving of time, and produces better results than can be obtained by any other means; it also economises steam and labour. It is evident that the degree of moisture and the temperature can be regulated according to the fabric under operation.

"Having thus stated the nature of my invention, and described a convenient mode of performing the same, I wish it to be understood that I do not intend to limit to the number or the arrangement of the heated and other rollers employed, as the same may be considerably varied or modified according to the quality or class of fabrics to be operated upon.

"I claim steaming and ageing printed fabrics by the alternate application of heat and moisture, as described; and

"I also claim the improved arrangement of the heated and other rollers in a closed steaming chamber, whereby the processes of steaming and ageing printed fabrics are performed continuously, as shewn and described."

A.D. 1876, April 3rd.—No. 1422.

KEIGHLEY, EDWARD, "Improved Means or Apparatus for Singeing Woven Fabrics and other Fibrous Substances."

This patent was not proceeded with, having received provisional protection only. As will be seen by the provisional specification given here in full, it is for making singe plates of platinum, a metal which, from its infusiblity and not being

liable to oxidation, would seem suitable for such a purpose; but apart from its great cost, the experience of chemists both in the laboratory and on manufacturing establishments, shews that it is liable to be easily corroded and injured by various chemical substances, and that in the state of thin sheets it is by no means that durable and resistant body which it might be supposed to be from the description given of it in elementary works upon chemistry.

"My improved apparatus consists chiefly of a platinum singe plate instead of an iron or copper plate as heretofore employed. This plate will on account of the expense of platinum be made considerably thinner than the ordinary plates, and to secure uniform heat I propose to make use of a bed of clay or rock salt, which when heated transmits the heat readily to the platinum plate.

"Instead of heating the plate by gas or other flame or fire I may use electricity for the purpose.

"The material to be singed passes over rollers fixed to a frame, and capable of being raised and lowered with great nicety by means of a suitable arrangement of racks and screws, and a brush or other equivalent is employed for raising the fibres before passing over the singe plate.

"Hitherto after the process of singeing it has been customary to wind the pieces upon a roller, and in this process they are sometimes scorched. To obviate this I cause the pieces to pass over a series of perforated cylinders through which a current of cold air is forced, whereby the pieces are cooled."

A.D. 1876, April 20th.—No. 1654.

MORGAN-BROWN, WILLIAM. "Improvements in the Manufacture of Ornamental Textile Fabrics." A communication from Samuel Barlow, of Lawrence, Massachusetts.

We give the specification of this patent without abridgement.

"The invention of improvements in the manufacture of ornamental textile fabrics relates to an improvement in the art of manufacturing ornamental textile fabrics, and consists in a novel method of producing a figured fabric wherein the portions which it is desired to have stained or printed are

composed of vegetable fibre or threads, as of cotton, and the portions which it is desired to have unstained or unprinted are composed of animal fibres or threads, as of wool; the fabric woven of fibres and threads so selected being printed after weaving with aniline black, the color, mixture, staining, or printing the vegetable threads of fibre, and leaving the animal threads or fibre after cleansing without stain and unprinted.

"Warps prior to being woven have been dyed or printed with other colors than aniline black, and such parti-colored warps (and in some instances parti-colored wefts) have been woven into fabrics to variegate the ground of the fabrics; but by this process the printing of the warps in the skein and the spooling, two expensive steps, are obviated.

"The cloth to be treated according to this invention must be so woven that the threads in which it is desired to fix the black color or dye are of vegetable fibre, and the threads which are to remain unstained by the same black color or dye are of animal fibre. Of this character, for instance, are certain classes of dress goods, delaines, worsteds, &c., composed of cotton warp and ordinary woollen or worsted filling. Such cloth after weaving is made ready for printing in the usual manner, and is then printed with a color mixture suitable for developing aniline black in cotton fabrics no care being taken to keep the color mixture from the woollen portions of the fabric; and in order to imitate more fully the effect of printing the cotton threads before weaving it is found advantageous to print both sides of the cloth.

"After printing the cloth receives the proper treatment for developing aniline black in cotton fabrics; but the woollen portions resist the fixation of this color to such a degree as to remain unstained by it after being cleansed by the operations of washing and raising.

"This fabric may preferably be woven on a jacquard or fancy loom adapted to produce ornamental figures raised usually by the woollen weft on the ground of plain woven threads of cotton and wool, and the woven fabric so prepared will after being printed and cleansed, as above described, present orna-

mental woven designs or effects in wool fibres standing out in relief on a printed or stained ground work of cotton fibre or threads ; but it is obvious that the fabric of threads of animal and vegetable fibre may be woven plain or tweeled in any usual way.

"Delaines or worsteds so made and printed may afterwards be dyed with colors which fix themselves in both woollen and cotton fibres without obscuring or obliterating the previously printed aniline black, and in this manner the beauty of the cloth may be still further enhanced.

"Instead of using aniline black, as above set forth, other and similar effects in black may be produced on the fabric herein described by means of color mixtures, substantially different from that for producing aniline black, but possessing the property when printed indiscriminately on the mixed fabric of becoming fixed in the cotton, and of being cleared almost if not wholly from the wool by subsequent cleansing operations. The color mixture in this second or modified process will contain as the basis of the color to be produced either the coloring matter derived from logwood or from other dyestuff, of which tannic acid or gallic acid or gallotannic acid is a constituent, such as nut galls, catechu, sumac, quercitron bark, etc., and with such coloring matter there must be combined a metallic salt to develop and fix the color upon the cotton, as herein-after more specifically designated.

"The black colors suitable for this purpose are known among calico printers as 'iron black' and 'chrome black.' The usual ingredients of the color mixing for producing 'iron black' upon cotton are logwood liquor and acetate of iron combined in well-known proportions, and mixed with suitable thickening. After printing this upon the fabric it should be aged for about three nights to allow the proper development of the color. The usual ingredients of the color mixture for producing 'chrome black' upon cotton are logwood liquor (to which may also be added some bark liquor) acetate of chromium, chlorate of potash, and thickening, and this after being printed upon the fabric should be steamed for some fifty minutes to develop the color. Other salts of iron, such

as the sulphate, muriate, or nitrate may be substituted for the acetate in making 'iron black' and other salts of chromium, such as the sulphate, may be substituted for the acetate. In making 'chrome black' gall liquor may also be substituted for logwood liquor in each instance by using it 50 per cent. stronger than the latter.

"By varying the proportions of the ingredients already specified, and by adding to the formula a salt of alumina, such as the acetate or the sulphate, as well as by substituting salts of copper, such as acetate or sulphate, for the salts of iron or chromium mentioned various shades of color, comprising browns, chocolates, and drabs, may be produced in well-known modes. Thus chocolate brown may be produced from a color mixture containing, in addition to the ingredients specified for 'chrome black,' a suitable proportion of acetate of alumina. Chrome brown may be produced by substituting catechu solution for logwood liquor in the color mixture for chocolate brown, and the shade of color may be still further changed by the substitution of acetate of copper for acetate of chromium.

"Other variations may be obtained by employing in the same color mixture two or more of the coloring matters or dyestuffs, already referred to, all of which are familiar to the calico printer.

"The fabric, after printing and ageing or steaming as may be required in order to properly develop and fix the color in the cotton, is then washed and raised in the usual manner, whereby so much of the color mixture as was printed on the wool is almost if not completely removed.

"Subsequent dyeing with colors of light shade that take equally in wool and cotton improves the appearance of the fabric, and obscures or obliterates on the wool any traces of printed color that may have adhered thereto."

A.D. 1876, May 2nd.—No. 1851.

SIMPSON, RICHARD, BROOKE, ARTHUR, and ROYLE, THOMAS. "Improvements in the Preparation of Alizarine and other analogous Coloring Matters made from Anthracene."

"This invention has for its object improvements in the preparation of alizarine, and other analogous coloring matters made from anthracene. Such coloring matters, viz., purple alizarine, blue alizarine, red or scarlet alizarine or anthrapurpurine, are at the present time sent into the market in a wet or pasty state, and heretofore all attempts to use them in a dry state have been unsuccessful, in consequence of the difficulty which is experienced after the color has been dried of diffusing it in the dyebath, so that the coloring matter may be taken up by the mordant on the fabric immersed in the bath. These difficulties we have overcome, and we are able to produce such colors in the form of a powder, which can be put directly into the dyebath, and is then without any special manipulation at once ready for use.

"We proceed as follows:—We take 20 parts of hydrate of lime, and mix it with sufficient water to form a paste; we then add 800 parts of the coloring matter in the pasty form, the paste containing 10 per cent. of color, or we use a corresponding quantity of a paste of another percentage; we well mix the whole, and then place the mixture in a drying room, or otherwise dry it at a temperature not exceeding 212° F. When sufficiently dry we pass the compound through a sieve, and it then forms a powder ready for use, as already explained; or a similar result may be obtained from the 'soda melt,' as it is called, where in the process of manufacture of the coloring matter the coloring principle is obtained in solution in soda. If lime water be added to the soda melt in the proportion of 100 parts of lime water to 5 parts of the soda melt (alizarate or anthrapurpurate of soda) a precipitate is obtained, which we collect in a filter, and dry as already described.

"The precipitate when dry forms a powder suitable for the dyebath. This powder does not differ from that obtained by the means first described, which means are the more convenient.

"We claim the preparation of alizarine and other analogous coloring matters made from anthracine in the form of a dry powder by means of lime, substantially as described."

A.D. 1876, May 15th.—No. 2048.

FROST, JOE and WALMSLEY, JOHN. "Improved Means or Methods of Obtaining Two or more Colours on Piled Fabrics, or on Material Intended for such Fabrics, with a view to Imitate the Skins of Animals or Produce Designs thereon, such Means being also applicable to Produce Different Effects on Natural Skins or Furs."

"This invention relates to means and methods of printing and dyeing piled or other fabrics composed of vegetable or animal fibres, and manufactured in such a manner as to imitate animal skins or furs, certain parts of our process being capable of application to the material of which such fabrics are composed in the raw or unmanufactured state. Our invention is also equally applicable for treating natural skins or furs.

"The object of the invention, as applied to imitation skins, is to produce gradations of shade or tint, spreckled or spotted effects, and particularly to produce tops or tips of a different colour or shade from the roots or body of the pile, which occurs in nearly all natural skins or furs.

"As applied to natural skins or furs our object is to operate upon the commoner or plainer kinds, so as to imitate the more ornamental.

"Our invention consists in using metallic compounds instead of vegetable colouring matters, as at present in use, such metallic compounds being at the same time capable of conversion into coloured compounds, either dark, light, or white, on the fabric or fibre, by means of suitable reagents, such as the sulphides or sulphydrates, oxides or hydrated oxides of metals, and other coloured salts of metals.

"The operation is as follows, and is equally applicable to natural or imitation furs or skins.

"In order to produce a coloured ground to the pile we first impregnate the same with a soluble salt of lead, such as the acetate or nitrate, such impregnation being effected either by immersion in a solution, as in dyeing, or by the process known as 'padding.' The salt may be applied to the entire piece, or in a partial manner only when a pattern or design is required.

"The salt of lead may then be converted into a sulphide by

exposure to a high temperature, such as that of steam, when the sulphur naturally existing in the fibres will unite with the lead; or the salt or lead may be converted into a sulphide by using the sulphides of soda, ammonia, potassium, sulphuretted hydrogen, or other well known compounds capable of forming sulphides with the above-mentioned salts of lead.

"To produce the light or white tops or tips we apply such acids as oxalic, tartaric, citric, hydrochloric, nitric, sulphuric, or other acids sufficiently strong to either wholly or partially convert or decompose the sulphides into a white or light coloured compound, and then dissolve or 'wash off' the same from the fabrics or fibres, either in hot or cold water, according to the solubility of the compound. The acids when applied are first thickened with a suitable thickening substance, such as are commonly used in printing fabrics or fibres. The strength of acid used in this case must depend upon the shade of 'top' or 'tip' required, a weak one by only partially decomposing the sulphide produces only a light shade, whilst a strong one produces a perfectly white 'tip.' The acid may be applied so as to produce a variety of patterns, either perfectly white, spreckled, grey, or mingled.

"In some cases we may use two or more metallic compounds mixed together, whose sulphides, oxides, or hydrated oxides are of different colours; such for instance, as the sulphide of lead, hydrated oxide of iron, or ferrocyanide of iron, by the use of which, in different proportions acted on by the reagents abovementioned, we are enabled to produce various shades or tones of colour.

"In addition to the metallic colouring process vegetable dyes such as madder, logwood, catechu, and other tannins, may be used for imparting shades or tones of colour unattainable by the use of metallic compounds alone.

"In order to fix the lead more particularly to the vegetable fibres, before proceeding to form the sulphide, it will be found advantageous at times to pass the fibres or fabrics through a bath of dilute sulphuric acid.

"It will be readily seen that raw fibres may be impregnated with the salt of lead, and by mixing such fibres with others

which do not contain lead, and working them up together, various results may be obtained.

"Having thus described the nature of our invention, and the manner of performing the same, we would have it understood that we do not confine ourselves to the use of the particular chemical compounds above described, as others of similar nature may be used with varying degrees of success, such as the compounds of salts of copper, tin, silver, or any other metal where the sulphides form staple compounds and capable of being converted into light coloured or white compounds, either soluble or insoluble, by treating with suitable reagents or chemical compounds, but what we claim as our invention is,—

"Firstly. The use of the metallic compounds instead of vegetable colouring matter, as and for the purposes herein described.

"Secondly. The use of metallic compounds in combination with vegetable colouring matters, as herein described."

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11. British and Foreign Patents, from the Commissioners of Patents Journal, Oct. 27th to Dec. 19th, 1876, inclusive.

Singing, Ageing, Steaming, Rollers, Engraving.

4223. James Percival Cross, of Halliwell, near Bolton, in the county of Lancaster, for an invention of "Improvements in the method of and apparatus for singeing fabrics."—Dated 1st November, 1876.—Provisional protection has been granted,

4321. Samuel Knowles, of Tottington Mills, near Bury, in the county of Lancaster, Calico Printer, for an invention of "Improvements in conditioning and ageing printed fabrics, and in apparatus employed therein."—Dated 8th November, 1876.—Provisional protection has been granted, and notice to proceed given.

4466. William Eli Sudlow, of Oldham, in the county of Lancaster,

Engineer, for an invention of "Improvements in machinery, or apparatus for steaming and setting textile fabrics."—Dated 18th November, 1876.—Provisional protection has been granted.

3569. HENRY WILDE, of Manchester, in the county of Lancaster, Engineer, for an invention of "Improvements in the manufacture of metal rollers for printing calico, and for other purposes."—Dated 12th September, 1876.—This patent has passed the great seal.

4729. DAVID FULTON, of the Duke Street Engraving Works, Glasgow, in the county of Lanark, North Britain, for an invention of "Improvements in machinery for engraving printing rollers." Dated 7th December, 1876.

Bleaching and Analogous Treatments of Fibres.

2529. JOSEPH JULIUS SACHS, of Canada Government Building, King Street, Westminster, in the county of Middlesex, Manufacturer, for an invention of "Improvements in bleaching and preparing for dyeing or printing cotton, wool, hemp, flax, jute, and other fibrous materials."—Dated 19th June, 1876.—This patent has passed the great seal.

3843. JOSEPH JULUS SACHS, of New Barns, Barrow-in-Furness, in the county of Lancaster, Manufacturer and Chemist, has given notice to proceed in respect of the invention of "An improved apparatus for use in treating animal and vegetable substances in order to facilitate the impregnation or the exhaustion thereof of aeriform or other fluid."

4601. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, for an invention of "An improved process of softening, cleansing, and decolourizing fibres and fabrics."—A communication to him from abroad by William Maynard, of New York city, United States of America.—Dated 28th November, 1876.—Provisional protection has been granted.

4654. JOHN SWINTON BUTLER, of Percy Street, in the county of Middlesex, for an invention of "An improved process for treating vegetable fibres."—Dated, 1st December, 1876.

3777. EDWARD CHARLES THEODORE BLAKE, of Brixton, in the county of Surrey, for an invention of "Improvements in treating, steeping, and bleaching jute and like vegetable fibrous materials." Dated 20th November, 1873.—This patent has become void.

40,565. F. V. KALLAB, for "Bleaching animal textile fibres."—Dated 2nd October, 1876.—Belgian patent.

Printing and Dyeing Processes and Apparatus.

2048. JOE FROST, of Huddersfield, in the county of York, Chemist, and JOHN WALMSLEY, of Mirfield, in the same county, Printer, for an invention of "Improved means or methods of obtaining two or more colours on piled fabrics or on material intended for such fabrics with a view to imitate the skins of animals or produce designs thereon, such means being also applicable to produce different effects on natural skins or furs."—Dated 15th May, 1876.—This patent has passed the great seal.

2630. CHARLES THOMAS KINGZETT, of Shaftesbury Terrace, Warwick Road, Kensington, Chemist, and MAXIMILIAN ZINGLER, of Buckland Terrace, Belsize Park, Gentleman, both in the county of Middlesex, for an invention of "Improvements in the preparation of blood albumen, and the application of the same for purposes of dyeing and printing on textile and other fabrics with colours, also applicable to sizing and enamelling wood, glass, and metals."—Dated 26th June, 1876. — This patent has passed the great seal.

2661. RICARD DIXON, of 79, Redcliffe Gardens, Kensington, in the county of Middlesex, Fur Merchant, has given notice to proceed in respect of the invention of "Improvements in the manufacture, dressing, dyeing, and colouring of furs, skins, and animal and vegetable fibres of all kinds."

3731. JOHN BRYSON ORR, of Glasgow, in the county of Lanark, North Britain, for an invention of "Improvements in the treatment of textile fabrics, printed or dyed with aniline black, in order to prevent what is known as 'greening.'"—Dated 25th September, 1876.—This patent has passed the great seal.

4185. WILLIAM CROYSDALE, of Leeds, in the county of York, for an invention of "Improvements in the means or apparatus employed in dyeing wool in indigo vats."—Dated 28th October, 1876.—Provisional protection has been granted.

4340. CHARLES DREYFUS, of the Clayton Aniline Company, Limited, Manchester, in the County of Lancaster, Chemist, for an invention of "Improvements in dyeing and printing."—Dated 9th November, 1876.—Provisional protection has been granted.

4582. JOSEPH FOSTER, of Preston, in the county of Lancaster, for an invention of "Improvements in web printing machines."—

Dated 27th November, 1876.—Notice to proceed has been given.

4625. JOHN ROGERS ASHWELL, of New Basford, in the county of Nottingham, Bleacher, for an invention of "An improvement in the process of dyeing hosiery goods."—Dated 29th November, 1876.

4696. GEORGE RYDILL, of Pontefract Villa, Highgate, London, for an invention of "Improvements in dyeing dark shades of piece goods, woollen waste, hair, and rags a light fast yellow or fawn colour, dyeing fast aniline blue and other colours, utilizing the waste products for treating sewage and manure."—Dated 5th December, 1876.

3407. THOMAS HOLLIDAY, CHARLES HOLLIDAY, and EDGAR HOLLIDAY, all of Huddersfield, in the county of York, Manufacturing Chemists, for an invention of "Improvements in means or apparatus to facilitate the dyeing of fabrics, and thread or yarns, by the use of indigo and certain hydrosulphites."—Dated 21st October, 1873.—This patent has become void.

3408. THOMAS HOLLIDAY, CHARLES HOLLIDAY, and EDGAR HOLLIDAY, all of Huddersfield, in the county of York, Manufacturing Chemists, for an invention of "Improvements in means or apparatus to facilitate the dyeing of wool, hair, or other fibre, by the use of indigo and certain hydrosulphites."—Dated, 21st October, 1873.—This patent has become void.

4043. DAN DAWSON, of Milnes Bridge, in the county of York, Aniline Manufacturer, and CLAYTON SLATER, of Barnoldswick, in the county aforesaid, Cotton Spinner and Manufacturer, for an invention of "Improvements in dyeing and in apparatus connected therewith."—Dated 8th December, 1873.—The £50 stamp duty has been paid upon this patent.

113,817. ROBERT, sen., of Puteaux, for "A dyeing process."—Dated 18th July, 1876.—French patent.

114,261. DABERT, for "A machine for printing or dyeing woollen or other filamentous substances by sections, for obtaining mixed or clouded threads by Vigoureux' process."—Dated 23rd August, 1876.—French patent.

Colouring Matters.

2534. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, for an invention of "An

improved black dye."—A communication to him from abroad by Charles Rave, of Paris, France.—Dated 19th June, 1876.—This patent has passed the great seal.

4655. JOHN SWINTON BUTLER, of Percy Street, in the county of Middlesex, for an invention of "Improvements in the preparation of aniline dyes."—Dated 1st December, 1876.—Provisional protection has been granted.

4839. CHARLES GIRARD, EDMOND WILLM, and GUSTAVE BOUCHARDAT, all of Paris, in the republic of France, for an invention of improved processes for obtaining colouring matters or of processes for obtaining novel colouring matters."—Dated 14th December, 1876.

3446. THOMAS DENTITH, of Manchester, in the county of Lancaster, Manufacturing Chemist, for an invention of "Improvements in producing or preparing indigo blue dye."—Dated 23rd October, 1873.—This patent has become void.

15. E. CROISSANT and L. M. F. BRETONNIERE, of Paris, for "A process for converting mould, saw-dust, wheaten bran, and other organic substances into useful colouring matters."—Two years.—Dated 17th October, 1876.—(Original patent, 18th October, 1873).—Prussian patent.

81. B. THÜRINGER, of Györszemere, for "Improvements in obtaining indigo from native plants."—Six years.—(Secret).—Dated 20th June, 1875.—Austrian patent.

40,770. R. SIMPSON, A. BROOKE, and T. ROYLE, for "Improvements in preparing alizarine and other colouring substances obtained from anthracene."—Dated 3rd November, 1876.—Belgian patent.

40,811. C. GIRARD, for "Manufacturing new colouring substances."—Dated 9th November, 1876.—Belgian patent.

Yarn, Skeins, Hanks.

3089. SYDNEY ELLIS, of The Newarke, in the town and county of Leicester, for an invention of "Improvements in machinery or arrangements for washing, dyeing, and sizing yarn or thread in the hank."—Dated 2nd August, 1876.—This patent has passed the great seal.

3853. PATRICK COMYN MACGREGOR, of Paisley, in the county of Renfrew, North Britain, Dyer, for an invention of "Improve-

ments in treating, scouring, and dyeing woollen and worsted yarns, and in apparatus therefor."—Dated 26th November, 1873. —The £50 stamp duty has been paid upon this patent.

3993. JAMES MALLISON, of Sharples, near Bolton, in the county of Lancaster, Yarn Agent, for an invention of "Improvements in the process of bleaching, mordanting, and dyeing yarn."—Dated 4th December, 1873.—The £50 stamp duty has been paid upon this patent.

114,375. LOMBARD-GERIN, for "A methodical and continuous apparatus for drying textile substances in skeins."—Dated 31st August, 1876.—French patent.

Treatments of Wool and Silk.

2505. EDWARD GRIFFITH BREWER, of Chancery Lane, London, for an invention of "Improvements in bleaching and purifying wool."—A communication to him from abroad by Messrs. Daudier, père et fils, of Paris, France.—Dated 16th June, 1876. —This patent has passed the great seal.

2916. EDWIN POWLEY ALEXANDER, of 14, Southampton Buildings, in the county of Middlesex, Consulting Engineer and Patent Agent, for an invention of "Improvements in the treatment of woollen and silk fabrics and other goods composed of animal products with a view to the removal of any vegetable substances contained therein; also in the apparatus or means employed therefor."—A communication to him from abroad by Daniel Michel, of Paris, in the republic of France, Woollen Waste Manufacturer.—Dated 17th July, 1876.—This patent has passed the great seal.

4228. JAMES HENRY ROGERS, of Bowbridge, Stroud, in the county of Gloucester, Dyer, for an invention of "An improvement in the process of cleansing woollen cloths preparatory to the dyeing of the same."—Dated 1st November, 1876.—Provisional protection has been granted, and notice to proceed given.

4580. EDWIN POWLEY ALEXANDER, of 14, Southampton Buildings, in the county of Middlesex, Consulting Engineer and Patent Agent, for an invention of "Improvements in apparatus or means to be employed in the treatment of woollen, silk, and mixed fabrics or goods with a view to the destruction of any vegetable fibres or substances contained therein."—A communication to him from abroad by Daniel Michel, of Paris, in republic of France.—Dated 27th November, 1876.

4107. Frederick Moore, of Trowbridge, in the county of Wilts, Dyer, for an invention of "Improved apparatus for washing wool."—Dated 13th December, 1873.—The £50 stamp duty has been paid upon this patent.

4157. John Oldroyd and Mark Oldroyd, the younger, of the firm of Mark Oldroyd and Sons, of Dewsbury, in the county of York, Woollen Manufacturers, and Joshua Woodcock, Dyer, and James Coulter, Engineer and Machinist, both of Dewsbury, aforesaid, for an invention of "Improvements in machinery or apparatus employed in dyeing, bleaching, scouring, and waterproofing woollen or other woven or felted fabrics."—Dated 18th December, 1873.—The £50 stamp duty has been paid upon this patent.

Finishing Operations.

4598. Frederick Cooper, of Limefield, near Bury, in the county of Lancaster, for an invention of "Improvements in the construction of apparatus employed for finishing velvets and velveteens and other similar piled fabrics."—Dated 28th November, 1876.—Provisional protection has been granted.

4710. James Barnes, Slasher, William Crossland, Overlooker, and William Westley, Mechanic, all of Preston, in the county of Lancaster, for an invention of "Improvements in machinery or apparatus for sizing and drying yarn and fabrics."—Dated 5th December, 1876.

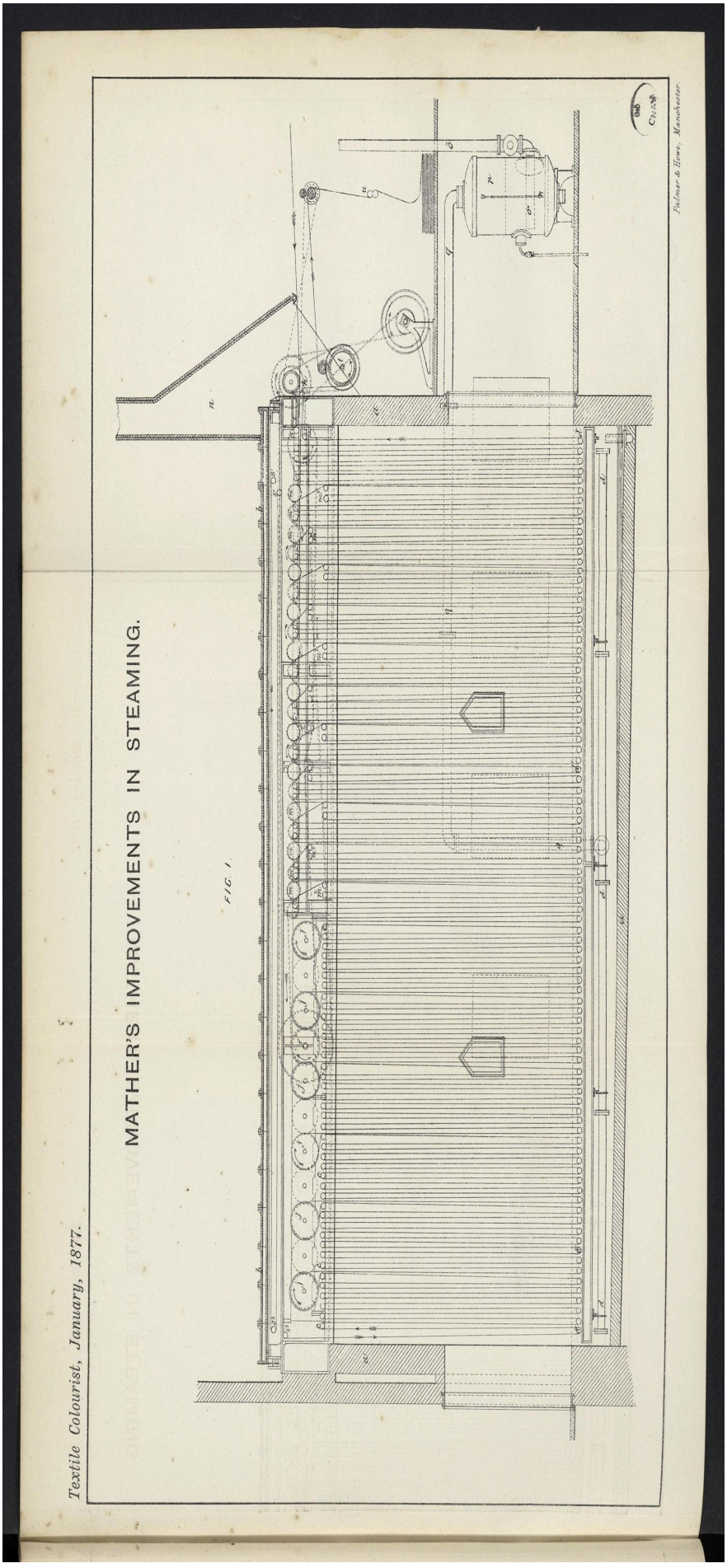
4756. Robert Wilson, of the Bridgewater Foundry, Patricroft, in the county of Lancaster, Engineer, for an invention of "An improved mode of finishing cotton fabrics."—Dated 8th December, 1876.

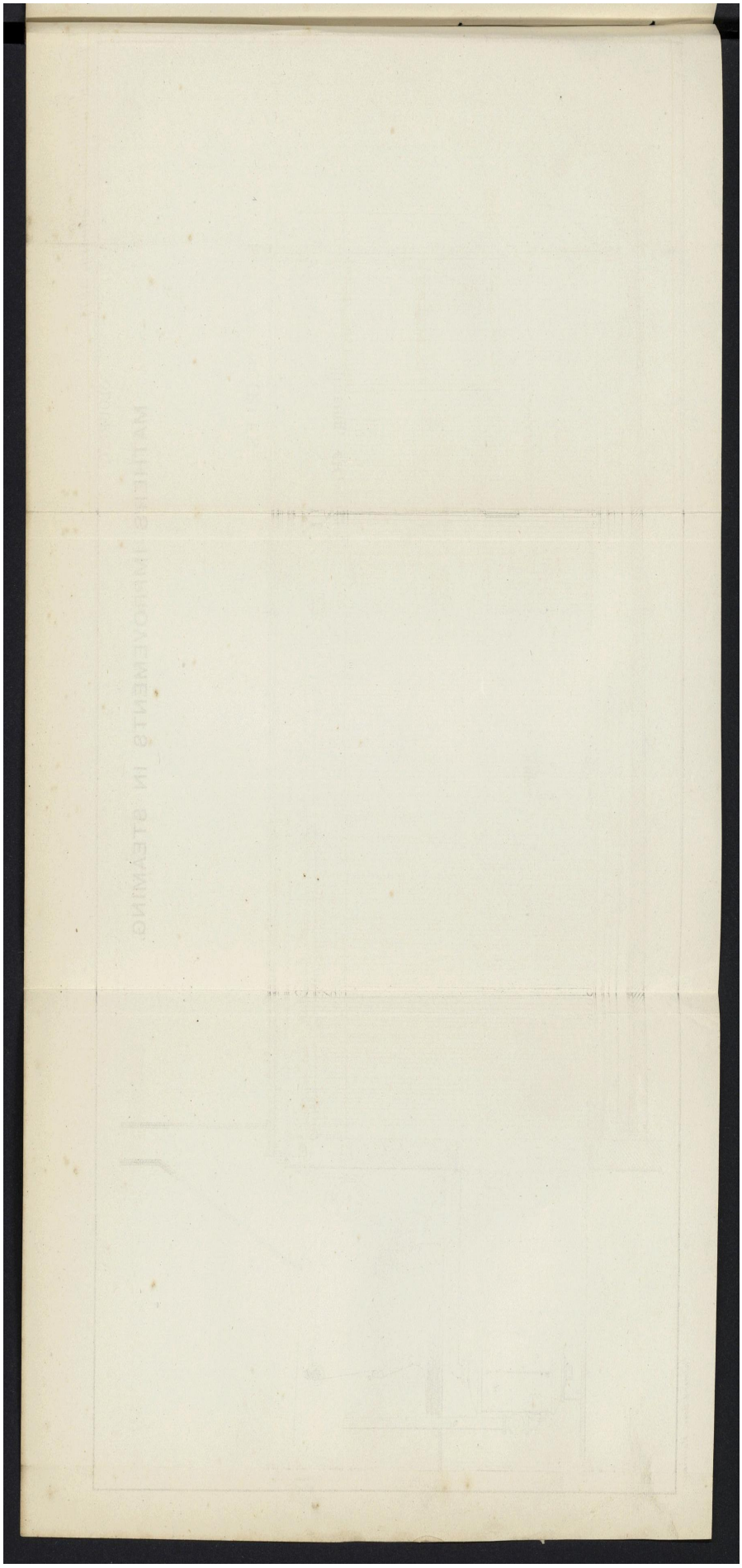
3969. James Worrall, of Manchester, in the county of Lancaster, Dyer, for an invention of "Improved machinery for finishing cut-pile fabrics."—Dated 3rd December, 1873.—The £50 stamp duty has been paid upon this patent.

40,502. C. Spineaux, of Liége, a patent of improvement for "A perpetual mechanical calendar."—Dated 23rd September, 1876.—(Original patent, 17th, June, 1876).

113,813. Nussey and Leachman, for "Improvements in machines or apparatus for dressing woven fabrics."—Dated 18th July, 1876.—(English patent, 21st January, 1876).

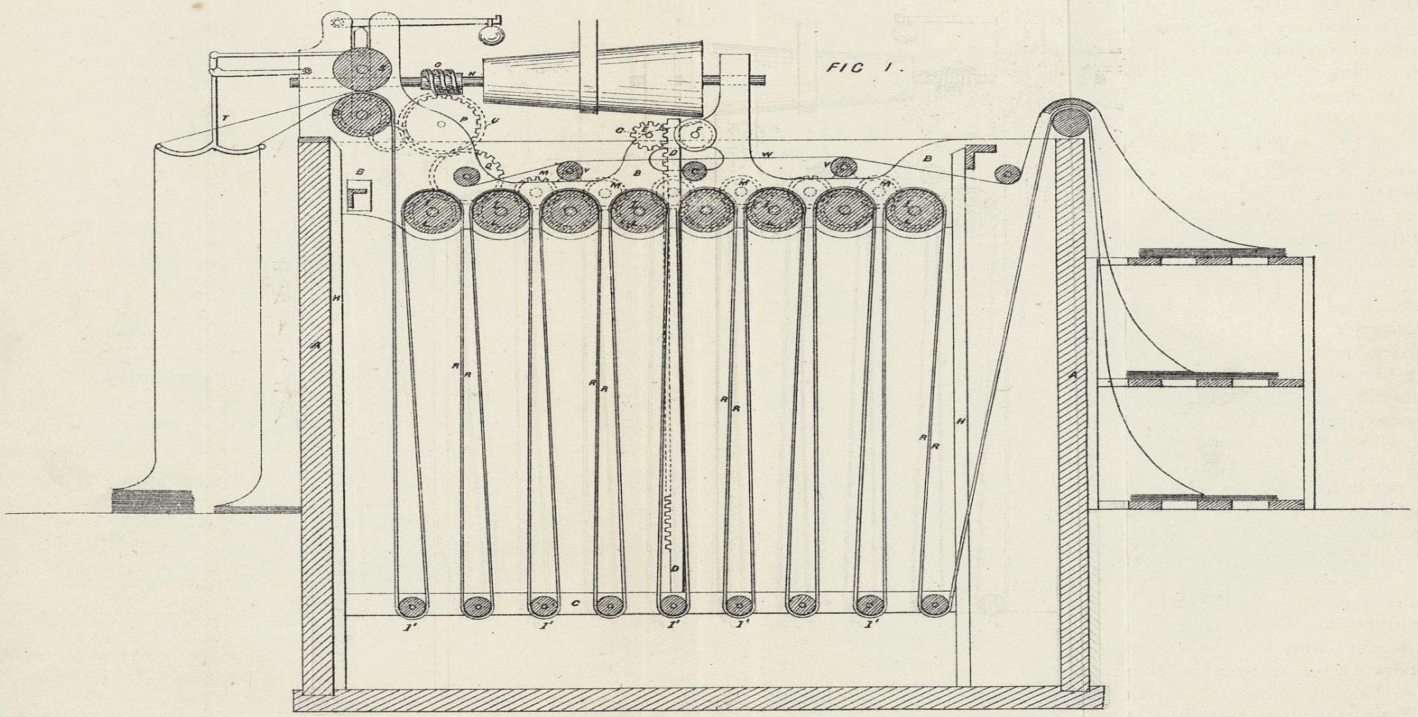
113,950. Pierron and Dehaître, for "A machine for smoothing silk and other fabrics after dyeing,"—Dated 27th July, 1876.



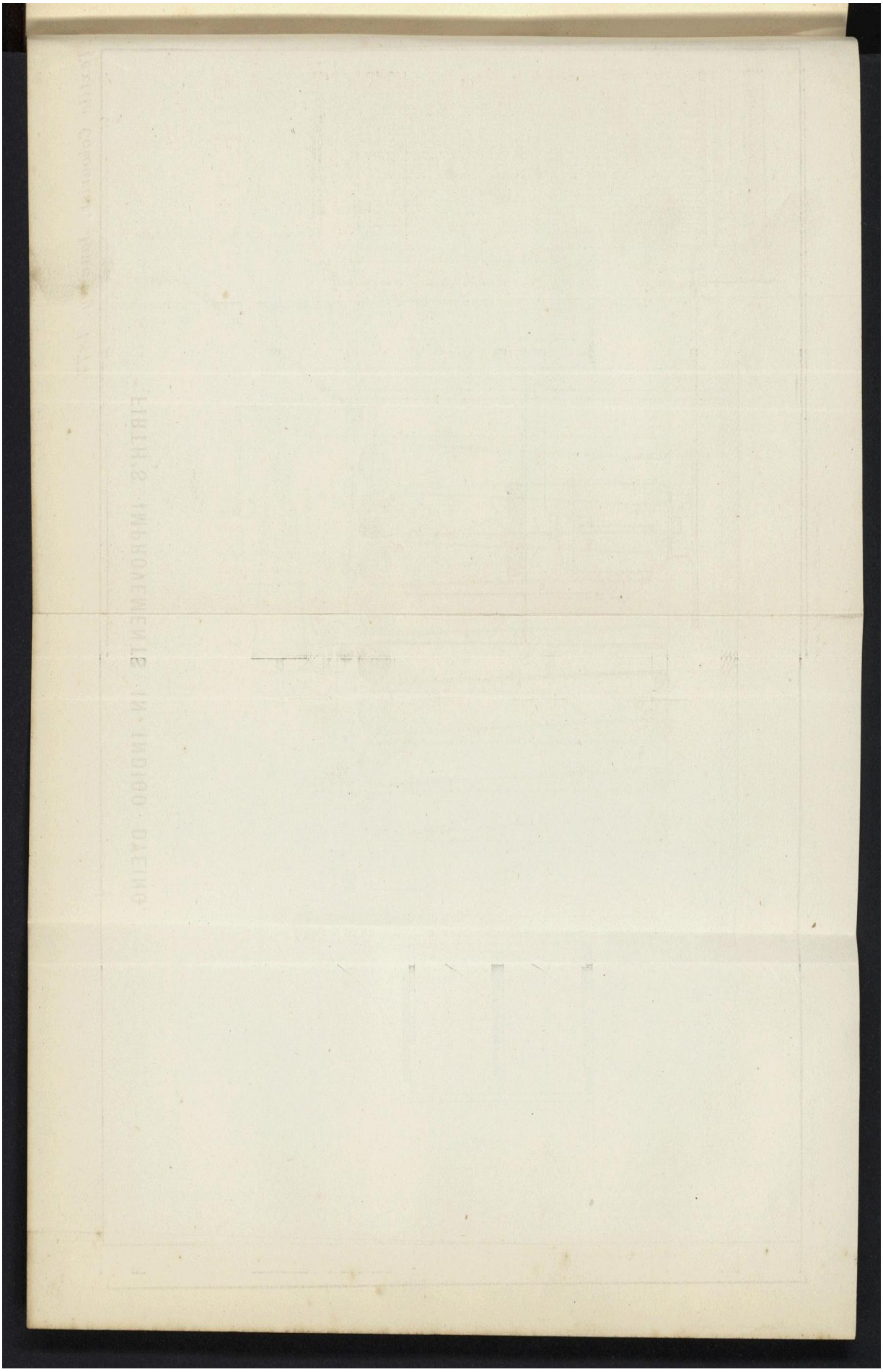


FIRTH'S IMPROVEMENTS IN INDIGO DYEING.

FIG 1.



Palmer & Howe, Manchester.



THE TEXTILE COLOURIST.

No. 14.] FEBRUARY, 1877. [Vol. III.

1. *Materials for a History of Textile Colouring, No. 5.**

WE continue our notice of Dr. Home's "Experiments on Bleaching." After recounting with much interesting detail eighty-five experiments upon the action of the various chemicals used by bleachers on linen cloth, he sets himself to draw conclusions from them. The chemist of this day, who has the advantage of more than a hundred years over our author, can detect in his candid and honest reports of many experiments, fallacies which completely vitiate them; in others, the results are evidently incorrect, owing to some oversight which cannot be discovered from the text. Dr. Home was fully aware of the difficulties which lay in his way when experimenting upon materials which had never before been subjected to the same kind of research, and speaks with great fairness and modesty of his work. Before drawing the conclusions he was led to, he says:—

"I have, in these experiments, related the facts as they appeared to me, and not the conclusions which may be drawn from them. Experiments, and the reasonings on them, ought, in my opinion, always to be kept separated, that every one may have it in his power to judge, whether the latter naturally and justly arise from the former. Let us now see what aphorisms or corollaries may be fairly drawn from the foregoing experiments. I could wish more of these had

* Continued from p. 14, vol. iii.

been made, that those might have been established with a greater degree of certainty. I endeavoured to supply their number by their accuracy; for these experiments were all repeated a second time. The first accounts of all arts and sciences have ever been imperfect; that will be excuse sufficient for what failings are met with here. But let it be remembered, that these first rude attempts have pushed on and helped others to bring their arts to greater perfection."

Then follow twenty-one corollaries or aphorisms, as the author calls them. The only ones which call for notice are those which concern the action of lime unmixed with any other agent upon linen. It will be remembered that in the Experiments 61 and 72, Dr. Home found that lime water rotted the cloth; in the Corollaries 6 and 7, he concludes that "stone-lime water," that is, lime water made from common lime obtained by burning limestone, on account of it extracting more matter out of the cloth than the ashes in ordinary use, is "sufficient to deter any person from using this material by itself;" and further, that lime water made from calcined oyster shells is much stronger than common lime water, and on this account whitens linen much more quickly, and should be looked upon as the "most dangerous material for bleaching that is yet known." But he is puzzled to know how it is that when lime is joined to the alkalies its destructive power is weakened, for he says that the common caustic is made by joining lime and alkaline salts together, and that as far as animal bodies are concerned there is no more corroding substance. Yet he has no doubt of the goodness of the experiments, which, in his hands, proved that simple lime water was so injurious to cloth. In this part he quotes a process of bleaching by means of lime in a safe manner, which, he says, is from "a paper" that fell into his hands long before he made any of the experiments quoted. This "paper" would appear to have been the account of a practical process as used by the person who wrote it; how much anterior in date it is to the date of Dr. Home's work (1756) there is no means of knowing, save from the expression that it was "long before" his experiments; but that is sufficient to prove that it is one

of the very earliest accounts of any bleaching process which has been published, and as such is worthy of attention. It is as follows:—

"*Method of Bleaching with Lime.*—First, I steep the cloth in warm water for twenty-four hours, then clean it in a washing mill of all the dressing, or sowen, as the vulgar term it. Afterwards I buck the cloth with cow-dung and water, and bleach it with this for three days; then clean it again, and boil it with a lye of cashub ashes. A pound to each piece of 18 or 20 yards long is sufficient. This I do twice, as no lime ought to be given to the cloth before it is a full third whitened, as it by no means advances the whitening of the cloth, but, on the contrary, protracts it; for instead of loosening the oil and dirt in the cloth, when brown, it rather fixes them, just as when fine cloth is bucked with over-warm lyes in the first buckings. Lime is by no means fit for discharging the oil in the cloth, but for cleaning it of the dead part, commonly called *sprat*. The cloth being cleaned, is laid upon a dreeper. It must not be drier before bucking with lime, otherwise it will take in more lime than can be got out again before the next application; but, as I have observed already, that lime is only fit for discharging the dead part, bucking thus wet makes it rest on the outside of the cloth. I take a lippy of the finest and richest powdered lime that can be got, of the brightest white colour, as poor lime does more hurt than good, to 30 pieces of the above lengths, and make a cold lye of it, by stirring and pouring water off the lime until all be dissolved but the dross, which is thrown away; then I add a little soap, which makes the lye have the nearest appearance to milk of anything I can think of, for this soap blunts the hotness of the lime. Then I take the cloth and dip it in the lime lye, and that moment out again, and lay it on a dreeper until it be bucked; then put it on the field, watering it carefully, for if allowed to dry it is much damaged. This is done always in the morning, as it cannot be done at night, in regard of the hot quality of the lime, which soon heats the cloth and tenders it. If a hot sunshine follows it has great effect, for lime is just like all other materials for bleaching, that have more or less effect according as the weather is good or bad. I take it up the second day after bucking and give it a little milling, or hand-bleaching, or bittling, commonly

called knocking, and lay it on the field again, watering it carefully as before. The effect is more visible the second than the first day. As all cloth when limed should have a great deal of work, otherwise more than half the effect is lost; and not only that, but a great deal of labour and pains is requisite to take the lime out of the cloth again; it must never be exposed on the *Sabbath* day, but carefully kept wet always while used in this way. Thus bucking for three or four times, at most, is sufficient for any cloth, except that made of flax pulled either over-green, or which grows in a droughty season, or perhaps not so well heckled as it should be. This sort occasions great trouble and expense to the bleacher. But the most effectual and expeditious way I ever found for this kind was, after boiling, to take a little of the warm lye and mix a very small quantity of lime with it, and draw the cloth through that as hot as possible, and put it on the field directly, watering it carefully. This will clean it of the sprat surprisingly. Then I boil it with pearl ashes, and give it the last boil with soap.

"There are innumerable mistakes in the use of lime committed by the vulgar, who are ignorant of its quality and effects. They know only this in general, that it is a thing which whitens cloth cheap, and is easy purchased, therefore, they will use it. Some of them begin whitening of their cloth with it, which I have already observed to be wrong, and given reasons for it, and continue it until the cloth is bleached; give it a boil or two at most, and then wash it up while the gross body of the lime is in the substance of the cloth. This makes limed cloth easily distinguishable from unlimed, as the former has a yellowish colour and is full of a powder. Besides, as lime is of a very hot corroding nature, it must, by degrees, weaken the cloth. The bad effects of this substance does not end here. When the cloth is put on board it contracts a dampness, which not only makes it yellow, and lose anything of colour it has, but directly rots it. And though it should escape this, which it is possible it may, by a quick and speedy passage, yet, whenever it is put in any warehouse, it will meet with moisture there, especially if the winter season should come on before it is disposed or made use of. These I take to be the principal reasons for so much complaint in bleaching with this material."

This is entitled a "method of bleaching with lime," but it is evident that the lime has exceedingly little to do with this process; a "lippy" is probably the name of some local measure, but we have not been able to ascertain what the word means. This quantity is made into lime water, or as that is not certain, say into weak milk of lime; soap is added, the effect of which would be to form a lime soap with liberation of the alkali of the soap, if only enough soap was added there would be no lime left in the free state; wet cloth is dipped for a moment in this liquor and left to drain, and then bucked, probably in ash. The effect of the ash would be to convert the caustic lime into chalk, while the ash would itself become to a slight degree caustic, the whole action of whatever lime might be in solution or suspension would be during the interval between the dipping in the lime-lye and the bucking. The allusions to the heating properties of lime and its "very hot corroding nature," are evidently drawn from the action which takes place between quick lime and water, and have no more relevance to slacked lime than the corrosive power of strong vitriol has to weak vitriol sours. The bad after-effects said to be produced upon lime-bleached cloth have probably no more foundation in fact; if the cloth as said is "full of a powder," it was clearly badly washed, and it may be assumed that its losing colour and going rotten in warehouses was simply owing to its being very hastily and superficially bleached, the greater portion of the removable matter being left in it, liable to become damp, mildew, and then go rotten. But quick-lime fresh from the kiln, during slacking with water, presented perhaps the most striking of all the chemical phenomena with which common people were acquainted, its avidity for water, and the enormous amount of heat liberated by its combination, struck deeply into the imagination; even when slacked it was credited with heating and corrosive powers, and became the scape-goat upon which all the sins of bad bleachers were laid.

Leaving this part of his subject our author proceeds to treat of the cause and effects of hard water, and the methods of softening it. He says that it was believed that the general

if not the only cause of the hardness of water was sea salt; his definition of hard water is water that does not give a lather with soap, but curds it; other distinguishing marks of hard water are that it does not soften peas that are boiled in it, that it boils fish better than soft water, preserves the green colour of vegetables that are boiled in it, and does not answer well for washing linen; but considering the latter characteristics as indefinite he takes the curding of soap as a fixed point, on one side of which the soft waters lie, and on the other the hard. His method of ascertaining the degree of hardness of a sample of water was to find out by trial how much soft water was required to be added to the hard water so that soap dissolved in it no longer separated into a curd rising to the surface, and shewing a plain point or line of difference between the upper and lower parts of the liquid. The simple suspension of a curd without separation after stirring was the first degree of hardness, and the visible breaking of the soap, but without actual visible particles of curd, he called the last degree of softness. His experiments, of which some account is here given, were made with a certain sample of hard water taken from a well in the month of July, when it was low, nothing is said of the geological formation of the neighbourhood. He tried the effect of heat upon the hard water, it being generally thought that fire softened hard water, and he says, "one is naturally led to think so, as boiled water has a softer taste than cold water when made into punch." But this particular sample of hard water did not become softer by heating or by boiling for a quarter of an hour; he even boiled eight pints of it down to one pint, and as might be expected found it harder than before, and he comes to the erroneous general conclusion that boiling rather hardens water than softens it. Evidently he was experimenting upon a water containing sulphate of lime, or some other metallic or earthy matter not in the state of carbonate. He tried the effect of putrefaction upon the the water, keeping some of it in a warm place from July 1st to November 11th, but it was unchanged and thrown out as incapable of corruption. Flesh and fish put into the water

and kept in until the water got very putrid are reported as softening it, and hence he concludes that putrefaction does soften water, but that hard waters resist putrefaction very powerfully. He demonstrated the fallacy of the notion that hard waters were softened by filtration through sand; at first the water coming through the sand was softened, but by continuing the experiment for twenty-four hours it came off just as hard as it went in; he states that though sand is incapable of softening hard water, it is very proper for removing suspended impurities and improving the taste of the water. It was a practice in some parts to throw quantities of chalk into wells of hard water, under the belief that it made the water softer; he demonstrated that it could not soften water by any addition from the substance of the chalk, but it might be of some use as a filtering substance. He next tried white of egg, fern, extract of bark, of gentian, and of centuary, but none of these things softened the water, nor did extract of wormwood, of black hellebore, of camomile, or of logwood; neither treatment with rhubarb, bohea tea, linseed, oak bark, gum arabic, or gum ammoniac.

He unexpectedly found that solution of pearl ashes softened the hard water, and afterwards that ammonia put in the water and allowed to stand for two or three days till the smell was gone softened it in a similar manner.

Next he turned his attention to try and discover what it was that made water hard, and operated upon distilled and rain water in a variety of ways. He shews that common salt, contrary to the general idea, does not make soft water hard, but that when it appeared to do so it was owing to impurities in it, for by taking the so-called *Sunday salt*, or great salt which crystallizes on Sundays when the fire is low under the pans and the sea water not completely evaporated, he got salt in a great measure free from "bittern," that is magnesium salts, and it did not make soft water hard when added in small quantities. He shewed that bittern has a very strong hardening effect, but he rejects the idea that bittern is the common cause of hardness in waters. He found that all soluble metallic salts made water hard; powdered

chalk, even when boiled with soft water did not harden it, neither did clay. Lime water he found to be a great hardener of soft water. He made many experiments upon lime water, preparing first common lime water called single lime water, then pouring that upon fresh lime to make double lime water, this again upon fresh lime to make treble lime water, and this latter again upon fresh lime to make quadruple lime water, and reports that the hardening actions of these various lime waters upon soft water to be for the single 9, the double 11, the triple 13, and the quadruple 17; that is that a given volume of each required the addition of these numbers of volumes of soft water to bring them to his first degree of hardness. He repeated these experiments several times and in several ways with results not very accordant, and at last concluded, but not with certainty, that lime water was made stronger by a double or triple treatment with fresh lime. We know now that with pure lime this would not be the case; it might very well be so with some samples of lime containing soluble matters other than lime, but even for that Dr. Home's appliances and tests were by no means delicate enough to justify his conclusions, though they must have seemed to him very probable.

In a solution of carbonate of potash Dr. Home believed he found a still more delicate test of the hardness of waters than even soap afforded, for the addition of this test shewed a milkiness in water which was not capable of curdling soap. He then classifies all waters with regard to the quality of hardness into three sorts. First, those which neither change with carbonate of potash, nor curdle soap; second, those which became milky with carbonate of potash but do not curdle soap; and the third sort are those where both effects happen. When these tests were applied to "the water which issues from the pipes of the *Edinburgh* wells" it was found that it was in the first class, dissolving soap well, and retaining its transparency when mixed with carbonate of potash; and further it gave no milkiness when solution of quicksilver in nitric acid was dropped into it. This was the test which Dr. Home used to detect the presence of

sea salt, and says that if any sea salt was present in the Edinburgh water it must be in a proportion of less than one grain to three English pints, that being the assumed limits of the reliability of the mercury test.

Dr. Home's efforts to ascertain what it was in water that made it hard did not result in complete success, or at least the language he uses permits us to doubt whether he clearly perceived the cause, but it is certain that he got very near the truth; he says that while "none of the perfect neutral salts compounded of an acid and alkaline base, render water hard," all what he calls the "imperfect salts compounded of an acid and absorbent earth or metal have this effect on water." Magnesia and alumina were the two absorbent earths; only in one case does he declare the earth in a certain hard water to be of the "calcareous kind and convertible into lime;" in all other cases that came under his notice he says the base was only absorbent and never calcareous, that is magnesia and not lime; he further pronounces that the acid of the salt is invariably the nitrous; of course neither of these conclusions are correct according to our present nomenclature, but at that time they conveyed a tolerably clear idea of what was the true state of the question. If Dr. Home had only known what carbonic acid was, much that perplexed him would have been made clear. For example, he quotes Dr. Alston's observation that the crusts formed by lime water when exposed to the air are double the weight of the lime dissolved to form the lime water; this is not far from the results of modern chemistry, lime absorbing somewhat less than its own weight of carbonic acid to form the crusts of carbonate of lime, but all that could be said about the increase of weight of the crusts at that day was, "that they get this additional weight from earth, or perhaps somewhat else, attracted from the water."

The nature of lime was a terrible puzzle to the older chemists, misled as they were by false hypotheses, and we cannot do better as an excuse for all we have inserted about it than quote what Dr. Home himself says, as a kind of apology upon quitting the subject.

"As there are middle natures which seem to join the opposite parts of the creation, the terrestial and the aquatic, the beasts and birds, the fishes and birds, the vegetable and the mineral, the mineral and the earthy, lime seems to me to be a substance designed by the Author of all to connect the salts and earth, two substances that differ widely from one another. It sometimes exists in the one shape, and sometimes in the other. By fire it becomes soluble in water, but not in a great degree; by the contact and influence of the air it becomes an insoluble earth; still, however, not so much so, but that it may be again reduced by a certain degree of heat, to its soluble saline state. This much I thought was due to a substance of such general use in the bleachfield, and whose nature and composition was so little understood."

Of the disadvantages of using hard water in bleaching, our author was well informed, not only in its destroying soap, as injuring alkaline leys, but its accumulation in the cloth itself, for he says, the hardening salts "thrown on the linen along with the water must penetrate wherever the water goes. The sun will soon volatilize the acid part, but the earthy will remain in the substance of the linen, and render it hard and husky. Nothing but an acid can take that earth out, by reducing it again to a saline state. Hence if more earthy particles are deposited by the watering than what are carried off by the souring, the cloth must not only turn hard but must be torn into holes and rendered useless." The effect of hard water in producing incrustations is noticed, and the difficulty there is of boiling vegetables properly in it, and the somewhat antiseptic properties of hard compared with soft water. Carbonate of potash is strongly recommended by Dr. Home as the effective and natural softener of hard waters, causing them to be as beneficial as before hurtful to the health of man. "Lord Verulam (Francis Bacon) had so high an opinion of the salutary effects of nitre, that as we are told, he used to mix it with all the water he drank. Hard water, when corrected by alkaline salts turns into soft water impregnated with nitre." This idea of the formation of nitre is at the bottom of the recommendation, but it was in a few years proved to be a misconception. Nitric acid is not found in

many waters away from towns, and the potash or soda salts left in solution in the water treated by Dr. Home's process would be either carbonates or sulphates, which are not very beneficial to the health of man.

In treating of chalybeate or steel waters we have a somewhat naïve anecdote of what "happened to a poor woman, who watered some webs she was bleaching from a spring near her own house. To her great surprise they turned redder and redder every day. Not being able to account for this effect in a natural way, or to remove that colour, she imputed it to witchcraft, blamed the neighbour she hated most, and sold them for a trifle." The test prescribed for iron in water is galls, green tea, or the leaves or bark of the oak, if with addition of any of these the water becomes black it is improper for bleaching. In the concluding chapter of the work Dr. Home enters into general considerations upon what is most likely to promote the interests of linen bleaching and manufacturing in Scotland. In the following passage he advocates inter-communication of ideas among bleachers and condemns the assumption of secresy.

"There is nothing promotes an art faster than the communication of those who practise it; nothing retards it more than a selfish spirit of keeping all a secret. It is by a gradual progress, where one refines upon the inventions of another, and not by the endeavours of a single person, that arts arrive at perfection. I cannot, then, but recommend to the Honourable Board of Trustees, a scheme of Mr. *John Chrystie.* He not only has made many advances himself in this art, but is desirous that others that should do the same. He proposes that every bleacher, especially those who have got, or expect any premium from the Trustees, should annually deliver an exact account of his method of bleaching. If this proposal took place, several faults would be observed and corrected; several advantages gained; the bleachers made more knowing, as one may excel in a particular branch, who is very deficient in all the rest; a complete history of the practice made out, and the art itself arrive at perfection. Let those who shelter themselves under the appearance of secrets, know, that ignorance always does the same."

Nothing will ever persuade the ordinary manufacturer that he ought to make a present to his rivals and competitors of any important discovery he has made in cheapening or improving his process of manufacture; to prevent injury to the commonwealth from the retaining of valuable discoveries as secrets, and perhaps their eventual loss, the scheme of protected patents was devised; this scheme it must be admitted has answered its purpose fairly well, though not perfectly. In such businesses as dyeing and bleaching, it is hard to see that there exists the least moral or social obligation for anyone to communicate improvements of his own discovery to others, even if they are of a trifling nature, for improvements are not such unless they give some advantage to the discoverer over his rivals, and that he should throw any advantage away is not to be expected. But this quite proper principle may narrow down into a hurtful selfishness, which if it were universal would soon put a stop to all improvement; all information would be frozen up, instruction would be refused, discussion would cease, and processes would be petrified, to grow no more. Between equals engaged in the same business there is at this day a more generous spirit; it is felt that excessive reserve or complete reticence is more injurious than openness. There are hundreds of things which come up in practice the communication of which may profit others without in the least injuring the giver, even supposing he got nothing in return; this sort of intercommunication really promotes the interests of all without abstracting from the position of any, and it would be well if such were extended and organised beyond its present limits. There are hardly any manufacturing secrets in these days; the man who pretends that he is possessed of valuable secrets will be either, as Dr. Home intimates, a very ignorant man, or, what not unfrequently happens, he will be a humbug.

Dr. Home considers that young people of both sexes stop too long at school to turn out good workers afterwards. The consequences of learning to read, write, and do accounts are said to be that men do not know what to do with themselves in the long winter evenings. This rather surprising statement

seems to mean that instead of spending time at school, they should have learned to spin or do something similar. But our author is evidently doubtful of the utility of giving much education to the working class; "it will be well," he says, "if this turn to speculative knowledge, which they have got, is attended with no worse consequences."

As to the state of the working class, it appears from Dr. Home that they were no better a hundred and twenty years ago, if not worse than they are now. He says, "our people work but in proportion to their demands, and if at any time they have more money than supplies them it is spent in drink."

2. *Process for the Purification of Fuchsine and Azaleine.**

WE have discovered and applied on the large scale for a year past a method of purifying fuchsine, which, with some modifications is also applicable to azaleine. This process, besides the advantages of yielding fine and regular colours, gives moreover the power of obtaining them of any desired depth either upon wool or cotton.

The process is as follows:—The fuchsine is dissolved in boiling water, of which it requires more or less according to the product. The solution is filtered through calico, and ammonia added in the proportion of about 1 lb. to 5 lbs. of fuchsine, but it varies according to the nature of the material, an excess must be avoided, as it causes a loss of colouring matter. The precipitate which is produced is sometimes a powder and sometimes of a resinous nature, it is collected upon a filter after the clear liquor, which is of a yellowish

* This is the contents of a sealed packet deposited by M. E. Hofer-Grosjean with the Industrial Society of Mulhouse, October 15th, 1860, and opened only July 25th, 1876, published in the Bulletin of the Society for December, 1876, p. 492. It is printed as possessing some historical interest.

pink colour, has been as much as possible decanted off. The precipitate is dissolved in alcohol, using 1 lb. to 1 lb. of fuchsine; the alcoholic solution is filtered, and being added in proper quantity to Senegal or tragacanth gum water, forms the colour for printing on woollen; for cotton goods albumen is added to the thickening. If the alcoholic solution is mixed with several times its bulk of boiling water and the mixture allowed to cool, a further small quantity of tarry matter precipitates, carrying down with it some colouring matter; when filtered it yields a liquid which dyes up lighter and purer colours than those described above. This liquid dyes silk very well; wool and albumenised cotton take very pure shades without any addition of alkali. By evaporating the alcoholic solution a fine colour can be obtained for artists in water colours.

For purifying azaleine the following process has succeeded perfectly in our hands:—Take 1 lb. of azaleine and mix it with 3½ lbs. of sand, which has been previously washed with dilute sulphuric acid, and afterwards with pure water. The azaleine attaches itself to the sand and can then be easily dissolved. Add 2 lbs. of water and about 1 oz. of ammonia. Stir well for five or ten minutes and pour off the liquid, repeat the treatment with the same quantity of water and ammonia. This operation is to remove from the azaleine a portion of tar and a yellow acid substance. Then add 5 lb. of boiling water and 3 oz. of acetic acid at 11° Tw.; heat on a water bath, filter through calico, and exhaust the residue with boiling water; there will be then about 3 gallons of solution, to which add about 3 oz. of ammonia. The treatment is continued as for fuchsine by dissolving the precipitate in a litre of alcohol. The alcoholic solution is used in the same way as with fuchsine; it gives shades equally as pure as fuchsine, but more violet coloured.

3. *Notes from Mulhouse.*

Monument to the late M. Daniel Koechlin.—The members of the Industrial Society have resolved to erect some memorial of M. Koechlin, one of the founders of the society, and whose name is well known to all readers of technical literature as one who contributed in a very important manner to the elucidation of obscure paints, in connection with the arts of dyeing and calico printing, and so conferred immense benefits upon the industry. The movement commenced about five years ago, soon after his death, among some members of the society in Russia, who forwarded the sum of 3,600 francs for the object; at the request of M. Koechlin's family, the realisation of the idea was postponed to a future time, but it is believed that, now that the fiftieth anniversary of the society has been celebrated, the time has come when the matter may be seriously entered upon. M. Rosenstiehl has consequently been authorised to issue a proposal for subscriptions for this object; the particular form of monument has not been fixed upon, but it will be some memorial placed in one of the rooms of the society.

Lauth upon New Colours.—M. Camille Koechlin communicated from M. Charles Lauth the result of experiments he has been making to obtain colours from other alkaloids than aniline, by the aniline black process with chlorates and copper.

In order to claim priority of discovery, M. Lauth states that *nitraniline* gives a dark buff colour, which may be reduced to a reseda shade; *benyzyline-phenylamine* gives a black; *phenylene-diamine* gives a black which appears to be little disposed to become green by contact with acids; *toluyline-diamine* yields a series of brown shades from catechu to grey, according to the metal which is employed along with the chlorate, copper, iron, chromium, or tin, all of which are stable colours; mixtures of *naphthyline* with *toluyline-diamine* yield a very varied series of colours.

Colour from Phenic Acid.—M. Jules Roth reports the

preparation of a new colouring matter, which dyes wool and silk of a grey shade, perfectly fast to soap, and resisting the action of acids. The following is the mode of preparation of this colour:—One part of crystallized and anhydrous phenic acid is reduced to powder, and intimately mixed with 2 parts of carbonate of ammonia, also in powder. The mixture is introduced into a glass vessel or an enamelled iron pan, which can be hermetically closed, and is left to itself for three or four weeks; at the end of this time the reaction is completed, and the colour can be extracted. The mass is moistened with a limited quantity of water, which dissolves or liquefies the uncharged phenic acid, and leaves untouched the bicarbonate of ammonia. The colouring matter dissolves in the phenic acid; the fluid is poured off and heated to boiling to expel the excess of phenic acid, and is evaporated to the consistence of an extract. The colour is then under the form of a resinous matter having the appearance of aniline grey; it is insoluble in cold water, soluble in hot water, alcohol, ether, acetic acid, and alkalies.

Anthraflavone.—Schunck and Roemer having lately published a note upon anthropurpurine and flavopurpurine in the Journal of the Berlin Chemical Society, and further announced their intention to extend their researches to anthraflavone, M. Rosenstiehl, who has worked upon these matters, has taken occasion to make known what is the actual state of his examinations upon anthraflavone. He says, "I shewed in 1874 that the anthraflavone discovered by Barth and Senhofer, when melted with caustic potash, gave rise simultaneously to two colouring matters, of which one, soluble in benzine and alum water, dyed colours resembling alizarine, while the other, insoluble in these two liquids, resembled purpurine. The colours obtained by dyeing bear comparison for brightness and fastness with those produced from madder.

The first was obtained in such small quantity that it was impossible to examine it thoroughly.

The second, which was more abundant, is really an isomer of purpurine, and comes near in its dyeing properties to the iso-purpurine or anthrapurpurine of Perkins.

By studying the conditions under which it was formed, I found that anthraflavone itself is a mixture of two isomers of alizarine which can be distinguished by their behaviour with alkalies. One gives a soda salt very soluble in water; it dissolves in cold baryta water colouring it brown, it unites with gelatinous alumina and forms an orange lake, and produces by fusion with the alkalies the isomer of purpurine which I have mentioned.

The other one forms a soda salt not very soluble and crystallizing easily; it is insoluble in cold baryta water, and melted with potash at the same temperature (between 135° and 140° C.) does not produce any colouring matter. It is only when the temperature is much higher that a little colouring matter is formed with destruction of a considerable proportion of the substance. This second body, whose characteristic properties have enabled me to isolate it in a great state of purity, is obtained under the form of silky needles, which, in mass, have the colour of yellow chromate of lead, and resemble in appearance chrysophanic acid. What is most interesting in connexion with this body is that I have found it identical with a bye-product which was sent to me by Messrs. Ulrich and von Perger, directors of the artificial alizarine manufactory at Prague. These chemists called the substance anthraxanthic acid, and desired me to examine it.

The characters of these two bodies agree so exactly with those of the substances which Messrs. Schunck and Roemer have described under the names of *iso-anthraflavic acid* and *anthraflavic acid*, (the presence of which they also discovered in a bye-product of artificial alizarine) that it is hardly posssible to doubt their identity. This important conclusion flows, that in the manufacture of artificial alizarine, starting from anthracene, the same products are obtained as in starting from oxy-benzoic acid; that is the products or the hydroxyles are among the two groups C_6H_4 which are found combined in anthracene, a constitution quite different from that of alizarine where the hydroxyles are contained in only one of the two groups.

Substitute for Albumen.—A sealed packet deposited in the archives of the society so long ago as October 26th, 1861, was lately opened at the request of the depositor and found to contain a proposition to employ legumine or vegetable albumen as a substitute for egg albumen. M. Eug. Dollfus being instructed to report upon the matter concludes that this substance can never act as a substitute for animal albumen. The vegetable albumen is composed of two matters, one of which is coaguable by heat like egg albumen, but is present in very small quantity, the greater bulk of the matter has all the properties of caseine. He intends to make a more complete report upon this substance.

Purpurine.—M. Rosenstiehl finding that several chemists are working upon anthracene products thinks it desirable to make a communication of what he has done so as to avoid any after disputes about priority of discovery. He says the purpuroxanthine discovered by Schützenberger and Schiffert in commercial purpurine is not identical with the product obtained by the reduction of purpurine. It splits up into two products one of which dyes alumina mordants yellow, while the other does not dye at all. The latter is an isomer of alizarine and the actual purpuroxanthine. The former body which is an isomer of purpurine is produced in such small quantity that it has been impossible to ascertain its true composition.

Pseudopurpurine boiled with water gives rise simultaneously to two isomeric purpurines, one of which, purpurine properly so called, dyes alumina mordants red; the other dyes them yellow. When a solution of ordinary purpurine is treated with permanganate of potash, it also yields a small quantity of the new isomer of purpurine.

The separation of these two isomeric bodies can be effected by means of hydrated peroxide of iron, which proves that the new purpurine exists in the state of mixture with the real purpurine, from which it is nearly impossible to separate it by repeated crystallizations. The author was only able to obtain four grammes of this body which quantity, however, enabled him to establish the following facts:—The new

isomer of purpurine is orange coloured ; it crystallizes in fine needles. It is soluble in alcohol, acetic acid, chloroform, benzine, and ether. It is the most soluble in water of all the colouring matters from madder, The alkaline solution of it is redder than that of purpuroxanthine but less violet coloured than that of purpurine. The lakes it forms with lime and baryta are insoluble in boiling water. It dissolves in a boiling solution of alum but without shewing any appearance of fluorescence, and it deposits upon the cooling of the liquor. It dyes alumina mordants in Chevreul's number four orange, and does not colour iron mordants. In dyeing it requires an equivalent of acetate of lime. It dyes badly in presence of carbonate of lime, better when carbonic acid is present ; the dyed colours do not resist the action of boiling soap. By reduction it is transformed into purpuroxanthine, and by melting with caustic potash into ordinary purpurine. This last character is easily explained by supposing that during this transformation it passes through the state of pseudopurpurine. Want of material alone has prevented a more complete study of the properties of this substance.

Runge, Kuhlman, Schunck, have indicated substances which dye alumina mordants yellow; this research shews that the new isomer is also a derivative of pseudopurpurine.

The actual state of the question may be summed up as follows :—The colouring matters, which are *primitively* contained in madder are *pseudopurpurine* and *alizarine*.

Pseudopurpurine or tetraoxyanthraquinone yields spontaneously by reduction two isomeric purpurines, which are trioxyanthraquinones, purpurine properly so called and its new isomer. A further reduction leads to purpuroxanthine or bioxyanthraquinone. As for alizarine, which is also a bioxyanthraquinone, it has not yet been obtained by acting upon pseudopurpurine.

Quite recently, M. Rosenstiehl has observed that by exposing an alkaline solution of pseudopurpurine to the air, it is spontaneously reduced, yielding a new isomer of pseudopurpurine. This character will enable the author to obtain the new product in larger quantity, and pursue still further his enquiries.

Vanadium Aniline Black.—In conversations upon the use of vanadium for aniline black it is said that the very minute quantities of this metal, which M. Witz stated to be sufficient to develop the colour, have required augmenting in other hands to four times or ten times the amount; it is reported that the steel doctors are acted upon by the vanadium colour, but not so much as with the sulphuret of copper colour. Some of the discrepancies may depend upon the state of acidity of the colour, and attention is again drawn to M. Witz's employment of aniline violet, as a delicate means of ascertaining when the aniline salts are in a neutral state.

Ceruleine and Galleine.—M. Horace Koechlin exhibited to the society samples of cloth, coloured by printing and dyeing with these two colouring matters, which were discovered by Baeyer, and which have been manufactured and sold for some time past by Durand and Huguenin, of Bâle. The best mordant discovered at present for fixing ceruleine is oxide of chromium associated with bisulphite of soda. Galleine dyes both iron and alumina mordants of a violet colour.

4. *Washing Machines for Bleaching and Printing.**

In this work the author passes in review all the systems of washing machinery with which he is acquainted. No first effort of this kind can possibly exhaust the subject, nor did it enter into the scheme of the author to describe and illustrate every washing machine which is or was employed by bleachers and printers, some omissions there must necessarily be, but the whole is a singular and remarkable monograph, quite unique in its scope and contents. The first washing apparatus described dates from 1766, and is from the work of Jean Rhyiner, of Bale, which was reviewed in a previous

* Sur les Machines à laver, etc., par Jos. Dépierre. Savy, 77, Boul. St. Germain, à Paris, 1876.

number of this Journal. After that date the author finds no reference to washing machinery until 1802, when he finds the English bleachers and printers employing the dash-wheel, which it is stated was not in use in France until it was introduced by Dollfus-Ausset, in 1819. A considerable time afterwards M. Fries introduced continuous washing into France, after having seen it working in England. The first part of the work consists of a description of washing machines which have gone out of use, or only employed to a limited extent; the second part is devoted to descriptions of machines in actual use. In the first part we find the description of a number of machines, with illustrations, which are unknown in this country, and of which the names have no equivalents in English; we find also some machines familiar to English technology, and which are by no means so obsolete as one might be led to suppose from their being included in the first part of the book. We find the wash-stocks, which have done good service in times gone by; the dash-wheel, which was almost the sole means of effective washing apparatus in use in England for many years; Holden's patent of 1856; Kaselowski's patent of 1850; a machine of Dollfus-Mieg & Co., of 1856; Parsons' machine, 1856; Crawford's apparatus of 1857; Whittaker's patent of 1857; Robinson's machine, Furnival's machine, and Fulton's machine, 1854; besides several others of French origin or adaptation. There are twenty-five figures to illustrate the apparatus described in the first part of the book.

In the second part of the book the first machine described is a slack washing machine, the peculiarity of which consists in the peg-rail being made moveable, and having a to-and-fro motion given to it while the pieces are drawn through the water, and between two wooden cylinders, otherwise it does not differ from the common bleach-house washing machine. It makes 90 to 100 revolutions per minute, and in the same time delivers 158 metres of cloth; there are 31 pegs in the rail, and the cloth therefore passes 30 times through the water and between the bowls; it requires 200 litres of water per minute, or 12 cubic metres per hour. The apparatus is

usually placed over flowing water, one operative can work it, but usually there are two machines connected with a pit of water between, which helps to open the pieces. This machine costs 2,250 francs. The second machine described appears to be the same as the first, but of a cheaper and less effective make; garancine work requires four passages through it to be washed; the power required is two-and-a-half horses.

The machine called "Clapeau Traquet" differs from the preceding, in which the cloth receives only the pressing action of the rollers, by having a square beater of 39 inches each side placed above the water where the piece leaves it, and a plank placed between it and the rollers, the effect being that the piece is beaten by the square beater, and besides gets flapped against the plank. The square beater makes 40 revolutions per minute, and, therefore, gives 160 strokes in that time to each piece, and as there are 24 pegs and as many threadings, it gives 3,840 beats per minute to the cloth; the cloth is beaten the same number of times against the plank, so that the apparatus gives 7,680 beats per minute, with 24 pegs; but as these beats are not given to the whole cloth, but only a portion at one time, and as it takes forty seconds to wash 100 metres of cloth, these 100 metres are struck only by one side of the square beater, and then upon the plank, and do not receive all the strokes upon the same parts. A given metre receives, at first say two strokes in the first second, then as there are 10 metres to travel, it remains four seconds without a stroke, then comes round and gets beaten a second time, so that a piece of 100 metres may be considered as being beaten for one-fourth of the time it is in the machine, say ten seconds, in each second receiving two strokes, each metre gets (in the forty seconds which it takes a piece to pass through) $2 + 24 = 48$ strokes. The machine of Witz and Brown, described further on (known in England as the Swiss machine), gives 52 strokes per minute. The machine is said to wash 8,000 or 9,000 yards per hour, can be managed by one man, is very good for rather heavy cloth, requires a power of three or four horses to drive it, and costs 2,800 francs.

A machine, called a continuous washing machine, is spoken of as being one of the best machines which has been produced for washing all styles, but principally madder and garancine styles. Two six-sided winces are placed above, and half in the water is a third six-sided wince; the frame is over a proper water box, the cloth goes through the water and round a roller near the bottom, and at one side of the box, thence up to one of the six-sided winces, down to the wince which runs half in water, up again to the other six-sided wince, and down into the water again; there are 36 pegs, and the piece passes 64 times over the winces. It washes well with 20 cubic metres of water per hour, requires only one man, once through is generally sufficient for the goods, and it requires two to two-and-a-half horse-power to drive; the cost is 2,200 francs.

The washing machine of Witz and Brown is tolerably well known in this country, it works by both pressure of the cloth between rollers and beating against boards. It is a slack washing machine and may be used for light goods, such as muslins, if care be taken not to have the drawing bowls so close together as to press the goods too much, for then the folds do not open again and cannot be well washed; the bowls are recommended to be carefully wrapped in cotton rope. The most convenient speed is 65 revolutions per minute, which making due allowance for slip, will give a yield of about 6,000 metres per hour once through the machine; but to wash well such styles as madders and garancines the pieces must go through three times, which gives an effective yield of only 2,000 metres per hour. The beating boards in this machine, as is well known, are driven by power. The driving wheel for these boards should have a speed of 161 revolutions per minute, which gives double that number of strokes, equal to 26 strokes per metre of cloth, and as the cloth passes 20 times under the bowls, each metre receives 52 strokes during its passage in the machine. The quantity of water required to work well in this machine, according to the calculations of MM. Huguenin and Co., who have worked this machine for twelve years, is 18 to 20 cubic metres per hour, equal to about

1 cubic metre per 100 metres of cloth going three times through. The driving power required is estimated at from four to five horses, it requires two attendants, and costs 4,000 francs.

Other machines are described by M. Dépierre and a minute comparison made of their cost and efficacy, for details of which we must refer to the original. The progress of invention in colouring matters is not without its influence upon the kind of washing required for dyed work. Substances like madder, garancine, and ground woods, require a great deal of washing and some kind of beating to free the cloth from the insoluble particles. The substitution of soluble extracts, or of extracts in a state of impalpable powder has done away in a great measure with the necessity for rough beating of the cloth; it is a great advantage both for cloth and colours that the washing should be as free from from friction as possible, for the effect of much motion is to raise up a downy surface on calico, especially when made from short stapled cotton, which gives it a very undesirable appearance for which there is no effectual remedy.

5. *Upon Silk Printing.**

The acetate of lime being cheaper than acetate of lead, can be used instead, it is more economical and gives excellent results when mixed in the following proportions :—

Water, 18 gallons.
Pyroligneous acid or wood vinegar, 4 gallons.
Alum, 80 lb.
Pyrolignite or acetate of lime, 32 lb.

The two salts should be dissolved separately, and then mixed in a vessel sufficiently large, with stirring for some time.

* Abridged from the work of M. D. Kœppelin upon this subject. *Continued from p. 41.*

Acetate of Alumina, at 18° Tw.

Water, 18 gallons.
Alum, 120 lb.
Acetate of lead, 105 lb.

Pyrolignite of Alumina, at 26° Tw.

Water, 16 gallons.
Wood vinegar, 4 gallons.
Alum, 144 lb.
Pyrolignite of lime, 64 lb.

These two concentrated mordants are prepared in the same manner as the previous ones.

Tartro-acetate of Copper and Potash.

Cream of tartar in powder, 6 lb.
Water, 2½ gallons.
Acetate of copper, 14 lb.

The cream of tartar is boiled up with the water and the boiling solution put into a tub containing the salt of copper. The mixture is well stirred until the salts are perfectly dissolved, and then let to cool. There is a small residue of cream of tartar not dissolved and a solution of the double salt which is decanted off and kept for use; there should be about 2¾ gallons standing at 45° Tw.

Acetate of Indigo at 22° Tw.

Sulphate of indigo at 28° Tw., 5 gallons.
Acetate of lead, 24 lb.
Water, 1¼ gallons.

The acetate of lead is to be dissolved in the water in an earthenware vessel, and the sulphate of indigo gradually added with stirring; the decomposition is soon accomplished, the sulphate of lead subsiding to the bottom of the vessel. Let rest for a few days and decant the clear liquid, which must be kept in well corked bottles; there should be about 2¾ gallons at 22° Tw.

By washing the sulphate of lead bottoms with hot water, a quantity of indigo salt, mechanically retained by it, is dissolved out, which, though weaker, can be used.

Sulphate of Indigo, at 28° Tw.

Powdered Indigo, 3 lb.
Nordhausen sulphuric acid, 12 lb.

The fuming Nordhausen sulphuric acid is carefully poured into an earthenware vessel. The indigo is then added by small portions at a time, so that the mixture may not become too much heated. Twelve hours after the whole has been mixed, an operation requiring much care, add water to it until it marks 28° Tw. There should be 5 gallons of solution.

Sulphate-prussiate of Indigo and Potash.

Sulphate of indigo at 28° Tw. 3½ gallons.
Yellow prussiate of potash, 22½ lb.

The prussiate is added to the sulphate, and the whole stirred up until the prussiate is quite dissolved. This mixing must be done with some care and with a long stirrer, so that the operator may not suffer from the prussic acid vapours which are given off. The vessels in which this indigo preparation is kept must be well covered; it is frequently employed.

Prussiate of Tin, or Tin Pulp.

Yellow prussiate of potash, 5½ lb.
Hot water, 4 gallons.
Crystals of tin, 6 lb.
Water, 4 gallons.

The salts are first dissolved separately in water and the solution then mixed. The prussiate of tin precipitates as a white pulp; when it has well settled, the clear liquid is drawn off, and the precipitate mixed with water and let to settle again. Then it is collected upon a filter, washed upon the filter, and let to drain until it forms a thick paste, which should weigh about 30 lb.; it must be kept in covered vessels. If a larger proportion of tin salt be used, the prussiate of tin produced is found to give brighter but paler colours.

Nitrate of Iron at 84° Tw.

Nitric acid at 64° Tw., 30 lb.
Water, 2 gallons.
Thin iron, a sufficient quantity.

The acid and water are mixed in an earthenware vessel, and

thin iron, as old hoop iron, is added a little at a time as it dissolves until the liquid marks over 84° Tw.; it is then reduced by addition of water to stand at that degree.

The nitrate of iron obtained in this manner, generally contains too much acid for general application; this defect is obviated by adding acetate of lead to the liquid. For example take

Nitrate of iron at 84° Tw., 40 lb.
Acetate of lead in powder, 12 lb.

Mix the whole in an eathenware vessel and stir well together, until the acetate of lead is perfectly dissolved. The excess of nitric aicd decomposes the acetate of lead, taking the oxide and forming nitrate of lead, which precipitates to the bottom of the vessel; the acetic acid set free remains mixed with the nitrate of iron. The clear liquor is decanted and preserved in closed vessels.

Persulphate of Iron, at 72° Tw.

Nitric acid at 64° Tw., 48 lb.
Water, 3¼ gallons.
Green copperas, 192 lb.

Mix the acid and water and add the green copperas or protosulphate of iron in coarse powder by degrees until it is wholly dissolved. The nitric acid raises the oxide of iron to a higher state of oxidation, forming the so-called persulphate, known also to workmen as nitro-sulphate of iron. The yield should be 145 lb. at 72° Tw.

Caustic Potash.

Commercial carbonate of potash, 30 lbs.
Water, 6 gallons.
Quick lime, 15 lbs.

Dissolve the potash in the water, raise to the boil, and add the lime by portions; the lime should be previously slacked. Boil up well after each addition of lime until all has been added. The lime abstracts the carbonic acid from the carbonate of potash, forming with it carbonate of lime, which deposits as an insoluble sediment. The clear caustic liquid should be decanted or syphoned off into an iron boiler and

concentrated by boiling until it marks 60° Tw. It must be kept in well corked bottles, for it becomes injured by contact with the air.

Other preparations required to be kept in stock are gum water, thick and thin, made from gum Senegal, decoctions of berries, sumac, cochineal, ammoniacal cochineal, and other colouring matters simply made by boiling them with water and concentrating to the required strength. In the two following cases vinegar or wood acid is added to the water.

Catechu Liquor, at 14° Tw.

Catechu in lumps, 16 lbs.
Water, 3 gallons.
Wood acid at 4° Tw., 2 gallons.

Boil together until the catechu is dissolved, and strain into a tub.

Gall Liquor, at 22° Tw.

Gall-nuts, 5 lbs.
Water, 4 gallons.
Vinegar, ½ gallon.

The whole is left to steep for several days, then boiled, and the liquor concentrated to the required strength.

The decoctions of colouring matters should not be prepared long before they are wanted, except in the case of Persian berries, which improves by keeping.

The following standards will also be required :—

Standard for Lilac.

Thick gum water, 2¾ gallons.
Water, 2 gallons.
Acetate of alumina, at 10° Tw., ¾ gallon.

Blue Standard M.

Warm water at 100° F., 2½ gallons.
Tartaric acid, 3 lbs.
Oxalic acid, 1lb.
Gum water, 3½ gallons.
Prussiate of tin pulp, 18 lbs.

Dissolve the acids in the warm water, add the gum water, and when cool, the prussiate of tin pulp; mix the whole well together, and strain carefully so as to have a perfectly uniform

mass. When about to be used it must be well stirred up, because the prussiate of tin has a tendency to settle at the bottom of the vessel.

Colours for Printing on Silk:—

Outline Black, No. 1.

Logwood liquor at 30° Tw., 5½ gallons.
Water, 10½ gallons.
White starch, 14 lbs.
Gum substitute, 40 lbs.
Sulphate of copper, 5 lbs.
Sulphate of iron, 5 lbs.

Boil up together, and when of a proper consistence let it cool down to 100° F., and add

Alum, 6 lbs.
Tallow, 5 lbs.
Extract of indigo, 6 lbs.

and when quite cold

Neutralized nitrate of iron, 18 lbs.

When this black is going to be used for printing, and not before, there must be added to every 5 gallons of it,

Spirits of turpentine, 3 lbs.
Sulpho-prussiate of indigo, 3 lbs.

This last addition prevents the colour from what is called burning the stuff, and from running when it is printed over with other colours.

Black for Grounds, No. 2.

Logwood liquor at 30° Tw., 6¼ gallons.
Dextrine gum water, 7¼ gallons.
Water, 5 gallons.
Sulphate of copper, 5 lb.
Sulphate of iron, 5 lb.
Alum, 6 lb.
Extract of indigo, 6 lb.

Heat up to about 100° F., and then let it cool. When cold add

Persulphate of iron, 18 lb.
Pyrolignite of alumina at 26° Tw., 6 lb.

The two liquors being previously mixed together ; imme-

diately before printing add at the rate of 3 lbs. of the sulpho-prussiate of indigo per 5 gallons of colour.

[*To be continued.*]

6. *Abridgments of Complete Specifications of Patents Recently Published.*

A.D. 1876, April 24th.—No. 1733.

JOHNSON, HENRY JOHN. *(A communication from Eugene Dollander, Paris).* "Improvements in or connected with Apparatus for Sizing and Dressing Yarns or Threads." The specification of this patent is illustrated by a sheet of drawings; in the absence of these we give the provisional specification, which describes the general nature of the invention.

"This invention consists in effecting the drying of the yarn or thread in dressing or sizing machines by combining the hot air system at present in use with a peculiar arrangement of plates heated by steam over which the yarn or thread is drawn by friction, whereby it becomes thoroughly dried.

"In carrying out this invention the central longitudinal portion of the machine is employed in effecting the drying of the threads, the extremities being of ordinary construction. The threads issue from the roll box at one end of the central portion, are conducted to the front of the machine, and pass over a fluted roller, and thence backwards and forwards over other fluted rollers. From the last fluted roller the threads pass by friction over steam plates, two of which are by preference employed slightly convex or rounded in form, whence they are conducted over a series of rollers, and finally over a registering roller. Serpentine pipes, composed by preference of drawn iron or copper, are employed to receive the steam from the plates. These plates and pipes communicate at their extremities with a purger or blow off for the

discharge of the water of condensation. The steam conducted from the boiler by a steam pipe passes through a steam regulator, and is distributed by a suitable pipe at any pressure which may be varied as required by means of the regulator into the two plates. Each plate is provided with an air cock, which is opened when the steam is first admitted to allow the air to escape which is driven out by the steam; this cock is again opened when the work is finished at the time when the steam cock is closed.

"The operation is carried out in the following manner:—On passing from the first roller to the first fluted roller and from the latter to the second fluted roller, the threads already receive a certain amount of the heat given off by the plates. In passing over the other rollers the threads receive the heat from the serpentine pipes, which heat or heated air is agitated by means of fans provided for that purpose. The rollers are fluted in order to prevent the wet threads from adhering inconveniently to their surfaces. By the time the threads reach the first plate they have already attained a sufficient degree of dryness to prevent any liability to become flattened, and in their passage by friction over the two plates the drying process is completed. Another fan is also provided near one extremity of the apparatus, which additional fan serves to create a current of air to carry off the moisture of the threads, so that according to this system the threads are dried by hot air and by friction over the plates, which are slightly convex or rounded.

"It is obvious that the details of the machine may be greatly modified without departing from the principle of the invention."

A.D. 1876, May 31st.—No. 2294.

THOMPSON, WILLIAM PHILIP. *(A communication from F. G. Sargent, Massachusets).* "Improvements in Apparatus for Washing Wool and other similar fibre." The full specification of this patent could not be understood without the drawings, to which it makes frequent reference. The following is the provisional specification, which describes the invention in general terms;—

"This invention relates to that class of machines in which a vat or tank containing the liquor is provided with squeezing or wringing rolls at one end, and with mechanism for feeding the fibre through the liquor and to the rolls.

"In carrying out my invention,—

"1st. I construct a tank or vat provided with an internal perforated false bottom; this tank is mounted on legs. At the end of the vat I mount two squeezing rolls, preferably one vertically above the other from the junction of the rolls backward, and downward to the false bottom I construct an inclined curved table; the lower part is concave upward, sometimes forming nearly a quadrant of a circle tangential to the false bottom or nearly so, the upper part is convex, and is armed with rows of rigid teeth, so shaped that while they allow the fibre to pass readily forward toward the rolls they effectually prevent it from moving backward. Above the upper toothed end of the curved table there is mounted a reciprocating frame, hereafter called the third carrier; this frame is provided with teeth pivotted thereto in such manner that as the frame moves forward they lock fast, pointing in a direction nearly perpendicular to the table, but yield as they pass over the fibre in a backward direction from the rolls. This third carrier is supported by two arms from below working on a counterbalanced transverse rocking shaft situated at the centre of the circular curve of the upper portion of the table, so that the teeth of the carrier in their forward motion traverse in a circular arc, their teeth being always close to and at a uniform distance from the table.

"2nd. The third carrier receives its reciprocating motion through a link (hereafter called the pitman) from a crank on the main shaft mounted on standards on the sides of the tank. To the rear of the third carrier is a similar frame, the second carrier provided with similar pivotted or with fixed teeth and with a link, the upper end of which is slatted and mounted loosely on a stud in the pitman, and provided with a vertical screw entering the upper portion of the slot from above. As the pitman draws the two carriers backward from the rolls it raises the link of the second carrier till it lifts the latter, so

that its teeth pass over and clear of the fibre below, and then as the carriers start forward toward the rolls the pitman lowers the said link and second carrier, so that the teeth of the latter enter the fibre, and carry a large mass of the same forward. By arranging the second carrier to rise and fall in the manner described the fibre floating in the liquor is caught and fed forward with certainty, uniformity, and rapidity. The second carrier has its hinge or joint, whereby it is jointed to the third carrier, so constructed as to limit its descent, and prevent its teeth from coming in contact with the table.

"For the purpose of feeding the fibre to the second and third carrier, I employ a swinging carrier (hereafter called the first carrier) provided with an arm or rod, the upper end of which slides in a pivotted bearing or box, while its lower end is mounted on and carried by the crank on the main shaft; the movement of the crank causes the first carrier to descend into the outer end of the tank, and move forward the fibre before it and then rise and move back in the air to its first position. The lower concave end of the table is given a curvature corresponding to the path of the first carrier. The first carrier feeds to the second, the second to the third. I place a screen in the tank below the table to hold such fibre as may pass round the rolls into the tank again.

"For the purpose of washing and rinsing the fibre more effectually I mount on the side of the tank a steam injector or pump with two pipes, through which a stream of water or other fluid is sprayed on to the fibre from one pipe just as the fibre enters the tank through the other just as the fibre is leaving it through the rolls. A third pipe may be employed to dip into the tank, and deliver water at the end furthest from the rolls.

"Sometimes, instead of swinging the third carrier from below, I swing it from above, and arrange the curve of the table to suit. I much prefer however the concave portion."

A.D. 1876, June 15th.—No. 2477.

BAMFORD, SAMUEL. "Improvements in the Method of

Treating Mixed Woollen Fabrics, for the purpose of separating the wool from any other fibrous material employed in the manufacture of such fabric." *(This patent was not completed and is void.)*

"The object of this invention is to utilize waste fabrics or rags composed of wool or worsted mixed with some other fibrous material (commonly called Bradford goods), by treating them with the solution herein-after mentioned, the result of which is the entire destruction of any other fibrous material, such as cotton, silk, or flax, the wool or worsted remaining perfectly unaffected, merely requiring stoving and carding to become ready for the wool mixing.

"The solution I employ consists of the following ingredients, but it must be clearly understood that I do not confine myself entirely to the exact proportions here stated, as they may be modified without materially affecting the results :—

Common vitriol	Two-thirds.
Oil of vitriol	One-twelfth.
White vitriol	One-twelfth.
Ammonia	One-twelfth.
Chloride of lime	One-twelfth.

"Water is then added until the strength of the mixture is reduced to about 10 degrees Twaddle's hydrometer.

"The fabrics to be treated are then boiled in this mixture for about ten or twenty minutes, when the wool or worsted will be found to remain alone, any other fibrous material present being reduced to a fine and almost impalpable powder."

A.D. 1876, June 16th.—No. 2505.

BREWER, EDWARD GRIFFITH. "Improvements in Bleaching and Purifying Wool." *(A communication from Daudier, Père et Fils, of Paris).*

"The object of this invention is to bleach wool and to purify it from matters of vegetable origin, whether in a raw or manufactured state, in skeins or hanks, in fabric, in waste or old pieces, this purification being effected in a bath composed as hereafter described and without subsequent stoving.

"This process differs essentially from the treatment generally adopted, in that the disintegration of foreign vegetable matters in the wool is produced in the bath itself without any other operation, while in the ordinary processes this is only a preliminary operation, the treatment being completed by stoving at a high temperature.

"In order to obtain a satisfactory result in treating materials according to this invention an essential point is to increase the density of the water by some composition which does not exercise a destructive action on the wool, and which will be sufficient to chemically produce the required result by adding for this purpose to a bath of this nature either acid salts for increasing the density or another acid not producing an insoluble salt.

"In describing the invention it must be understood that it is not to be limited to the employment of the particular salts named, as other simple or compound salts may be used.

"According to this invention wool and materials of vegetable origin are submitted without changing their nature to a prolonged ebullition in a concentrated bath of chlorure of calcium, and this same bath, with the addition of hydrochloric acid or a combination of this acid with metallic bases, such as aluminium, iron, zinc, copper, tin, and the like, will energetically attack the materials of a vegetable organic origin, while the wool submitted to the same treatment is not changed in any way. It is then sufficient to dip the materials to be purified into this antiligneous bath, the composition of which may be more or less charged with hydrochloric acid or its metallic combinations, according to the nature of the materials to be treated, and to raise the temperature of it to produce the disintegration which takes place in a few minutes. After this simple immersion it is only necessary to wash the material to obtain the purified product. The operation is simple as well as economical; no special or costly apparatus are required. The superintendence of the work does not necessitate any special knowledge, and uniform results are obtained.

"The antiligneous bath before described may also with

advantage be employed as a steeping bath in those cases where the treatment is carried on in combination with the acid bath followed by a stoving; in fact, if in a bath thus prepared wool containing ligneous matters is placed for a very short time, and after previous drying or airing it is placed in a stove similar to that now usually used for the purpose, all the vegetable matters fall out in dust and the wool preserves its good qualities. In this case it can be utilised with advantage in place of acids or salts hitherto employed, especially when it is used for bleaching wool and at the same time removing ligneous materials. Thus, as before stated at the commencement of this description, the bath of chlorure of calcium can be advantageously employed for bleaching wool; in fact, if the wool is steeped in a bath having for its base chlorure of calcium, and after drying or by simply draining it is dipped into a second bath, thus precipitating the oxide of calcium into its pores, a remarkable whiteness is imparted to the material. This result may also be obtained by using as a second bath sulphuric acid diluted with water or oxalate of ammonia, or simply oxalic acid.

"This antiligneous bath having chlorure of calcium as base may be employed either simply as a steeping bath or completing the operation by drying at a high temperature, or even at a low temperature, and passing through dry steam, or as a special bath for the disintegration of organic vegetable matters, or for the bleaching of wool.

"Chlorure of calcium is preferred as the base of the antiligneous bath produced according to this invention, and this is in an economic point of view. Other chemical products may, however, be employed to produce the same or similar results without departing from the invention. For example, the chlorures of barium, of strontium, of magnesium, of aluminium, of potassium, of sodium; the soluble components of these bases and the like may be employed for the purposes of this invention.

"Experience has proved that the bath prepared with chlorure of calcium, for example, becomes charged after a certain time with salts and other chemical combinations pro-

ceeding from the treatment of the material in the bath, the density of which from this fact is increased, which, however, far from injuring the operation, on the contrary singularly facilitates it; besides, the proportion of chlorure of calcium remains sensibly the same in consequence of the dissolution in the bath of salts of lime introduced by the materials to be purified. Under these conditions the duration of the chlorure of calcium bath is almost unlimited, and it is sufficient to add to it from time to time a certain dose of hydrochloric acid in order to maintain the destructive property of the woody products which characterise it.

"A bath may also be obtained by the addition of mineral or vegetable acid in glycerine, forming with these different acid combinations, which produce sulphur-glycerine, chlorhydro-glycerine, or oxalo-glycerine, baths which also possess the property of destroying the vegetable matters mixed with wool without necessitating subsequently stoving the products taken from the bath, the simple washing of same being only required after the operation.

A.D. 1876, June 19th.—No. 2529.

SACHS, JOSEPH JULIUS. "Improvements in Bleaching and Preparing for Dyeing or Printing Cotton, Wool, Hemp, Flax, Jute, and other Fibrous Materials."

"In carrying my improvements into effect I in most cases, except cotton, first wash the fibrous material in a weak solution of chlorine such as is now generally used in the process of bleaching. When treating cotton this chlorine process is not necessary. The materials to be acted upon are then subjected to the action of a solution of permanganate of potassium. For this purpose I dissolve, say, from 1 to 4 parts of permanganate of potassium in 100 parts of water, depending upon the character of the material operated upon, and I allow the matters to remain in this solution for from, say, three minutes to an hour, depending on the strength of the solution or the absorbent character of the material under operation.

"In some cases in order to expedite the action of the solution of the permanganate I add to it a small proportion of

sulphate of magnesia (Epsom salt), say, 1 oz. to 1 lb. of the permanganate. I use these solutions cold. I then subject the matters to be heated to the action of the vapours of sulphur in a close chamber until the desired discoloration is attained, which in the case of cotton is generally about three minutes. I then wash the materials in a weak alkaline solution.

"The proportions given may be varied to the character of the material under operation.

"The improvements are applicable to the treatment of the materials in a raw or manufactured condition.

"The effect of these operations is not only to bleach the material, but when so required the better to prepare it for dyeing or printing processes.

"By these means I obtain a direct bleaching of the vegetable fibre without the necessity for the use of steam or boiling water, whilst the process is expeditious, simple, and economical, and the material by it is rendered increasingly soft, elastic, and glossy, and is brought into a better condition for dyeing and printing purposes by being rendered more susceptible to dyeing and printing matters without the necessity in the majority of cases for the use of mordants.

"Having thus described my invention, and means which I adopt in carrying the same into effect, I would have it understood that what I claim is, the use of permanganate of potassium combined with sulphate of magnesia, the vapor of sulphur, and, except in the case of cotton, a weak solution of chlorine, in manner substantially as described."

A.D. 1876, June 19th.—No. 2529.

CLARK, ALEXANDER MELVILLE. *(A communication from Charles Raue of Paris).* "An Improved Black Dye."

"In the ordinary process of dyeing black logwood is applied to the materials to be dyed after they have been previously impregnated with a mordant, which usually consists of salts of iron, chromium, and copper.

"The present invention consists in forming a pure black coloring matter with logwood or its extract and the salts

which oxidize it, which is then applied to the materials to be dyed, more particularly wool and felt.

"This invention presents great advantages, the dyeing operation being effected in a single bath without mordant, and wool dyed in this manner is not injured as when dyed in the ordinary way. A considerable saving in time and fuel is also effected, while the cost of the coloring matter is but little if any increased.

"According to this invention I make a decoction or extract of logwood, and by adding thereto one of the mordants or salts used for changing it to a black I obtain a precipitate which I collect on a filter and wash. I thus obtain a black homogeneous paste in condition for use. This black will also furnish fast grey colors."

The claim which follows this incomprehensible specification is for "the manufacture of a black dye or coloring matter (termed a direct black) with logwood and the salts which serve to oxidize it, capable of being applied directly to wool, felt, and other fabrics.

"Also the employment thereof for dyeing grey, as herein specified."

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7. *British and Foreign Patents, from the Commissioners of Patents Journal, from Dec. 22nd, 1876, to Jan. 23rd, 1877, inclusive.*

Printing, Bleaching, Singeing, Ageing, &c.

3473. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, has given notice to proceed in respect of the invention of "An improved method of and machine for printing woven and other fabrics."—A communication to him from abroad by Eugène Boeringer, of Paris, France.

4223. JAMES PERCIVAL CROSS, of Halliwell, near Bolton, in the county of Lancaster, for an invention of "Improvements in

the method of and apparatus for singeing fabrics."—Dated 1st November, 1876.—This patent has passed the great seal.

4321. SAMUEL KNOWLES, of Tottington Mills, near Bury, in the county of Lancaster, Calico Printer, for an invention of "Improvements in conditioning and ageing printing fabrics, and in apparatus employed therein."—Dated 8th November, 1876.—This patent has passed the great seal.

4729. DAVID FULTON, of the Duke Street Engraving Works, Glasgow, in the county of Lanark, North Britian, for the invention of "Improvements in machinery for engraving printing rollers."—Provisional protection has been granted.

4970. JAMES ASHCROFT, of Halliwell, near Bolton, in the county of Lancaster, for an invention of "Improvements in the construction of bleaching kiers."—Dated 23rd December, 1876.—Notice to proceed has been given.

266. JAMES CHADWICK, of the Spring Brook Print Works, Chadderton, in the county of Lancaster, for an invention of "Improvements in printing textile fabrics."—A communication to him from abroad by James Harley, of Lowell, Massachusetts, United States of America.—Dated 20th January, 1877.

176,626. E. HARTMAN, of Brooklyn, E.D., N.Y., assignor to L. Dryfoos and Co., of New York city, for "Machines for printing-fabrics of circular form."—Application filed 27th April, 1869.—American patent.

Claim.—"The combination of a conical printing-roller and a conical impression-roller, operating together, substantially as and for the purposes set forth."

113,030. PERINAUD, for "Suppling re-dyed silks."—Dated 23rd September, 1876.—French patent.

113,486. IMBS, for "Prints imitating looped or cut velvet."—Dated 9th September, 1876.—French patent.

114,590. BRESSOLLES, for "A machine for supplying fabrics, whether dyed or not."—Dated 16th September, 1876.—French patent.

114,606. MATHER, for "Improvements in apparatus for steaming and ageing printed fabrics."—Dated 16th September, 1876.—(English Patent, 18th March, 1876.)—French patent.

Colours, Mordants, and Dyeing Processes.

2748. JAMES MORTON, Manager to Messieurs William Stirling and

Sons, of Cordale and Dalquhurm, Turkey-red Works, in the county of Dumbarton, North Britain, for an invention of "Improvements in preparing woven fabrics and yarns of cotton or other vegetable fibres for being dyed or printed."—Dated 5th July, 1876.—This patent has passed the great seal.

4655. JOHN SWINTON BUTLER, of Percy Street, in the county of Middlesex, has given notice to proceed in respect of the invention of "Improvements in the preparation of aniline dyes."

4696. GEORGE RYDILL, of Pontefract Villa, Highgate, London, has given notice to proceed in respect of the invention of "Improvements in dyeing dark shades of piece goods, woollen waste, hair, and rags a light fast yellow or fawn colour, dyeing fast aniline blue and other colours, utilizing the waste products for treating sewage and manure."

4839. CHARLES GIRARD, EDMOND WILLM, and GUSTAVE BONCHARDAT, all of Paris, in the republic of France, for the invention of "Improved processes for obtaining colouring matters or of processes for obtaining novel colouring matters."—Provisional protection has been granted.

4912. WILLIAM VIRGO WILSON, of 7, Cottage Grove, Bow, in the county of Middlesex, Manufacturing Chemist, and HEMINGTON CANT, of 8, Coborn Street, Bow aforesaid, Analytical Chemist, for an invention of "Improvements in the manufacture of aniline dyes."—Dated 20th December, 1876.—Provsional protection has been granted.

169. JOHN GARRET TONGUE, of the firm of Tongue and Birkbeck, Patent Agents and Engineers, of 34, Southampton Buildings, Chancery Lane, in the county of Middlesex, for an invention of "Improvements in means and processes for obtaining colouring matters from cannel, anthracite, and other coals, applicable to various useful purposes."—A communication to him from abroad by Doctor Meusel, of Breslau, in the empire of Germany.—Dated 12th January, 1877.

105,554. GRAWITZ, for "Black aniline colours."—Dated 24th August, 1876.—Certificate of addition to French patent.

114,407. MEUSEL, for "Obtaining colouring substances or colours by the chemical treatment of coal."—Dated 2nd of September, 1876.—French patent.

4286. GEORGE JOSEPH ALFRED WUTH, of Accrington, in the county of Lancaster, for an invention of "Improvements in

extracting and utilising waste fatty and colouring matters contained in the washings of print and dye works."—A communication to him from abroad by Richard Albert Forster, of the city of Augsburg, kingdom of Bavaria.—Dated 31st December, 1873.—This patent has become void.

179. FREDERICK JOSEPH BIRD, of Stroud, in the county of Gloucester, Dyer, for an invention of "An improved manufacture of mordant applicable to the dyeing of cotton and union goods."—Dated 13th January, 1874.—This patent has become void.

Treatments of Yarns, Hanks, Skeins, Spools, etc.

3476. WILLIAM ROBERT LAKE, of the firm of Haseltine Lake, and Co., Patent Agents, Southampton Buildings, London, has given notice to proceed with respect of the invention of "An improved machine for dressing and cleaning skeins or hanks of silk and other spun materials."—A communication to him from abroad by César Corron of St. Etienne, (Loire,) France, Dyer.

3582. PETER JOEL LIVSEY, of the city of Manchester, Consulting Engineer and Patent Agent, for an invention of "Certain improvements in machines for printing or embossing spools."—A communication to him from abroad by Ira Dimoc, of Hartford, in the state of Connecticut, in the United States of America.—Dated 13th September, 1876.—This patent has passed the great seal.

4710. JAMES BARNES, Slasher, WILLIAM CROSSLAND, Overlooker, and WILLIAM WESTLEY, Mechanic, all of Preston, in the county of Lancaster, for the invention of "Improvements in machinery or apparatus for sizing and drying yarn and fabrics."—Provisional protection has been granted.

145. HENRY BERNOULLI BARLOW, of Manchester, Patent Agent, for an invention of "Improvements in machines for sizing yarn."—A communication to him from abroad by William Lancaster, of Cannstadt, in the kingdom of Wurtemburg.—Dated 18th January, 1870.—The £50 stamp duty has been paid upon this patent.

7059. G. HALL, jun., of South Wellington, Connecticut, and G. W. AVERELL, of New York, N. Y., assignors to G. Hall, jun., for "Machines for printing on spools."—Patent No. 102,257, dated 26th April, 1870.—Application filed 4th April, 1876.—American patent.

Claim.—"1. In a machine for printing on spools, the combination with a

spool-carrier, of a set of reciprocating dies, and an intermittenly-operating feeding device, as and for the purpose described. 2. In a machine for printing on spools, the intermittently-revolving skeleton spool-carrier H, revolving in vertical planes, and having spool cavities *y*, in combination with the holders *a*, as and for the purpose described. 3. The combination of the intermittently-revolving skeleton spool-carrier H, with the shaft I, plate K, rachet-wheel J, connecting rods M, N, lever O, and the wheel E^1, as and for the purpose described. 4. The combination, with oppositely-operating printing-dies, of an intermittently-revolving spool-carrier, located between the same, substantially as and for the purpose described. 5. The combination of an intermittently-revolving spool-carrier, with the reciprocating dies, and an intermittently-operating feeding device, substantially as described. 6. The combination with the barrel B, of the die-plates *g*, dovetailed in guides therein, and carrying dies *f* and lugs *i*, and the shaft D, carrying cams *h*, as and for the purpose described. 7. The combination with barrels B, and the reciprocating dies *f* contained therein, of the plates *k*, attached to shafts D, and carrying inking-rollers *j*, adapted to revolve upon the periphery of the barrel and ink the surface of the dies *f* when the latter are withdrawn from the spool as described. 8. The synchronously-revolving wheels E, E^1, geared together and combined with shafts D, D^1, the reciprocating dies, barrels B, B, and the intermittently-revolving spool-carrier, located between the said dies, substantially as and for the purpose described. 9. In a machine for printing spools the combination of an inclined chute T, the intermittently-rotating spool-carrier, and an intermittently-operated feed-regulator, as described. 10. The feeding device T, and rotating carrier, H, combined with reciprocating dies *f*, *f*, constructed as and for the purpose described. 11. The combination with a carrier-wheel H, dies *f*, and feeding-chute T of a revolving shaft D, cams *h*, *v*, and lever *u*, u^1, whereby a corresponding number of spools will always be fed in and headed automatically. 12. The combination of the stationary cam *d* with the lever *a* and spring c^1, as shown and described, to hold the spool while being imprinted, and allow its exit from the chamber at the time and in the manner set forth."

114,610. PRENAT, of Lyons, for "A machine for drawing and skeining textile substances in a dry or wet state."—Dated 16th September, 1876,—French patent.

36. ROBERT GOTTHEIL, of the International Patent Office, 126, Linden Str., Berlin, Prussia, Civil Engineer, for an invention of "Improvements in the means and apparatus for dyeing warps."—A communication to him from Alfons Lemmens, of Gladbach, in the kingdom of Prussia.—Dated 2nd January, 1874.—This patent has become void.

146. EDWARD LORD, of Todmorden, in the county of York, Machine Maker, for an invention of "Improvements in sizing machines, and in apparatus for drying yarn in the processes of

sizing, dressing, bleaching, and dyeing."—Dated 10th January, 1874.—This patent has become void.

Treatments of Wool and Silk.

3509. JONATHAN HOLDEN and JOHN EDWARD HOLDEN, both of Reims, France, Wool Combers, for an invention of "Improvements in machinery for washing wool and other fibrous material."—Dated 6th September, 1876.—This patent has passed the great seal.

4228. JAMES HENRY ROGERS, of Bowbridge, Stroud, in the County of Gloucester, Dyer, for an invention of "An improvement in the process of cleansing woollen cloths preparatory to the dyeing of the same."—Dated 1st November, 1876.—This patent has passed the great seal.

4923. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, for an invention of "Improvements in the treatment of wool."—A communication to him from abroad by Jules Raulin, Professor of Chemistry at the Faculty of Sciences, of Lyons, France.—Dated 20th December, 1876.

114. JONATHAN HOLDEN and JOHN EDWARD HOLDEN, residing at Reims, France, Manufacturers, for an invention of "Improvements in machines for washing wool."—Dated 8th January, 1874.—The £50 stamp duty has been paid upon this patent.

4212. GEORGE LUNGE, of South Shields, in the County of Durham, Doctor of Philosophy, for an invention of "Improvements in scouring wool and in utilizing the products resulting therefrom."—A communication to him from abroad by Dr. Karl Krant, Professor of Chemistry, Hanover, in the empire of Germany.—Dated 23rd December, 1873.—This patent has become void.

43. JOHN PETRIE, junior, of Rochdale, in the County of Lancaster, Machine Maker, for an invention of "Improvements in machinery or apparatus for scouring or washing and dyeing wool and other fibrous materials."—Dated 3rd January, 1874.—This patent has become void.

114,439. RYDILL, for "Improvements in preparing woollen, cotton, silk and other such like fabrics, for extracting vegetable fibres therefrom, and for cleaning the same."—Dated 4th September, 1876.—(English Patent, 4th March, 1876.)—French patent.

114,440. RYDILL, for "Improvements in utilizing waste heat in drying wool, hair, woollen and linsey rags, woollen piece goods,

chemically treated with acids for removing vegetable substances therefrom."—Dated 4th September, 1876.—(English Patent, 4th March, 1876.)—French patent.

114,485. BERENGER, of Elbeuf, for "Using sulphate of Ammonia for cleansing raw or wrought wool by chemicals."—Dated 9th September, 1876.—French patent.

114,791. BRIDOUX, for "A process and apparatus for drying and cleansing wool, and for drying all wet products."—Dated 29th September, 1876.—French patent.

40,910. P. N. PERICHE, of Verviers, for "Incinerating vegetable substances in wool by applying and manufacturing salts."—Dated 22nd November, 1876, 1876.—Belgian patent.

41,078. E. GAUDCHAUX-PICARD, for an imported invention of "Charring vegetable substances in woollen and silks."—Dated 13th December, 1876.—(French Patent, 9th December, 1876.)—Belgian patent.

Finishing Operations.

2956. JOSEPH KEIM, of Tharm Alsace, Allemagne, for an invention of "Improvements in machinery for stretching and drying textile fabrics."—Dated 20th July, 1876.—This patent has passed the great seal.

3353. SAMUEL GIBSON RHODES, of Park Street, Leeds, in the county of York, Gentleman, has given notice to proceed in respect of the invention of "Improvements in finishing yarn and fabrics and in apparatus connected therewith."

3947. PAUL MAGNER, of Percy Street, in the county of Middlesex, Analytical Chemist, for an invention of "An improved process of treating vegetable fibres to impart to them a silky appearance."—Dated 12th October, 1876.—This patent has passed the great seal.

4756. ROBERT WILSON, of the Bridgewater Foundry, Patricroft, in the county of Lancaster, Engineer, for the invention of "An improved mode of finishing cotton fabrics."—Provisional protection has been granted.

4964. EDWIN FIRTH, of Dewsbury, in the county of York, Woollen Manufacturer, for an invention of "An improved method of embossing cotton, silk, woollen, and other textile cloths or fabrics, and also paper and thin metal and wood, and

in machinery or apparatus to be employed therein."—Dated 23rd December, 1876.

84. WILLIAM BIRCH, of Salford, in the county of Lancaster, Machinist, for an invention of "Improved self-acting machinery for opening, smoothing, spreading, and guiding fabrics for the use of bleachers, dyers, calico printers, and others."—Dated 8th January, 1877.

4234. WILLIAM BIRCH, of the city of Manchester, in the county of Lancaster, Machine Maker, for an invention of "Improved arrangements and apparatus applicable to machinery for opening, smoothing, spreading, and guiding calico, cloth, and other fabrics for the use of bleachers, dyers, calico printers, and others."—Dated 24th December, 1873.—This patent has become void.

4270. BENJAMIN JOSEPH BARNARD MILLS, of the firm of Harris and Mills, of 23, Southampton Buildings, in the county of Middlesex, Patent Agent, for an invention of "Improvements in machines called teazles, for raising the nap or pile of textile fabrics."—A communication to him from abroad by Pierre Fauchamps-Nicolai, of Hodimont, in the kingdom of Belgium.—Dated 30th December, 1873.—This patent has become void.

184. CHARLES DENTON ABEL, of 20, Southampton Buildings, Chancery Lane, in the county of Middlesex, for an invention of "Improvements in dressing and finishing woollen cloths and other like fabrics, and in apparatus therefor."—A communication to him from abroad by Jules Varinet et A. Enoult, fils, of Sedan, in the republic of France, Manufacturers.—Dated 14th January, 1874.—The £50 stamp duty has been paid upon this patent.

40,923. J. S. BUTLER, for "Processes for giving vegetable fibres a silky appearance."—Dated 23rd November, 1876. Belgian patent.

99,612. GALY, Sons, for "An apparatus for calendering stuff."—Dated 6th September, 1876.—Certificate of addition to French patent.

106,974. MARTHINOT, Brothers, for "A machine for shearing and dressing fabrics."—Dated 23rd September, 1876.—Certificate of addition to French patent.

114,427. DE SIMPELAERE, for "Imparting a silky appearance to textile substances."—Dated 4th September, 1876.—French patent.

THE TEXTILE COLOURIST.

No. 15.] MARCH, 1877. [Vol. III.

1. *Steam Colours from Nitro-Alizarin.**

BY L. STAMM.

It is known from the experiments of Stroebel and Rosenstiehl that nitro-alizarin dyed up an orange colour with mordants of alumina; the author communicates the results of some experiments upon the application of this material, which is now an article of commerce, as a steam colour.

He printed various mixtures of nitro-alizarin with mordants, especially with the mordants most disposed to form lakes with coloured bodies, and selecting those results which appeared to be of some value, he endeavoured to determine the best conditions for obtaining bright and deep colours.

The most interesting of the colours from nitro-alizarin is that yielded by the alumina mordant. It is a reddish orange, dull and flat after simply washing off, but much brightened by soaping, so that upon oiled cloth it rivals the chromate of lead orange.

In preparing the colour a certain proportion of acetic acid must be added, so as to prevent the formation of a lake in the colour before it is printed.

A small portion of acetate of lime brightens the shade very much, but an excess makes it dull immediately. Oil is a useful addition to the colours thickened with starch.

* Bull. de la Soc. Ind. de Mulhouse, xlvii., p. 22.

The depth of shade increases up to a certain point according to the proportion of alumina. Too much alumina reduces the colour, at the same time brightening it a little.

Nitrate of alumina gives colours somewhat darker and redder than the acetate of alumina, but they are not so fine and good.

The following proportions have given the best results:

1 gallon nitro-alizarin, 15 per cent. (Muller's).
½ gallon acetic acid.
1 lb. acetate of lime at 28° Tw.
1 quart acetate of alumina at 20° Tw.

or the following—

1 gallon nitro-alizarin.
½ gallon acetic acid.
1½ lb. acetate of lime.
2 lb. nitrate of alumina at 30° Tw.

By reducing these colours a series of very good shades can be obtained, ranging dark to light orange.

Iron liquor with nitro-alizarin gives only dull and dirty purples; acetate of lime makes the colours more grey, but they are flat and without value.

Red prussiate gives very fair chocolates with nitro-alizarin; with 1½ to 2 lb. prussiate per gallon of the colour a tolerably dark chocolate may be obtained which is fast to soap. By doubling the weight of prussiate the shade becomes nearly black, but by soaping comes back to chocolate.

With chromium mordants, at the rate of half the measure, or six-tenths of the mordant at 14° Tw. to one measure of nitro-alizarin, light chocolates are obtained. By combining the two mordants red prussiate and chromium, a series of light to dark chocolates can be obtained, some of which may turn out to be useful.

Besides the above mordants, the other metallic oxides give with nitro-alizarin only very poor colours, most of which are completely washed away by soaping. It may however be remarked that oxide of uranium gives a grey, but not so good as can be obtained from alumina. The oxides of copper, nickel, cadmium, bismuth, and antimony, give a yellowish

pink, short of brightness, the shades being too light and too dull to have any interest.

It is only the orange colour which can give this product any place among the colouring matters used in manufactures.

This colour is very fast not only to soaping treatments, but to the chloring operations. A sample of the orange was put in a solution of bleaching powder at 8° Tw. and left for ten or twelve hours, it was only acted upon in some few places, the greater part of the sample was but slightly changed; by a prolonged action of chlorine, or with bleaching powder and acid, the colours are eventually destroyed.

There are three samples of colours on calico attached to this article in the original; the orange colour might be taken at first glance as being a chrome orange, the chocolates, light-reddish and dark, having nothing special in their appearance.

2. *Note upon Chlorate of Chromium and the Formation of Chromate of Lead by Steaming.**

BY MM. STORCK AND DE CONINCK.

THE chlorate of baryta, which is now a commercial article of moderate price, being employed in certain methods of preparing aniline black, permits the easy production of other metallic chlorates. One of these, the chlorate of the sesqui-oxide of chromium, has enabled us to observe an interesting fact.

If to a hot and concentrated solution of chlorate of baryta a sufficient quantity of chrome alum be added to precipitate the whole of the baryta, a green solution is obtained, which, upon cooling, deposits crystals of chlorate of potash; the solution is the chlorate of sesqui-oxide of chromium.

If this solution be concentrated by heating, it gradually loses its green colour, becoming finally an orange red; when

* Bull. de la Soc. Ind. de Mulh., xlvii., p. 35.

now tested it shews the presence of chromic acid, which did not exist in the liquor before concentrating.

If a certain quantity of acetate of lead be added to the chlorate of chromium, and the mixture be kept some time at a high temperature, there will be obtained a precipitate of chromate of lead.

This remarkable reaction lead us to endeavour to produce chromate of lead upon cloth by steaming.

A bit of calico, soaked in the mixed liquid just mentioned, when dried in the air, had a greenish grey colour, such as is proper to the salts of sesqui-oxide of chromium. When it was steamed it took a tolerably deep chrome yellow colour, which was not removed by washing, and which became orange when passed in lime.

In our endeavours to apply the same mixture to printing we met with many difficulties.

The chromic acid on the one hand is partly reduced by the organic matter of the thickening, the sesqui-oxide fixing along with the yellow tarnished the shade; on the other hand the simultaneous production of an oxide of chlorine at the high temperature weakened the fibre in a sensible degree.

Taking the causes of failure into account, we succeeded in avoiding them by using light calcined starch as the thickening matter, and mixing a proper quantity of precipitated oxide of lead with the colour. Under these conditions, when the proportion of oxide and acetate of lead and chlorate of chromium are correctly ascertained, a clear and brilliant yellow is obtained, while the injury to the fibre is reduced to a minimum amount.

We may add, that the production by steaming of an oxidant so powerful as chromic acid in the midst of a mixture originally inactive, would appear to be capable of various applications.

3. *Notes upon Alizarine and Purpurine.*

IN the *Berichte der Deutschen Chemischen Gessellschaft* for February, 1877, there are communications from Hermann W. Vogel, and Schunck and Roemer, upon purpurine and alizarine. They are mainly of scientific interest, but there are some portions of practical interest.

Cochineal present in Purpurine.—Vogel's communication refers to a spectrum process for distinguishing between magnesia and alumina by means of purpurine, he reported previous to this paper that there were some kinds of purpurine in commerce which did not give the normal purpurine spectrum. Fresh examination shewed that this impure purpurine contained a small quantity of cochineal. When a portion of it was treated with ether the purpurine alone dissolved in it, leaving the cochineal behind, which, when further washed with ether, and dissolved by warmth in dilute alcohol, shewed in a very distinct manner its proper spectrum.

If a water solution of such impure purpurine be shaken up with ether, this solvent extracts all the pure purpurine, while the carmine or cochineal remains dissolved in the water. The mixed fluids being placed in a test glass separate, it is easy to detect the cochineal spectrum in the lower part, and the purpurine spectrum in the upper part. There is probably no more simple method by which the presence of these two bodies in mixture could be ascertained.

Sensitiveness of Purpurine in Alkaline Solution to Light.—Vogel takes the opportunity of pointing out the extraordinary sensitiveness of an alkaline aqueous solution of purpurine to the action of light, by which it loses its colour. Other colouring matters such as fuchsine, alkanet, and sandaline, which are sensitive to light, do not become bleached until after several days' exposure; stuffs dyed with these colouring matters are sooner affected. A solution of purpurine of the shade of a light-coloured red wine, shews the bleaching

action in warm weather in the course of ten minutes; even lamp light has a sensible action upon a thickness of 20 centimetres within thirty minutes. An alkaline solution of cochineal carmine is also sensitive to light, but not nearly to the same extent as alkaline solution of purpurine.

A New Body accompanying Natural Purpurine.—Schunck and Roemer, in the course of purifying commercial purpurine, observed that a portion of it could not be precipitated, or only with difficulty precipitated by weak hydrochloric acid from its alumina combination; it required boiling with strong acid to precipitate it. They obtained a small quantity of an orange-coloured substance, which a superficial examination shewed to be free from purpurine, and to differ in character from any of the substances described by Schützenberger and Schiffert as accompanying purpurine. The chief characters of this new substance are as follows:—Its melting point is 231° C.; at 232° to 233° C. it is decomposed into carbonic acid and purpuroxanthin; soluble in hot dilute alcohol and in hot glacial acetic acid, the latter solution presenting a green fluorescence, more soluble in boiling water than purpurine, soluble in benzol, chloroform, and ether, soluble in concentrated sulphuric acid, with an intense yellow colour; this solution shews no absorption bands, only a darkening in the blue. Soluble in potash, with a colour between that of purpurine and purpuroxanthine; no characteristic absorption appearances; by heating forms purpurine. Soluble in ammonia with the same colour as in potash; soluble in soda with a yellowish colour. The baryta compound is carmine red, and insoluble in water. Soluble in boiling alum water with an intense orange yellow colour, upon cooling the greater portion falls out; no absorption bands, but darkening in the blue. The purpurine yielded only about 1 per cent. of this substance, which the discoverers call purpuroxanthincarbonic acid, from its decomposing by heat into purpuroxanthin and carbonic acid.

Detection of small quantities of Alizarine in Purpurine.—The spectral analysis shews very well the presence of these two bodies, even when a small portion of purpurine is mixed

with a large quantity of alizarine, but when the quantity of alizarine is very small in proportion to that of purpurine, say present to the extent of 1 per cent., the optical method is at fault on account of the relatively great intensity of the absorption of the purpurine alkaline solution.

The known methods of separating alizarine and purpurine are all wanting in sharpness, and operating upon small quantities, give unsatisfactory results.

The statement of Schützenberger,* that a saturated solution of purpurine in alum water does not separate upon cooling, is erroneous; it entirely separates, giving a colourless filtrate, which does not shew the absorption bands of purpurine. Alizarine has the same property, but it is far less soluble in alum water than purpurine.

The different behaviours which alizarine and purpurine shew when alkaline solutions of them are exposed to the air, gives a method by which the smallest quantity of alizarine can be detected in presence of purpurine.

One gramme of a mixture of 99 per cent. purpurine and 1 per cent. alizarine was dissolved in caustic soda and left exposed to the air until it became nearly colourless, and did not shew the absorption bands of purpurine. The purpurine is by this means destroyed; the alizarine can be set free from the soda solution by addition of hydrochloric acid, taken up by ether, and its spectrum easily recognised, the destruction products of purpurine not interfering in the least. Even with 5 millogrammes of the mixture above-mentioned, containing only 0·0005 alizarine, the reaction was distinct.

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4. *Notes upon the Action of the Bleaching Hypochlorites upon Guignet's Green.*†

BY M. BALANCHE.

HAVING left a sample of calico printed with Guignet's green (fixed by albumen) for twelve hours in a solution of chloride

* Matières Colorantes, ii., p. 128.

† Bull. de la Soc. Ind. de Rouen, iv., p. 419.

of lime (bleaching powder), at about 3° Tw., I observed that it was much lighter and that the liquor was coloured. When washed, the sample was almost without colour.

To explain this, two suppositions may be entertained.

(1) Either the chloride of lime had destroyed the albumen, and the liquor became coloured by suspended pigment;

(2) Or the green itself had undergone a change and become dissolved.

In order to ascertain which of these suppositions was the true one, the liquid was filtered; it passed through the filter yellow coloured and perfectly clear; after washing the filter, there was nothing left upon it but a white deposit of carbonate of lime. There must consequently have been a solution of the green by the chloride of lime.

It is also true that the albumen was decomposed, and the reason of the print losing nearly all its colour by washing was owing to the pigment becoming freed in consequence of the change of the albumen.

In order to determine the product of the transformation of the green pigment, I treated some of the Guignet's green (from the Thann manufactory) directly with chloride of lime, in the following quantities :—

10 grammes green in paste.
170 grammes chloride of lime at 13° Tw.

Ground these materials together in a mortar. In twelve hours in the cold, with occasional agitation, it was found the green had completely dissolved; in warmth the action is more rapid; the liquor was coloured of a reddish brown, owing to the presence of chromic acid. Hypochlorite of soda has the same action as hypochlorite of lime. It appears then that Vert Guignet which is a particular oxide of chromium, not easily acted upon by ordinary reagents is transformed into chromic acid in the cold by the hypochlorites, a fact not, I believe, previously known, and which though of secondary importance, deserves to be noted.

It is known that there is great difficulty in removing this green from printed pieces by the methods of bleaching and discharging; the action of bleaching powder may be utilised

in bleaching this green, but to prevent an injurious action upon the fibre it must be used weak, in which state it is not so effective, but by following with a good washing and a soaping, the desired effect will be accomplished.

5. *Note upon some Chemical Properties of the Green Oxide of Chromium.**

BY M. G. WITZ.

THE transformation of the green oxide of chromium, known under the name of Guignet's green, into chromic acid by contact with solution of alkaline hypochlorites, is a new fact which we owe to M. Balanche. Although this green, fixed by albumen, can be easily and completely bleached in this manner, it is probable the practical application of the process in discharging will be very limited; but from a chemical point of view this slow oxidation in the cold deserves to be studied, I have therefore given some results of laboratory experiments with hypochlorites and other oxidizing agents.

(1) Hypochlorite of lime (bleaching powder) sp. gr. 1·014 or 3° Tw. nearly, which requires some hours to act in the cold, operates immediately when warmed—this characteristic reaction may probably be of some application in analytical chemistry—a little chromate of lime separates sometimes by evaporation which is soluble in hydrochloric acid.

1,000 grammes of bleaching powder solution can dissolve 10 grammes of dried Guignet's green in two or three minutes at boiling heat.

The ultimate reaction may be roughly represented by assuming that 3 equivalents of hypochlorite of lime and 2 of oxide of chromium, give rise to 4 of chromic acid and 3 of calcium chloride.

When an excess of hydrochloric acid is added to a solution

* Bull. de la Soc. Ind. de Rouen, iv., p. 421.

of hypochlorite, the mixture has no action upon the green oxide.

When nitric acid is added so as to pass the point of neutralizing the small quantity of excess of lime present in a clear solution of bleaching powder, it injures its power of acting upon the chromium; a small quantity, not exceeding 1 part of acid to 2,000 parts of solution at 5° Tw., increases its powers.

On the other hand a small quantity of hydrate of lime in suspension in the bleaching powder solution retards its oxidizing action.

It appears, therefore, that the neutral solution at boiling point possesses the maximum effect upon the chromium oxide; these are also precisely the best conditions for obtaining oxygen from the hypochlorites, and it might be concluded that the formation of chromic acid was specially owing to the oxygen in the nascent state, and not to the chlorine or its oxygen compounds. However, my attempts to render the action more energetic, and to increase the activity of the separation of oxygen by the well known influence of a salt of cobalt upon the bleaching powder, did not meet with success.

(2) Diluted hypochlorite of soda effects the same change with the assistance of heat, but in the cold it acts more slowly than the bleaching powder. It is necessary to renew the contact of surface by agitation, and when another insoluble matter is present the green is only completely changed after several days. The yellow colour of the liquor observed in treating certain parcels by this agent was incorrectly attributed to the presence of chromates in the colour, for, in reality, it resulted from an oxidation of a part of the chromium green.

The green pastes, which have a slightly yellowish shade (as some samples of German origin), do actually yield chromate of soda when treated by a solution of hypochlorite of soda, and leave a slight residue of a very pale yellow colour, flocculent, heavy, insoluble in water and acetic acid, yielding immediately chromic acid upon addition of a few drops of hydrochloric acid; baryta is found in the solution, from which it is concluded that there exists some chromate of

baryta in these qualities of green to which their distinctive shade is owing.

The examination of the green pigment for insoluble chromates is very simple. It consists in mixing the pigments with pure hydrochloric acid diluted with water. Upon settling, the liquid floating above is perfectly limpid, and shews by its yellow or orange colour that it contains chromic acid. The base which exists also in solution can be ascertained by the ordinary analytical methods.

Some analagous facts may be cited with regard to the properties of the chrome green.

(3) The bi-hydrated sesqui-oxide of chromium, or Guignet's emerald green, is not acted upon even at boiling heat by alkaline liquids; owing to this property we are enabled, as it is well known, to free it from the boric acid used in its preparation.

Thus, when the green is boiled with a somewhat concentrated solution of caustic soda, no yellow colouration is observed unless some chromate has been previously added to the colour to modify its shade.

But if some crystals of red prussiate be added to the hot mixture of alkali and chromium green there is an immediate oxidation; the oxide of chromium is entirely changed into soluble chromate, and there remains only a small quantity of oxide of iron in the insoluble state.

A specimen of chromium green was fixed by printing with albumen, forming a dark shade perfectly fast to prolonged soapings and other treatments; being covered with a thin layer of caustic soda at 8° Tw., and raised to the boiling point, it was bleached in a few instants in places where crystals of red prussiate touched it. With the alkaline mixture the chromium green disappeared completely with heat, or left only a light yellow colour due to chromate of baryta mixed with it, the cotton fibre was not further changed than by acquiring a light buff shade from the oxide of iron deposited upon the whites. If the caustic be mixed with a little alkaline tartrate, the oxide of iron does not precipitate from the clear yellow liquid, and the cotton then remains white.

The coagulated albumen is destroyed at the same time as the chromium green, by the oxidating action of the alkaline red prussiate. Probably, if it was desirable, a white discharge style upon chromium green might be effected by means of the red prussiate.

(4) There is another case of the formation of chromic acid from oxide of chromium in alkaline solution; it is described by Prud'homme in the *Bulletin de la Société Chimique de Paris*, xvii., p. 253 (1872). In the presence of chromium oxide the oxide of copper dissolves in potash, and at a temperature below 212° it forms a bright red precipitate of sub-oxide of copper (which afterwards becomes black), while at the same time there is formation of chromate of potash. I refer to this simply, for the experiment tried with pure soda at 18° did not succeed; heat produced a precipitation of chromium oxide from the alkaline solution without any signs of oxidation.

The immediate change in the cold of oxide of chromium in alkaline solution into chromate, by means of the puce coloured oxide of lead has been long known.

(5) When the chromium green in suspension in water is heated with a solution of permanganate of potash either pure or with addition of caustic soda, the transformation of the oxide of chromium into chromate takes place rapidly; brown flakes of oxide of manganese separating at the same time; this has been noticed by Rose and Wurtz. Solution of permanganate of potash acidified with sulphuric acid, also changes the chromium oxide into chromic acid in a few hours if cold, and quickly when heated, and this is generally without any deposition of oxide of manganese.

The same reaction, somewhat modified, permits the solution of a little chemical problem. "Given a specimen of chromium green printed with albumen, to demonstrate the presence of oxide of chromium by transforming it into chromate of lead upon the cloth."

This can be done easily by the wet process and at a low temperature. The sample to be operated upon is gently heated in a mixed solution of acetate of lead and permanganate of potash, kept clear by a few drops of nitric acid;

the oxide of manganese which is deposited upon the cotton is removed by washing with dilute bisulphite of soda, and the shade of the chromate of lead becomes evident although tarnished by some of the oxide of chromium which has escaped oxidation in the depth of colour. This singular simultaneous conversion by oxidation and double decomposition takes place also in the cold in a few hours, but it is more rapid and complete upon the chromium oxide in the free state than when it is fixed by albumen.

(6) With the soluble salts of chromium, the oxidation into chromic acid is also easy. Thus, by treating with heat, crystals of chrome alum with an acidulated solution of permanganate of potash, there is a brown precipitate which disappears in a few moments; the liquid clears up, shews a dark yellow colour, and the presence of chromic acid is easily demonstrated.

Hypochlorite of soda does not give rise to any chromic acid by acting upon acid solutions of chromium salts.

(7) The anhydrous sesqui-oxide of chromium in impalpable powder, which resists the action of most chemical agents applied in the wet way, begins to be acted upon immediately by boiling hypochlorite of lime, more slowly in the cold. The action is accompanied by disengagement of small gas bubbles.

The intensity of this action varies considerably, according to the origin or mode of preparation of the anhydrous oxide. For bright green-coloured oxides, the action is immediate and complete; some other varieties appear not to be acted upon at all.

By contact with sesqui-oxide of chromium, the solution of bleaching powder produces spontaneously at the temperature of 60° F., a feeble disengagement of oxygen gas; much more slowly, however, than takes place either with sesqui-oxide of manganese or pulverised native peroxide of manganese. With the latter, the production of gas is tolerably abundant and apparently the same whether in sunshine or shade. The hypochlorite of lime usually remains colourless with oxides of manganese, while the hypochlorite of soda containing

some bicarbonate of soda is soon coloured a reddish purple by the formation of a trace of permanganate.

In conclusion, it may be stated generally that bi-hydrated or anhydrous sesqui-oxide of chromium can be easily oxidized into chromic acid in the wet way by alkaline oxidizing agents, or by the permanganates even in the acid state, especially with the assistance of heat.

The solution of Guignet's green by alkaline oxidizing agents, at a low temperature or by heat, is the more remarkable as this oxide is not acted upon by solutions of caustic alkali, nor by nitric acid; hydrochloric acid only dissolves it slowly at a boiling heat; bicarbonate of soda has no action upon it.

6. *Upon Silk Printing.**

Black for Ground or Outline, No. 3.

Gall liquor at 22° Tw.	18 lb.
White starch	2½ lb.
Gum substitute	2½ lb.
Olive oil	6 oz.
Tallow or fat	1 lb.

Boil and when cold add

Muriate of iron at 72° Tw.	1½ lb.
Acetate of iron at 26° Tw.	2½ lb.

Chocolate Colours.—The outline chocolate below is made with archil, as it is intended for printing before scarlet and red, which colours cut into the ordinary wood chocolates, when they fall upon them.

Archil at 18° Tw.	11 gallons.
White starch	10 lb.

Boil, and when cooled down to 100° F., add

* Abridged from the work of M. D. Kœppelin upon this subject. *Continued from p. 92.*

Alum	8 lb.
Salammoniac	2 lb.
Tartaric acid	3 lb.

When quite cold, for each gallon of colour add 2 lb. of acetate of indigo, at 22° Tw., or the same quantity of sulpho-prussiate of indigo. This colour, without the indigo, gives a good reddish chocolate.

Chocolate for Grounds, No. 2.

Redwood extract at 26° Tw.	1 gallon.
Logwood liquor at 30° Tw.	¾ gallons.
Bark liquor at 30°	¾ gallon.
Acetate of alumina at 18°	1½ gallons.
Boiling water	½ gallon.
Salammoniac	3 lb.
Tartro-acetate of copper	8 lb.
Dextrine gum water	3½ gallons.

Heat up to 140° F.

Wood Outline Chocolate, No. 3.

Of the above chocolate	16 gallons.
Green, No. 1 (see further)	3 gallons.

Different proportions of chocolate and green may be employed to obtain colours of greater or less intensity.

It sometimes happens that the chocolate grounds printed with No. 2 above come up covered with orange specks. This is attributed to the formation of an acid salt of copper, which crystallizes on the sieves, especially when the printing room is warm and dry, and the sieve cloths old. Although this is a very rare occurrence, it is best to take precautionary measures against it, and it is found that the addition of the smallest quantity of sulpho-prussiate of indigo will prevent the formation of these orange specks; it is best added in the shape of Green No. 1, of which 1 part to 32 parts of chocolate are sufficient to effect the purpose without any injury to the beauty of the colour.

Browns or chocolates, in which chlorate of potash and red prussiate are employed and commonly used for woollen and calico, can also be used for silk printing.

Red and Scarlet Colours:—

Outline Red, No. 1.

Cochineal liquor at 8° to 12° Tw.....12 gallons.
White starch .....14 lb.

Boil, and when partially cool, add

Oxalate of potash ..... 2¼ lb.
Oxalic acid ..... 2¼ lb.
Crystals of tin ..... 4½ lb.

When the colour is quite cold, add

Bichloride of tin at 130° Tw. ... . 2 lb.

Outline Red, No. 2.

Cochineal in grains .....13½ lb.
Boiling water..... 3½ gallons.
Oxalic acid ..... 2 lb.
Crystals of tin ..... 1¼ lb.

Mix the whole together in a wooden tub provided with a cover; leave for twelve hours, at the expiration of which time the cochineal will be found perfectly softened, and it is only necessary to strain the liquor through a fine cloth, and extract as much as possible of it from the insoluble matter by a press or some other contrivance. Add water to make up the measure of fluid to 4¾ gallons; thicken with 7½ lb. white starch, let the colour become quite cold, and add 1 lb. of bichloride of tin at 130° Tw.

Red for Grounds, No. 3.

Cochineal .....39 lb.
Boiling water.....20 gallons.
Oxalic acid .....10 lb.
Tin crystals ..... 7 lb.

From this mixture there should be obtained 24 gallons of liquor, which is to be thickened with white starch, and when cold 4 lb. of bichloride of tin at 130° Tw. added.

Red Standard, No. 4.

Cochineal liquor at 8° Tw. .....10½ gallons.
Gum .....36 lb.
Crystals of tin ..... 4¼ lb.
Oxalate of potash..... 2¼ lb.
Oxalic acid ..... 2¼ lb.

Heat to 100° F. to dissolve the gum and salts, and when the colour has cooled add

Bichloride of tin at 130° Tw. .....2 lb.

Instead of using cochineal liquor in the above receipt, there may be taken instead 30 lb. of cochineal, and the solution made as in the Outline Red, No. 2, making the liquor up with water to 10½ gallons.

Red for Sprigs, No. 5.

Red standard No. 4 ..... 7 gallons.
Orange No. 3 .... 3 quarts.

Other reds can be made in the same way, increasing the orange to one-sixth of the quantity of red standard, and by reducing with gum water.

Notwithstanding the greater cost of gum, the cochineal colours thickened with it are more economical in use than those thickened with starch. It requires nearly double the quantity of starch colour than gum colour in printing, and the latter colours never shew the white cracks which are seen after washing off starch colours, which are caused by the colour peeling off before steaming in the folds of the goods; this serious defect is mostly observed in heavy grounds. The starch colour rests very much on the surface of the silk, and is easily detached before steaming, while the more fluid gum colours penetrate into the interior of the tissue.

Pink Colours:—

Standard Pink, No. 1.

Cochineal liquor, at 7° Tw..... 3 gallons.
Boiling water..... 2½ quarts.
Crystals of tin .....14 oz.
Oxalic acid ..... 1½ lb.
Bichloride of tin ..... 8½ oz.
Thick gum water ..... 2½ gallons.

Dissolve the oxalic acid in the water first, and then mix the other ingredients. To make colours from this standard it is only necessary to reduce it with gum water to any desired extent, say for a dark shade of pink, 2 measures of the standard to 1 measure of gum water, and for a light shade, 1 measure of the standard to 6 measures of gum water, and of course any intermediate proportions.

Chinese Pink, No. 2.

Standard pink, No. 1	1 gallon.
Gum water	12 gallons.
Jonquille (see afterwards)	8 gallons.

Finer shades of pink are made with ammoniacal cochineal, a standard solution of which, containing 1 lb. of dry prepared cochineal per gallon of water, is employed.

Pink Standard, No. 3.

Ammoniacal cochineal	2¾ gallons.
Thick gum water	2¾ gallons.

heat to 100° F., and then dissolve in it

Alum	2¼ lb.
Oxalate of potash	½ lb.

The colours are made from this standard by reducing with gum water to the intensity required.

Very Dark Pink, No. 4.

Pink standard, No. 3	1 gallon.
Crimson, No. 5 (below)	1 quart.

Crimson, No. 5.

Dry ammonical cochineal	8 lb.
Boiling water	1½ gallons.
Acetate of alumina, at 18° Tw.	1¼ gallons.

Leave the materials together for several hours at a gentle heat, or until the whole is dissolved, strain through sieving silk, and add warm water to make up the whole to 2¾ gallons, thicken with 6 lb. of gum, and when cooled down to 100° F., add 1¼ lb. of oxalate of potash.

Lilac Colours from Logwood:—

Standard Lilac, No. 1.

Logwood liquor, at 30° Tw.	1½ gallons.
Acetate of alumina, at 18° Tw.	2½ gallons.
Dry ammoniacal cochineal	1¼ lb.
Oxalic acid	1 lb.

Mix the whole in a pan and raise to the boil for a couple of minutes, then add

Thick gum water	1¼ gallon.

allow the colour to cool, and add the following solution:—

Red prussiate liquor, at 24° Tw..... ½ gallon.
Alum ..... 6 oz.
Oxalic acid ..... 4 oz.

heat gently until the salts are completely dissolved, and when cold add

Bichloride of tin, at 130° Tw..... 3 oz.

With this standard lilac, and the acetate of alumina lilac standard, all shades from the darkest purple down to the palest colour can be obtained by mixing in proper proportions, the lowest shade being about 1 measure of the standard lilac No. 1, to 72 measures of the acetate of alumina lilac standard.

Lilac Colours from Cochineal:—

Dark Lilac, No. 1.

No. 3 pink standard..... 1 gallon.
Sky-blue, No. 1 (see further) ..... 1 quart.

Pale Lilac, No. 2.

Dark lilac, No. 1 ..... 1 gallon.
Gum water ..... 3 gallons.

Blue Colours from Prussiates:—

Dark Blue for Grounds, No. 1.

Water..... 3 gallons.
Starch ..... 6 lb.
Tartaric acid .....15 lb.
Oxalic acid ..... ¾ lb.
Yellow prussiate .....15 lb.
Tin pulp .....20 lb.

Boil the water and starch well together, and then add the tartaric and oxalic acids; mix well, and when the whole has cooled down to 100° F., add the yellow prussiate in powder, and when completely cold add the tin pulp or prussiate of tin. Just before giving out for printing add 1 lb. of dextrine or soluble gum per gallon; this is to prevent the risk of the colour running in the steaming.

A blue possessing a purplish hue can be made by the following formula:—

Blue, No. 2.

Water	2½ gallons.
Starch	4 lb.
Flour	1¾ lb.
Thick tragacanth gum water	½ gallon.

After boiling the above, the hot mixture is emptied into a tub, and the following added :—

Red prussiate	4½ lb.
Tin pulp	22 lb.
Yellow prussiate	11 lb.
Tartaric acid	13½ lb.
Oxalic acid	¾ lb.

The tartaric acid is added when the mixture has cooled to 86° F., and the oxalic acid is previously dissolved in about a quart of water. When about to be used and the colour quite cold, add 13 oz. of sulphuric acid mixed with 13 oz. of water. This colour should be steamed the same day it is printed; as it does not work well when old it should not be made in larger quantities than is required.

Reducing Paste for Blues.

Starch	6 lb.
Water	6½ gallons.
Oxalic acid	1¼ lb.
Water, hot	¾ gallon
Tin pulp	4 lb.
Bichloride of tin	1 lb.

Boil the water and starch and let the paste become quite cold, then add the oxalic acid dissolved in the hot water, and lastly the other ingredients.

Gum Blue, No. 3.

Thick gum water	4 gallons.
Water	2 gallons.
Tartaric acid	16 lb.
Oxalic acid	1 lb.
Yellow prussiate	16 lb.
Tin pulp	28 lb.

Make the gum water and water hot, and dissolve the two acids in the mixture, then dissolve the yellow prussiate, and when all is cold add the tin pulp or prussiate of tin,

Reducing for Gum Blue, No. 3.

Boiling water	1¼ gallons.
Tartaric acid	1½ lb.
Oxalic acid	½ lb.
Thick gum water	1½ gallons.
Tin pulp	8 lb.

The formation of blue colours from these receipts is owing to the action of the acids upon the prussiates; the base potash is taken by them, there is disengagement of some prussic acid, and production of a compound of the elements of prussic acid and iron, which fixes by steaming. The pale colour, as it is when produced, becomes dark by oxidation, which takes place when the pieces are exposed to the air, and by washing in water. The prussiate of tin gives body and brilliancy to the colour.

Sulphate of Indigo Blues:—

Sky Blue, No. 1.

Boiling water	1¼ gallons.
Alum	¾ lb.
Tartaric acid	1 lb.
Extract of indigo	2 lb.

Sky Blue, No. 2.

Boiling water	4 gallons.
Yellow prussiate	8 lb.

Boiling water	2 gallons.
Tartaric acid	3 lb.

Water	3 gallons.
Sulphuric acid	3 lb.

The above three solutions are to be made separately.

Thick gum water	12 gallons.
Water	6 gallons.
Sky blue, No. 1	3 gallons.

When this mixture is made add the first solution alone, then the second, and lastly the third, stirring well after each addition.

When these light blues are printed as grounds care must be taken that the pieces do not lie upon one another, for, if so, the other colours will probably be injured by the acid in the blue forming light stains. The pieces should be hung up in a dry place until they can be steamed.

Ultramarine Blues:—

Ultramarine Blue, No. 1.

Albumen solution	¾ gallons.
Ultramarine	4¼ lb.

Ultramarine Blue for Two Blues, No. 2.

No. 1 blue (above)	1 gallon.
Water	4 gallons.
Zinc white or chalk white	10 lb.
Albumen solution	4 gallons.
Ammoniacal soap	½ gallon.

Albumen Solution.

Blood albumen	6½ lb.
Water at 90° F.	1½ gallons.
Ammoniacal soap	½ gallon.

Ammoniacal Soap.

Soft soap	3 lb.
Warm water	4 lb.

Dissolve the soft soap, and add

Spirits of turpentine	2 lb.
Ammonia	2 lb.

[*To be continued.*]

7. *Upon the Theory of Aluming Wool for Dyeing.*

THIS abstract of the labours of M. Paul Havrez is taken from the *Moniteur Scientifique*, xiv., p. 600; it has the advantage of having been drawn up, or at least approved of by

the author himself. The original memoir is in the *Bulletin du Musée de l'Industrie*, a Belgian publication. M. Havrez was the director of the Technical School at Verviers.

(1) Among the principal facts observed in the action of pure wool upon alum dissolved in pure water, we may distinguish two series of causes, those of the action upon the wool and those upon the solution itself, both varying according to the time, quantity, temperature, etc. The causes which act during the aluming appear to be, first, the *dissociation* of the alum by the water more or less heated. Then is produced a mixture of alum, hydrate of alumina, and hydrated sulphuric acid; it is the same for sulphate of alumina, which can replace alum though it does not give precisely the same shades; in the second place, the *absorption* and the separate adhesion of a special unequal nature between the fibre and the two hydrates of alumina and sulphuric acid. M. Chevreul has shewn that under the same circumstances of dilution, time, and temperature, 1,000 parts of wool absorbed 24 parts of sulphuric acid while only 10 parts of alum were absorbed.

Our observations of the action of wool upon a mixture of alum and sulphuric acid have also demonstrated that there is more acid absorbed than alum, for continued alumings in the solution employed shewed that it became nearly deprived of acid while alum remained.

This unequal absorption, which in practice is called aluming or mordanting, is a variety or form of dialysis where the porous body (the septum) is the wool which first takes up, then sets at liberty the dissociated substances it contains, when placed in a bath of colouring matter.

The absorption makes the dissociation permanent, gives it a stability and solidity which is afterwards made visible by its reaction upon dyeing matters.

We will examine the effects of these two successive actions dissociation and absorption upon the alum solution and the alumed wool.

(2) Effects of this dissociation and absorption upon the alum solution. The theory of the dissociation of alum by water has

been perfectly confirmed by the study of the alum liquors used in mordanting.

The sulphuric acid dissociated, being fixed or non-volatile, could not (like hydrochloric acid) separate from the mass by the boiling of the sulphate of alumina, it is conceivable that if the solution had no action upon the wool, or only acted very slightly and for a few moments, the dissociation would not be made evident by any sensible change, the relative proportions of the materials being unchanged.

But if a dialyser, or if wool intervenes, the sulphuric acid being absorbed in greater proportion than the alumina, the latter will accumulate in the liquor.

Thus, *the alum liquor will be poorer in sulphuric acid and richer in alumina according to the quantity of pure wool which has been acted upon*, whether the action has been at one operation, or whether the result of several successive operations, or whether it has been produced by a number of repeated absorptions produced by a prolonged boiling of the materials together.

This effect has been proved in all our experiments, and most notably in the dyeing in *series* of wool, whether neutral, slightly acid, or sulphured, which have been successively alumed in the same bath. The basic alumina becomes more and more predominant as evidenced by the action of the liquid upon litmus, by the bluer and richer shades which it enables the wool to dye, or lastly by the accumulation of the precipitate of dehydrated alumina in the liquor.

Let us examine why this precipitate does not shew itself at once. The alumina separated from the alum would at first be in the soluble state.*

Further, even after the first aluming the excess of basic alumina in the liquor is in the soluble state. In fact, a solution of 1 part of alum in 1,000 to 5,000 parts of water, in

* M. Havrez here quotes the observation of Tichborne upon dilute alum solutions heated to considerably above the boiling point of water. But in fact, a solution of alum saturated in the cold is dissociated by simply boiling in a flask for an hour with visible separation of a precipitate; this precipitate, analysed by Naumann, is not dehydrated alumina, it is an insoluble kind of alum containing besides alumina, sulphuric acid and potash.—*Ed.*

which 100 parts of wool have been mordanted, does not become turbid upon addition of carbonate of soda. Ebullition is necessary before the flakes of dehydrated alumina become insoluble.

It may be conceived that the soluble alumina which accumulates in an alum bath only precipitates through the action of long boiling, a state of affairs only existing after a succession of alumings. When rinsing the wool which has been a long time boiled in old alum liquors, it is found to be loaded with white powdery insoluble dehydrated alumina.

(3) Effects of the Dissociated Alumina and Sulphuric Acid upon the Wool:—These effects differ according to the relative proportions of wool and alum. The wool which has been more or less modified to begin with by its preparation (scouring with alkalies, sulphuring, and incomplete washing in calcareous waters), and the mineral matters, especially ferruginous, which it contains ought to react differently upon them after the unequal absorption of sulphuric acid and hydrate of alumina. It is known how much more energetically alkalies act upon wool than acids do. The study of these two actions will give a probable explanation of what happens during the aluming, and especially of the considerable deterioration of wool with a small quantity of alum, and its preservation when the quantity is considerable.

Dilute Sulphuric Acid upon Wool.—M. Chevreul proved the formation of sulphate of ammonia produced at the expense of the wool, when the latter was steeped in a cold solution of alum. He also observed that the mineral substances in the wool, and especially the ferruginous matters, were dissolved and removed by steeping in weak sulphuric acid; 1,000 parts of wool before treatment left 1·1 of ash (silica and iron), but after steeping in acid left only 0·53 ash, principally silica. The colours obtained by dyeing wool treated with acid in colouring matters appeared to M. Chevreul to be purer and clearer than those on untreated wool. We have observed the same on the dyeing of sulphured wools charged with sulphuric (query sulphurous?) acid; we believe also that wool became whiter with sulphuric and oxalic acids.

Gerhardt also observed the production of sulphate of ammonia by the action of weak sulphuric acid upon wool; besides this there is formation of sugar, tyrosine, and leucine.

In effect sulphuric acid is energetically absorbed by wool. According to the experiments of Chevreul it requires a large quantity of water to deprive the wool of this acid, at the same time the mineral bases, lime, and iron are removed, which enables the wool to dye up finer shades. The acid may exist as such in the pores of the wool when the wool is in too small quantity to neutralize it by forming sulphate of ammonia with it; the acid will be neutralized and annulled when the mass of wool is large, or when it is kept for a long time at boiling point with it.

In reality *when the wool is more than fifteen times greater than the alum*, the bath after boiling does not redden litmus, nor the dyes from logwood, Brazil wood, etc., which the wool subsequently takes. There is not enough acid to maintain the hydrate of alumina in solution, and this can be seen as a white powdery matter, probably in part dehydrated.

This alkaline reaction of the wool shews even when it has been previously acidified. After a number of repeated alumings in the same liquor, the bath becomes alkaline in its behaviour to litmus; it is possible that the sulphate of ammonia formed helps to give the blue shades in dyeing; the presence of brown sulphate of iron shews itself by degrees in the bath after several alumings.

If there is *less than 15 parts of wood for 1 part of alum*, and the boiling not too prolonged, the dissociated acid shews itself in the wool, it probably therefore reforms sulphate of ammonia with excess of acid; in all cases it manifests itself in the liquor and upon the wool by redding, brightening, and making paler the litmus test, and in the further dyeing of the wool in logwood, Brazil-wood, etc. It retains alumina in solution during the aluming, and hinders it from taking the insoluble dehydrated state, and from changing, tarnishing, and browning the dyes which it afterwards takes.

The excess of alum, and, in consequence, the dissociated sulphuric acid which is absorbed, purifies the wool from its

ferruginous matters, which enables it to take brighter and clearer dyes. The more alum there is and the more the wool becomes charged with sulphuric acid, which retains the alumina and opposes the formation of coloured lakes, the brighter and redder are the dyed tints obtained.

Soluble Hydrate of Alumina and Wool.—We have seen that this agent cannot act unless the large mass of wool (fifteen times the quantity of alum) neutralizes the acid by a long continued boiling. When the mass of wool is small and that of the alum large, the acid in excess in the wool may react upon the hydrate of alumina, and oppose its action upon the wool and in dyeing.

Hydrate of alumina is in excess in alum liquors where either there has been a large quantity of wool, or where several parcels of wool have been heated, or where a prolonged ebullition with wool has removed the sulphuric acid. This has been shewn by our experiments. The excess of alumina becomes evident by the whitening of the boiling water, and by the gradually increasing depth and blueness of the colours dyed up in logwood or Brazil-wood upon successive parcels of wool mordanted in the same liquor.

It is therefore when there are more than 15 parts of wool for 1 part of alum that the action of the hydrate of alumina is visible upon the wool, but in this case the wool becomes damaged; it darkens, gives off odorous gases, and will only dye up dull shades. A prolonged ebullition must therefore be avoided in such cases. This injury to the fibre is probably connected with the powerful action which the hydrated alkalies have upon wool. This explanation seems admissible seeing that wool can be safely boiled with 1 per cent. of alum mixed with a little acid, or with an excess of alum, while 1 per cent. of pure alum changes it when the boiling lasts for not more than fifteen minutes.

We may remark that heat is not a necessity for the union of hydrate of alumina with wool employed in large quantity, for we have perfectly mordanted wool at a low temperature by the aid of hydrate of alumina held in solution by acetic acid. This aluming wool at low heats preserves the wool,

and also the chemical activity of the hydrate of alumina fixed.

Wool may have a special coagulating action at the same time as an absorbing power for soluble hydrate of alumina, reference may be made to the fact that Graham found the coagulation of soluble silicic acid to be favoured by contact with solid bodies such as graphite.

(3) *Conditions of Time, Quantity, and Temperature, which affect the Aluming.* — We will examine the causes which increase the amount of hydrates dissociated in a mixture, in a state of equilibrium of water, hydrate of alumina, hydrated sulphuric acid, and sulphate of alumina or alum. These causes are *(a)* the mass or quantity of water; *(b)* the temperature; *(c)* the mass of the absorbent or dialyser (wool); and *(d)* the duration of the action.

(a) Action of the Mass of Water.—The addition of water during the aluming increases the amount of alumina fixed upon the wool, since it takes afterwards bluer, purer, and darker colours. Without the dissociation promoted by the mass of water, the greater dilution of the alum would weaken the effects of the aluming so as to produce paler colours afterwards.

(b) Action of the Temperature of the Aluming.—The heat of the alum liquor dilating the pores of the wool frees them better from air, and should therefore increase the absorption of the dissociated hydrates. The heat then contributes to upset the equilibrium between the quantities dissociated and consequently provokes new dissociations, and augments the total quantity of alum successively dissociated and absorbed. High temperature should therefore act like an alkali during the aluming; all our experiments have confirmed this. It appears also that in the cold the sulphate of alumina (or the alum) predominates in the aqueous solution, while at high temperatures the dissociated hydrates of alumina and sulphuric acid predominate.

The very different solubility of alum in cold and hot water, may also influence the equilibrium. The dehydration of the alumina by heat, and its precipitation in the inactive state, may also intervene when a large mass of wool has removed

the sulphuric acid ; this decomposition would act the same as an absorption of the dissociated hydrate, and promote a fresh dissociation.

(c) Action of the Quantity of Wool.—The quantity may act simultaneously or successively upon the same bath. Now, as the greater the quantity of wool the greater is the quantity of hydrates dissociated (hydrated sulphuric acid especially) and removed from the bath, the equilibrium of the solution is upset, and in consequence a fresh portion of alum is brought under the dissociating influences, and so the quantity of alum dissociated, with neutralization of acid and fixation of alumnia, should increase with the quantity of wool. This mass of wool acts therefore as an alkali during the aluming.

(d) Duration of the Action of Aluming.—The prolonged action of the aluming promotes a succession of absorptions by the wool, followed by a succession of dissociations. The duration accumulates the reaction of the two dissociated hydrates upon the wool; every instant the absorption by the wool of the molecules of sulphuric acid disturbs the equilibrium of the salts, causing a fresh dissociation of sulphuric acid, which continues as long as the absorption continues.

We found it going on after five hours' boiling. A long aluming at the boil constitutes an accumulated series of dissociations and absorption of basic alumina, with saturation of the acid by the elements of the wool; the result being that long boiling acts as an alkali in the aluming.

A boiling of five hours in a bath, which had served for four alumings and which consequently contained but little alumina, did not injure the wool on account of the large quantity of sulphuric acid, which prevented the decomposing action of the basic alumina and purified the wool from the iron impurities in it. The wool was in good condition and took a pure red colour when dyed in red wood; therefore, *the long duration of a boiling in a weak alum does not injure, or very slightly injures the wool, provided there be at the same time an excess of sulphuric acid in the liquor, and further, the long duration of the aluming acts again as an alkali and tends to render the aluming basic, notwithstanding the excess of acid present.*

The duration and quantity of wool act then in the same manner during the aluming by augmenting the totality of dissociations and absorptions, the one by succession, the other by simultaneousness; they cause an adhesion of basic alumina and give blue shades when dyed in logwood and Brazil wood.

To resume: the *blue* tints from logwood and the *purplish* tints from Brazil wool which are due to the basic hydrate of alumina are produced—

(1) By a comparatively small quantity of alum.

(2) By a comparatively large quantity of water.

(3) By a comparatively large quantity of wool (more than fifteen times the weight of the alum).

(4) By a long duration of the aluming.

(5) By a high temperature in mordanting and dyeing.

(6) By addition to the alum of alkali, or alkaline salts, or neutral salts with a volatile acid (nitric, hydrochloric, acetic, etc.), or an acid not easily soluble (arsenious, etc.) The addition of these bodies allows a diminution of both the temperature and time of the aluming. A small dose of alum (1 or 2 parts to 200 of wool) thus loads the wool with hydrate of alumina.

The *violet* tints from logwood, and the *reddish* tints from red wood are obtained by the opposite conditions. A large proportion of alum to the wool acts by fixing upon the wool not only the hydrate of alumina, but also hydrated sulphuric acid, then sulphate of alumina.

An excess of alum can be replaced, but not in a proportional manner by sulphuric acid, bisulphate of potash, or other acid salts, bitartrates, bioxalates, etc.; by a shorter and cooler aluming, by sulphuring, or by acid preparations.

A deficiency of alum, on the contrary, gives rise to the production of basic alumina, and is equivalent to the addition of soda, alkaline salts, common salt, etc.; or to a very long and very hot aluming. The calcareous or alkaline waters act in the same manner, and so operate upon the wools washed in them.

The sulphuric acid from an excess of alum has a special

purifying action by dissolving out iron from the wool. Sulphuring has the same action. Washing in acids or sulphuring contributes to give purer and yellower reds in dyeing, and especially with cochineal, fuller colours.

The theory of aluming, based upon the unequal absorption by wool of the dissociated hydrates, explains not only all the phenomena which are observed with the various amounts of alum, but also the actions which occur when alum is combined with acids, or acid salts of potassium, and with neutral or basic salts.

Some theoretical conclusions seem to follow which may serve as guides in researches upon the absorption of solutions of various metallic salts by wool. These conclusions are :—

(1) Strong doses of mordants act in solution as salts (or as salts and acids) after their absorption by wool.

(2) Weak doses of mordants act upon wool as metallic hydrates, the formation of which is assisted by long boiling.

(3) The unequal absorption by wool of the basic hydrates and dissociated acids, and its reactions upon each of them cause these differences.

(4) The excess of salt, it would appear, may be replaced by small quantities of acids, or of acid salts of potassium (bisulphate, bioxalate, tartar, etc.) which in water are resolved into acids and neutral salts.

(5) The augmentation of the metallic hydrate fixed is procured by addition of water, increase of heat, or prolonged contact.

(6) The colour which pure wool takes in dyeing, confuses that due to the first portion of hydrated acid, or metallic hydrate absorbed by the wool. Acids act specially in purifying wool, they seem also to set the colouring free from glucosides (as carmine red from carmine). The metallic hydrates fix coloured lakes upon wool in a different manner.

8. *Programme of Prizes offered by the Industrial Society of Rouen.**

THE prizes will be given at a general meeting of the society to be held in December, 1877, to those authors who shall have answered in a satisfactory manner the questions proposed.

The prizes consist of gold medals, value 300 francs, medals in silver gilt, and silver medals. The society has power to add a sum of money if the importance of any of the papers sent in merit it.

The answers should be addressed to *M. le President de la Societé Industrielle de Rouen*, not later than October 1st, 1877.

Competitors preserve the right to patent any invention described, but the society reserves to itself the right to publish the whole or any part of the papers received.

The society will not return either the papers or drawings which are received; but the authors may make a copy of them. Models alone will be returned.

The papers should not be signed, but distinguished by a motto, and accompanied by a sealed envelope bearing on the outside the same motto, and containing inside the name, address, and calling of the writer.

(1) *Rondeaux Prize.*—A medal of silver gilt and 250 francs for the best paper treating of the dunging of printed mordants for dyeing, including the history of the question, and a study of the part which dunging acts as a fixer of mordants upon the cloth, a detailed notice of the substances which may replace cow-dung in the cleansing operations, a description with plans of the apparatus used in dunging, and an indication of what improvements are desirable.

(2) *Rondeaux Prize.*—A medal of silver gilt and 250 francs for the best paper treating of the steaming of printed goods, and principally of cotton goods; including the history of the question, a study of the part which steaming takes in the fixing of so-called steam colours, a description with plans and

* Journal of the Society, iv., p. 566.

explanations of steaming apparatus, and indications of what advances may be made in the process.

(3) Gold medal for a substitute for egg albumen in all its applications to printing, and being distinctly cheaper than albumen.

(4) Gold medal for a new source of albumen, obtained either by extracting this substance from natural products not yet utilised for this purpose, or by transforming into albumen other protein matters. The process of extraction or transformation must be practical, and furnish a material fit for all purposes of printing.

(5.) Silver medal for a mineral blue capable of resisting acids, alkalies, and chlorine, as bright as ultramarine blue, and not dearer than it for blueing the same depth of colour.

(6) Silver gilt medal for a new steam black as intense and fast as aniline black, not tendering the fibre, and which can be printed with any other colours without injurious mutual action where they come into contact with it.

A black with an aniline base would fulfil these conditions.

(7) Silver gilt medal for the best process of aniline black for dyeing cotton yarn and cloth without injuring the fibre.

(8) Silver medal for a volumetric method of testing the quality of commercial glycerine.

(9) Silver medal for a dark red or purple lake from the colouring matters of madder, natural or artificial.

(10) Silver gilt medal for a fast and bright orange not dearer than chrome orange, and which will not blacken with sulphuretted hydrogen, and which may be applied by means of albumen.

(11) Gold medal for a bright, dark, and transparent green, which can be applied to calico along with alizarine colours, and be as fast as them. Its price must be such as to permit its industrial application.

(12) Gold medal for the industrial preparation of artificial indigotine.

(13) Gold medal for a fast blue colouring matter, cheaper than indigo, and capable of being applied in the same way.

(14) Silver gilt medal for a process by which plain indigo

blues can be produced from the lightest to the darkest shade by a single padding, the colour to be as good as dipped blue.

(15) Silver gilt medal for a new process of fixing indigo blue chemically by steam.

The colour must be dark, bright, and chemically attached to the fibre, and not suffer much by washing and long soaping. Further, it must be capable of being printed with other steam colours.

(16) Silver gilt medal for one or other of the following colours :—

A bright mineral red.
A dark mineral purple.
A dark mineral green.
A plastic chocolate.
A bright mineral pink.

These colours should be fairly fast to light and chemical agents, and possess the qualities necessary for good albumen colours.

(17) Silver gilt medal for a new method of fixing aniline colours, having advantages in fastness and cheapness over albumen.

(18) Silver gilt medal for a new thickening matter as substitute for gum Senegal in all its applications, and being cheaper than it.

(19) Silver gilt medal for a finishing material not changeable by moisture, and as cheap as the starchy matters.

(20) Gold medal for the production of ozone in a concentrated state.

Up to the present time nothing stronger than 200 to 250 milligrammes of ozone per litre of odorous oxygen has been produced. The prize will be given for a preparation with double this quantity of ozone.

(21) Gold medal for a practical process for the preparation of ozone.

The price being fifty times that of chlorine as tested by its bleaching action, say upon indigo.

(22) Silver gilt medal for a new application of ozone.

The point in view is the production of colouring matters or the practical application of ozone in bleaching.

(23) Silver gilt medal for the economical production of oxygenated water (bioxide of hydrogen).

This prize will be awarded for a method which yields it at not more than ten times the price of chlorine, as tested by its bleaching action upon indigo for example.

(24) Silver gilt medal for a practical process for preparing oxygen cheaper than by the means at present known.

(27) Silver gilt medal for a method of conditioning (determining the amount of fibre and moisture) in cotton yarn and cloth, grey, bleached, or dyed.

This method should enable the real quantity of dry cotton in yarn or cloth to be determined with quickness and exactness.

There are a number of other prizes for subjects not connected with textile colouring.

The same journal contains reports upon the efforts of candidates for prizes offered last year, some extracts will be interesting.

For the fifth prize (an improved process for dyeing aniline black on cotton) there was only one application, which was examined by a committee appointed for the purpose. The paper described two processes, the first of which struck the reporters from its originality; it is as follows:—

Dyeing Aniline Black on Cotton.—The cotton being cleansed and then dried, is steeped in a liquor composed of aniline, chlorate of potash, hydrochloric acid, chloride of copper, and water; it is worked about so as to get it evenly saturated with the liquor, and then dried at a moderate heat. After drying, the cotton is plunged into a bath of oil, heated up to 150° F. and left in a quarter of an hour, taking care that the temperature does not increase beyond 150° F.; it is then taken out, squeezed, and the oil removed by passing into a weak and warm solution of crystals of soda, finishing by a hot soaping.

The process yielded in the hands of the reporters a brilliant, intense black, soft and silky to the touch; but the fibre of the cotton was so greatly weakened as to make this plan quite

impracticable. They tried to suppress the drying and place the damp cotton directly in the oil, but still the fibre was was severely acted upon.

The second process differs from the ordinary methods by the addition of a considerable proportion of chloride of calcium to the dyeing liquor; this, according to the author, has the effect of retarding the too rapid oxidation of the black, and allows it to dye up more gradually and more evenly. But the four reporters tried the method, each separately, with the same results; they did not get an even colour, with all possible precautions in changing the surfaces during drying there were always some parts of the skeins darker than others, and nothing afterwards could remedy this defect. Besides this want of evenness, the strength of the fibre was considerably injured. The prize was therefore not awarded, and is put on the list for the current year.

9. *Abridgments of Complete Specifications of Patents Recently Published.*

A.D. 1876, June 26th.—No. 2630.

KINGZETT, CHARLES THOMAS and ZINGLER, MAXIMILIAN. "Improvements in the Preparation of Blood Albumen and the Application of the same for Purposes of Dyeing and Printing on Textile and other Fabrics with Colours, also Applicable to Sizing and Enamelling Wood, Glass, and Metals."

"In carrying out the objects of our invention, as above mentioned, we treat defibrinated blood with a certain volume of turpentine or rosin spirit, or any other hydrocarbon which developes peroxide of hydrogen by absorption of oxygen, and pass a current of air through the mixture heated to about say 60° Farenheit, or to any desired temperature, or we use the antiseptic described in Kingzett and Zingler's Patent, No.

274, Jan. A.D. 1876. This operation is preferably, however, conducted upon the serum of blood, by which means nearly colourless albumen is obtained, and can be kept in a soluble form as liquid at any strength for any length of time. By mixing the colourless albumen, prepared according to our said invention, with colours according to the consistency required for dyeing or printing on textile or other fabrics, a colour or dye is obtained. The fabrics as printed or dyed are then passed through either heated rollers or dried in a hot air chamber, or submitted to the action of steam. Colours, like aniline dyes, are first dissolved either in spirit or water previous to mixing with the albumen solution.

"Sometimes when treated with colours such as aniline a particular mordant, such as acetate of lead or tartaric acid, or any other mordant, may be used and applied.

"In applying the product (purified albumen) for sizing or enamelling, we merely coat the surfaces over and allow them to dry; or the product may be mixed with baryta or its salts or strontia or its salts. The same, (that is, sizing and enamelling) can be effected by treating dissolved blood or egg albumen in water mixed with methylated spirit or turpentine, and incorporated with baryta or its salts or strontia or its salts.

"There are two main varieties of albumen used for printing and other purposes; these are egg and blood albumen, and of these again there are various qualities.

"Hitherto, for all the most important purposes, egg albumen has been employed, on account of the difficulty presented by the colour of blood albumen; the consequence is that a large amount of food is withdrawn from the market, and blood albumen being only used for the less important purposes, its manufacture is not very profitable. We have thus set forth in a general way the means we have invented of improving the quality of blood albumen by decolourizing it by a new process. At the same time such a change is effected that it may be kept in solution without undergoing any putrefactive process during a protracted period. In consequence of this we believe our product will effectually fulfil all the purposes

to which egg albumen has been hitherto chiefly applied, and we also use our purified and improved albumen for the other purposes set forth, this is to say, in addition to its use as a vehicle for fixing certain colours on textile and other fabrics, it also will fix certain colours not admitting hitherto of fixation by any hitherto known form of albumen. Moreover, we use a mixture of our preparation with various colours, with or without mordants, as a dye or colouring material, apart from the ordinary printing process. We further use our albumen as a size or enamel for articles of wood, glass, or metal.

"We now proceed to describe the processes by which we obtain an improved form of blood albumen, and we also apply these same processes to the egg and blood albumen of commerce. As these occur in commerce in the form of dry scales, we first dissolve them in water, and to the solutions apply the processes which we also supply to blood in its various forms and conditions hereinbefore recited.

"The blood of oxen, sheep, or any other slaughtered animals is allowed to stand for some hours in flat shallow vessels, or is beaten by twigs; in the first case a clot forms, leaving a thinner solution, still containing some blood corpuscles; in the second case the fibrine coagulates and encloses in its meshes the corpuscles of the blood, and is removed in either case. To these liquids freed from clot, or to blood itself, we add from five or ten to thirty or more per cent. of ordinary turps or turpentine, or rosin spirit, or any other hydrocarbon which by absorption of oxygen produces peroxide of hydrogen. We prefer to use turpentine. We then cause a current of air or oxygen to be drawn or blown through the mixture at a temperature of 20 to 60 degrees centigrade, the mixture being contained and the whole operation performed in such an apparatus as that we have described in the Specification of our Patent, No. 274, dated January 24th, A.D. 1876. In this way any turpentine that is volatalised is condensed and returned, so far as need be, to the vessels containing it in mixture with the albumen. As the air or oxygen passes through, it is absorbed partly by the turpentine forming peroxide of hydrogen, camphoric acid,

and camphor, and this peroxide of hydrogen decomposes *in situ*, evolving nascent oxygen, which decolourizes the albumen solution, while the camphoric acid and other products formed, while they do not interfere with its further uses, yet preserve it from putrefaction and decay. In this way then a solution is obtained by continuing the process for some hours until all the turpentine is oxydised or volatalized, or both, or the mixture is drawn off and the excess of turpentine separated by decantation, filtration, or other means. Such a solution of albumen can be used by itself for the purposes we have set forth above, or it can be diluted before use with water and a small quantity of methylated spirit, or it can be evaporated to dryness by the ordinary methods, so preserved. We prefer both to store upon and use it in the original form of solution.

"The following applications are made for sizing, enamelling, and painting: in each case the process is first gone through for preparing the albumen:—

(1) "In sizing, the material (which must be quite dry) is either painted with a brush or rubbed or worked in with a solution of albumen; before doing so a small addition of spirit is made to the albumen solution. If the material for sizing is required to represent any colour, it is coated with the colour required first; after this is dry, the albumen solution for sizing is applied; and in order to effect the coagulation or hardening of the same it is coated when dry with any of the known spirits, or petroleum, or turpentine; this process is repeated according to the thickness of sizing required. Sizing effected in accordance with our invention, as above described, is especially applicable to musical instruments composed wholly or partly of wood, such as violins, violincellos, pianofortes. and such others.

(2) "In enamelling, the albumen is mixed with any desired pigment, with the addition of baryta or its salts, or strontia or its salts, to the consistency required, and then applied. After application it is submitted to the action of heat or steam.

(3) "In painting, the pigment colour is mixed with the

albumen solution and thoroughly incorporated with same. The pigment and the solution are preferably mixed in equal proportions. When the mixture is to be thinned, water is added. When the painting is dry, it may be desirable that a thin coating of gum solution be applied, which, however, must not contain oil.

"Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed or put in practice, we would say that we do not claim the use of mixing turpentine with blood or blood albumen, and allowing the mixture to stand with some stirring; neither do we claim the use of peroxide of hydrogen prepared by other processes and added to the blood or blood albumen; but what we do claim as one invention is,—

"The use of turpentine in admixture with any form of albumen solution in such a way that we induce from its oxidation, by air or oxygen, a rapid formation *in situ* of peroxide of hydrogen, camphoric acid, and camphor.

"We further claim the various uses of our products, as hereinbefore set forth and described.

"Finally; we also claim the use of the solution of peroxide of hydrogen, camphoric acid, and other constituents prepared as described in our Patent, No. 274, A.D. 1876, for effecting our invention, as above set forth, instead of generating such a mixture of substances *in situ* with the albumen."

A.D. 1876, July 5th.—No. 2748.

MORTON, JAMES. "Improvements in Preparing Woven Fabrics and Yarns of Cotton or other Vegetable fibres for being Dyed or Printed."

"My said invention has principally for its object to cheapen and shorten the process wherein oil is used for preparing woven fabrics and yarns of cotton or other vegetable fibres for being dyed or printed, and my improvements are of especial advantage and importance in dealing with Turkey-red goods, whilst they admit of goods prepared as for Turkey-red having advantageously applied to them various colours for which such preparation has hitherto been too expensive.

"My invention consists essentially in subjecting the woven fabrics or yarns, after being saturated with and wrung from the usual combination of oil and alkaline lye, to the action of superheated steam.

"And, in order that my said invention, and the manner of performing the same may be properly understood, I will, by way of example, particularly describe the practical application of it, in what, I believe to be, the most advantageous manner in the case of Turkey-red goods, as follows, that is to say:—The goods, bleached in the usual way and dried, are saturated with an emulsion or "white liquor" of oil, such as is usually employed and made with a solution of carbonate of potash. Both woven fabrics and yarns are passed between squeezing rollers to remove superfluous liquor, yarns being arranged in the condition of "chains," as for warps, to admit of their being passed through the apparatus like woven fabrics. The emulsion or "white liquor" employed may be made up in any way that is suitable for the preparation of Turkey-red goods in the ordinary way. The goods after being thus oiled, are at once, or as soon as convenient and without further drying, passed through a chest or chamber containing superheated steam. I prefer to run the goods continuously through the steam chest in such manner as that each part may be subjected to the superheated steam during from ten to thirty minutes. The temperature of the steam should be between 250 and 400 degrees Fahrenheit, but the pressure need not correspond to the temperature, nor in fact exceed twenty pounds per square inch above the atmosphere, whilst a pressure of about five pounds per square inch may in many cases be quite sufficient, and is more conveniently managed than a higher pressure. In any case the steam must be quite dry.

"A suitable steaming chest may be made by taking a horizontal cylindrical boiler shell of about seven feet in diameter and twenty-six feet in length, and fitting its interior with two horizontal rows of transverse rollers. The goods are entered between a pair of rollers and through a narrow opening in one end of the chest, and pass alternately round

upper and lower rollers inside. At each of three or more points in the length of the chest a pair of driven nipping rollers is placed to divide the strain for drawing the goods through, and the goods pass out through a narrow opening at the further end and between another pair of driven nipping rollers. The spindles of the internal driven rollers pass out through stuffing boxes, if necessary, to external driving gearing, and the parts about the entering and withdrawing rollers are enclosed as much as possible to prevent excessive leakage of steam. In order to maintain the heat of the steam, fresh quantities must continually enter the chest from the superheater, and if what is thus required is more in quantity than what will make up for unavoidable leakage, an outlet valve, loaded to the desired internal pressure, must be fitted to the chest. It is important to have the steam chest protected from loss of heat through radiation by applying to it a suitable non-conducting covering, or by enclosing it in a heated building or casing.

"The goods may be treated twice or oftener in the manner hereinbefore described, that is to say, with the emulsion and subsequent steaming, but in many cases a single treatment will be found quite sufficient, and after having superfluous oily matter stripped or removed from them in the usual way, the goods may be at once mordanted and dyed or printed.

"More or less air may be mixed or allowed to mix with the steam, provided the necessary temperature is maintained, and a suitable atmosphere may be formed by passing sufficiently heated air over or through water or in contact with moisture in the goods themselves.

A.D. 1876, June 28th.—No. 2661.

DIXON, RICHARD. "Improvements in the Manufacture, Dressing, Dyeing, and Colouring of Furs, Skins, and Animal and Vegetable Fibres of all Kinds." *(Provisional Protection only.)*

"The invention consists in the application to furs and skins of all kinds, and also to all other animal and vegetable fibres and tissues of a coating of the dust of metal of all kinds.

"One portion of the invention consists of applying by means of a brush to furs, skins, and animal and vegetable fibres, the dust of metals of all kinds by means of adhesive materials, such as glue, gum, varnish, paste, or other glutinous substance with which the fibre is either impregnated after the manner of a mordant or with which it is coated in order to receive the metal dust.

"Another process of the invention consists of applying powdered gold, silver, tin, zinc, or other pulverised metallic substances by means of galvanism or like chemical action to such furs, skins, animal, or vegetable fibres and tissues.

"The object of the invention is the improvement in appearance and lasting qualities of the objects so treated by the means and in manner aforesaid."

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10. British and Foreign Patents, from the Commissioners of Patents Journal, Jan. 26th, to Feb. 20, 1877, inclusive.

Bleaching, &c.

3896. FRANK WIRTH, of the firm of Wirth and Company, Patent Agency, of Frankfort-on-the-Maine, in the empire of Germany, has given notice to proceed in respect of the invention of "Improvements in bleaching animal fibre."—A communication from Ferdinand Victor Kallab, Chemist, a person resident at Wiese, in the empire of Austria.

4601. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, has given notice to proceed in respect of the invention of "An improved process of softening, cleansing, and decolourizing fibres and fabrics."—A communication to him from abroad by William Maynard, of New York City, United States of America.

4654. JOHN SWINTON BUTLER, of Percy Street, in the county of Middlesex, for an invention of "An improved process for treating vegetable fibres."—Dated 1st December, 1876.—This patent has passed the great seal.

59. J. CARREY, of Mulhouse, for "Obtaining new designs in coloured fabrics by combined weaving and printing."—3 years.—Dated 10th June, 1876.—Grand Duchy of Baden.

Colouring Matters, Mordants, Albumen.

4655. JOHN SWINTON BUTLER, of Percy Street, in the county of Middlesex, for an invention of "Improvements in the preparation of aniline dyes."—Dated 1st December, 1876.—This patent has passed the great seal.

4696. GEORGE RYDILL, of Pontefract Villa, Highgate, London, for an invention of "Improvements in dyeing dark shades of piece goods, woollen waste, hair, and rags, a light fast yellow or fawn colour, dyeing fast aniline blue and other colours, utilizing the waste products for treating sewage and manure."—Dated 5th December, 1876.—This patent has passed the great seal.

674-—MICHEL EDMOND SAVIGNY, Chemist, and ALFRED CHARLES COLLINEAU, Doctor in Medicine, both of Boulevard St. Denis, 1, at Paris, for an invention of "The manufacture of an improved vegetable colouring substance and the derivatives thereof."—Dated 19th February, 1877.

177,987. FREDERICK J. BIRD, of Stroud, England, for "Mordants."—Application filed 17th March, 1876.—American patent.

Claim.—"The composition herein described of gallnuts, tannin, alum, tin, and soda, or ingredients possessing similar properties, substantially as set forth."

41205. M. ZINGLER, for an imported invention of "Improvements in preparing albumen from blood, &c."—Dated 2nd January, 1877.—(French patent, 28th December, 1876.)—Belgian patent.

Squeezers, Spreaders, etc.

3732. JAMES SHAW, of Galashiels, in the county of Selkirk, North Britain, Manufacturer, has given notice to proceed in respect of the invention of "Improvements in rollers for expressing liquid from textile materials, yarns, and fabrics."

4031. WILLIAM BIRCH, of Salford, in the county of Lancaster, Machine Maker, has given notice to proceed in respect of the invention of "Improvements in squeezing machines."

84. WILLIAM BIRCH, of Salford, in the county of Lancaster, Machinist, for the invention of "Improved self-acting machinery for opening, smoothing, spreading, and guiding fabrics for the use of bleachers, dyers, calico printers, and others."—Provisional protection has been granted.

Yarns, Hanks, Skeins, etc.

3353. SAMUEL GIBSON RHODES, of Park Street, Leeds, in the county of York, Gentleman, for an invention of "Improvements in finishing yarn and fabrics and in apparatus connected therewith."—Dated 26th August, 1876.—This patent has passed the great seal.

3929. WILLIAM CRAWFORD, of Paisley, in the county of Renfrew, North Britain, Dyer, has given notice to proceed in respect of the invention of "Improvements in bleaching, washing, and dyeing yarns in hanks, and in the machinery or apparatus employed therefor."

612. CHARLES CUNNINGHAM CONNOR, of Belfast, in the county of Antrim, Ireland, Manufacturer, for an invention of "Improvements in the preparation of yarns and fibrous substances."—Dated 18th February, 1874.—The £50 stamp duty has been paid.

177,345. WILLIAM MCALLISTER, of Lawrence, Mass., for "Apparatus for dyeing yarn in skeins."—Application filed 10th March, 1876.—American patent.

Brief.—"Improvement upon Patent No. 153,973, 11th August, 1874. The yarns are stretched upon rods, which fit at one end into holes in a board, and at the other into holes in a series of slats, each slat holding a pair of rods. The board and slats holding the rods slide like a drawer into a revolving holder, and are fastened in place by keys. The whole is then revolved in the dye-vat."

Claim.—"1. In combination with the rotary supporter B, the skein-holder C, C, applied to it, substantially as described. 2. The combination of the skein-holder carrier C, and a series of skein-holders F, constructed and applied thereto, substantially as set forth. 3. A skein-holder carrier C, substantially as described, composed of the frame *g*, the holed head-board *h*, and the rods *i*, *i*, arranged as specified. 4. The skein-holder F, substantially as described, composed of the two rods D, D, and the perforated bar *k*, all arranged and applied as specified. 5. In the said skein-holder, each of the rods D, made in two parts or pieces, provided with means of connecting or disconnecting them, as set forth. 6. The combination of the rotary supporter B, the skein-holder carriers C, C, and their two series of skein-holders F, all constructed and applied substantially in manner and for use with a vat A, as set forth."

Wool Treatments.

4318. EMILE GAUDCHAUX-PICARD, of Paris, Manufacturer, has given notice to proceed in respect of the invention of "Improvements in chemically unweaving textile fabrics made of animal and vegetable fibrous substances, for the purpose of utilising by combing silk or wool filaments therefrom."

4923. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, for the invention of "Improvements in the treatment of wool and apparatus for the same."—A communication to him from abroad by Jules Raulin, Professor of Chemistry at the Faculty of Sciences, of Lyons, France.—Provisional protection has been granted.

433. EDWARD GRIFFITH BREWER, of 89, Chancery Lane, in the county of Middlesex, for an invention of "The incineration of mixed vegetable substances from wools or woollen fabrics by the application and manufacture of chloride or chlorate salts, preferably of zinc, magnesium, and aluminium, applicable to unbleached and dyed or coloured materials."—A communication to him from abroad by Romain Joly, of Caudebec-lès-Elbeuf, France.—Dated 3rd February, 1874.—The £50 stamp duty has been paid.

177,606. J. WILKINS, of Baltimore, Md., for "Processes for separating wool from mixed fabrics."—Application filed 17th April, 1876.—American patent.

Claim.—"The herein-described process of separating wool from its admixture with cotton fiber, by subjecting the rags or mixed fiber to the action of sulphuric, nitric, or hydrochloric acids in the presence of chromic acid or a salt of chromium, substantially as and for the purpose described."

Finishing Processes.

3018. JEAN PERINAUD, Chemist, and JUSTIN MARCHAL, Dyer, both of Paris, France, for an invention of "A process of suppling dyed silk fabrics."—Dated 26th July, 1876.—This patent has passed the great seal.

4598. FREDERICK COOPER, of Limefield, near Bury, in the county of Lancaster, for an invention of "Improvements in the construction of apparatus employed for finishing velvets and velveteens and other similar piled fabrics."—Dated 28th November, 1876.—This patent has passed the great seal.

231. HENRY LISTER, of Ashbrow Mills, near Huddersfield, in the county of York, for the invention of "A new or improved method of finishing felted fabrics for imitating woven carpets."—Provisional protection has been granted.

41,217. HUPPERTS and JUNGBLUT, of Dixon-Verviers, for "A new mode of shearing cloth, tissues, and stuffs in general."—Dated 4th January, 1877.—Belgian patent.

THE TEXTILE COLOURIST.

No. 16.] APRIL, 1877. [Vol. III.

1. *Note upon the Application of Chlorate of Chromium.**

BY MM. J. DEPIERRE AND B. TATARINOFF.

OF all the metals which are applied to the colouration of textiles, chromium is, without doubt, the one which gives rise to the most interesting and most varied combinations.

In the last number of the "Textile Colourist," there is given a new method by which this metal can be fixed as chromate of lead; the interesting peculiarity of that process is that the chromate of lead is obtained by steaming. The authors, MM. Storck and De Coninck, endeavoured to apply the mixture described to printing, but, as they state in their paper, they were not able to obtain a satisfactory result.

By employing British gum (roasted starch) or preferably a thickening of marine gum,† we have succeeded in obtaining, by printing, yellows and oranges, according to the quantity of lead salt employed. This interesting reaction takes place by the decomposition of chlorate of chromium in presence of acetate of lead, and it is upon the application of this chlorate that we now write.

Chlorate of chromium is not even mentioned in the most recent chemical treatises. It is easily prepared by means of

* Communicated by the Authors.

† Ly-cho; this product is to be obtained from Tissot, at Asnières, Seine; it is prepared probably from marine algae. See Thao, "Textile Colourist," ii., p. 153.

chrome alum and chlorate of baryta ; the product contains some chlorate of potash, but this presents no practical inconveniences.

Chlorate of chromium is a dark green liquid, it possesses the property of dissolving at the ordinary temperature about 20 per cent. of its weight of well pressed hydrated oxide of chromium. This solution has the same properties as the normal chlorate, but somewhat less active. When a small quantity of the ordinary chlorate of chrome is placed in a tube and heated, it commences to change at about 130° to 140° F., and if a salt of lead be now added there will be formed a precipitate of chromate of lead ; if the heating be continued either with or without presence of lead salt it becomes green. The gas which is disengaged by the decomposition, when absorbed by alkalies forms chlorates and chlorites. Nitrate of lead as well as the acetate gives the characteristic reaction of chromate, but in printing it must not be used on account of disengagement of nitric acid, which would take place upon the cloth.

With the acetates of lead attention must be paid to the quantity of chlorinated gases disengaged, which will act upon the tissue unless some substance is added to the colour capable of neutralizing its destructive action.

The basic chlorate of chromium ought not to be prepared in advance, for it is liable to spontaneous decomposition at the ordinary temperature. In the course of five or six days the oxide of chromium passes into the state of chromic acid, the presence of which can be readily shewn by the addition of acetate of lead in the cold, which gives the characteristic yellow coloured precipitate of chromate of lead no such precipitate being produced in the fresh and unchanged chlorate.

A somewhat analogous reaction has been signalised lately by M. Balanche,* who found by treating the oxide of chromium, known as Guignet's green, by solution of bleaching powder, that it became oxidized into chromic acid.

* Bull. de la Soc. Ind. de Rouen, iv., p. 419 ; "Textile Colourist," iii., p. 115.

If indigo blue dyed calico be impregnated with a solution of chlorate of chromium, the colour is discharged when it is exposed to heat. The same thing happens with red from either natural or artificial alizarine, whether obtained by dyeing or steaming. This bleaching action is owing to the formation of chromic acid and chlorinated gases, and was previously observed by M. Ernest Schlumberger in the decomposition of chlorate of alumina by heat; "but," he remarks, "the solution does not present the same phenomena if it has been previously saturated with alumina; when heated no hypochloric acid is produced, the solution becomes milky from separation of a small quantity of alumina; by careful management it may even be evaporated to dryness without decomposing the salt. A piece of indigo dyed calico is not acted upon in the cold by either of the solutions, but when it is heated the colour is destroyed in the acid solution, but remains unchanged in the solution saturated with alumina."*

In the latter case there is no formation of hypochloric acid, or if there is it combines with the excess of alumina. But the chlorate of chromium behaves differently to the chlorate of alumina, for whether in the normal or basic condition there is always a destruction of the indigo colour, which may be supposed to take place not only by the action of chlorinated gases evolved, but also by the action of chromic acid formed.

We have employed in experiment the two following quantities:—

Yellow No. 1.

310 grammes chlorate of chromium, at 15° B.
76 grammes acetate of lead, in crystals.
30 grammes marine gum.

The gum is dissolved cold and with agitation until solution is perfect.

Yellow No. 2.

260 grammes chlorate of chromium, at 15° B.
38 grammes acetate of lead, in crystals.
22 grammes marine gum.

* Bull. de la Soc. Ind. de Mulh., xlii., p. 307, and following pages.

We may observe that the No. 1 yellow printed upon white does not tender the cloth, but gives a greenish yellow; the No. 2 tenders the cloth, but gives a brighter and purer yellow. This inconvenience can be remedied by adding either oxide of lead or ferricyanide of lead to the colour, according to the information kindly communicated to us by M. Storck.

The No. 1 yellow when treated with lime gives a fine orange, but the No. 2 yellow cannot be changed into orange.

When these two colours are printed upon a medium shade of indigo blue, No. 1 gives a dull yellow and No. 2 a bright yellow; when the latter is passed in hydrochloric acid a white is obtained; to either of the colours aniline black may be added to realise other effects.

Chlorate of chromium thickened and printed upon blue and then steamed discharges the blue colour; it discharges also the red from alizarine and extract of madder, but the resulting white is not pure, nor have we succeeded in obtaining a good white by this means.

If about 50 per cent. of acetate of alumina, at 10° B., be added to the chlorate of chromium, then printed upon a medium shade of indigo blue, and steamed, a discharge is obtained which dyes up a good red in garancine or artificial alizarine.

We believe that chlorate of chromium is destined to receive some applications, not only as a means of obtaining yellow, but as a fixing agent for other colouring matters, such as aniline, catechu, logwood, etc., especially when used in its basic state.

We should remark that the basic chlorate cannot be thickened with the marine gum; dark British gum alone is the suitable thickening agent.

With the following mixture a black, somewhat greenish, can be obtained :—

200 grammes chlorate of chromium, at 15° B.
25 grammes salammoniac.
20 grammes aniline oil.
100 grammes aniline salt.
50 grammes peroxide of iron in paste, of 5 per cent. dry.

200 grammes hot water.
500 grammes starch paste.

We give the above preparations simply for a starting point; we believe that by a proper modification of them good results may be obtained.

Catechu is readily fixed with the chlorate, and gives a very fast colour. The following formula may be used :—

Steam Catechu by Chlorate of Chromium.

250 grammes catechu liquor below.
200 grammes water.
60 grammes white starch.
20 grammes British gum.

Boil, and when cold add,

200 grammes basic chlorate of chromium.

Catechu Liquor.

100 grammes catechu.
50 grammes water.
100 grammes acetate acid, at 7° B.

after solution, make into 250 grammes measure.

The colour should be steamed for an hour; in may be washed off immediately; it will be found quite fast to soap.

With logwood a very fine black can be obtained, especially when a portion of the steam catechu above is mixed with it.

Logwood Black.

130 grammes white starch.
500 grammes water.
65 grammes British gum.
300 grammes logwood liquor, at 20° B.
100 grammes acetic acid, at 7° B.

Boil, and when cold add,

200 grammes basic chlorate of chromium.

Mixed Black.

3 parts logwood black.
1 part steam catechu.

These colours keep well, and may be used for printing at least thirty-six hours after preparation.

By printing chlorate of chromium, thickened with dark

British gum, fixing by silicate of soda, and dyeing in garancine, an agreeable wine or claret colour can be obtained. If instead of silicate the printed cloth be passed in ammonia, the mordant does not dye so easily, nor are the whites so good as when silicate is used as the fixing agent.

The basic chlorate treated in the same manner does not give so good a colour. In both cases the fixing must be done at a low temperature, about 40° C. (104 F.), at higher temperatures, as 65° or 70° C., much less oxide of chromium is fixed.

Nitro-alizarine dyes this mordant in a catechu colour, but this mordant, singularly enough, gives much lighter colours with nitro-alizarine than other salts of chromium containing an equal quantity of oxide of chromium.

We printed a colour made with acetate, another with nitrate, and a third with chlorate; the colours were aged together, fixed in silicate, and then dyed in garancine, artificial alizarine, quercitron bark, etc. (nitro-alizarine excepted), and found the chlorate to give the darkest colours. The acetate gave the lightest shade; when died in nitro-alizarine it was evident that the nitrate gave the darkest colours.

An analogous property of nitro-alizarine has been observed in the orange colour obtained by means of alumina mordants, the nitrate of alumina giving more definite and characteristic colours than the acetate.

2. *Batick, an Eastern Style of Print.*

M. A. SCHULTZ has communicated some details upon a peculiar and not much known style of print which is a favourite in some of the native markets of the East. The following is a translation of his paper from the Moniteur Scientifique, for March, 1877:—

India is the place from which prints originated, and their common name in French, *Indienne*, is derived from this origin, another designation also common in French, *toiles peintes*, or painted cloth, is traceable to the original processes, when the designs were painted on in the same way that pictures are painted. Mordants of alumina and iron were applied by a rough sort of pencil brush, to be afterwards dyed in madder.

Even at this day the natives of Java paint or pencil a particular kind of cotton garment used as clothing by both sexes, and known as the Batick style.

The Indians execute these goods by following pencil tracings upon the cloth by means of a brush dipped in melted wax, this is to serve as a resist, and the operator fills at once the various functions with us divided among the designer, the engraver, and the printer.

When the native has finished his more or less fantastic work in melted wax, which is done upon a cloth about two yards long called a sarrong, it is dyed blue in a kind of vat prepared by some means which are unknown to us.

In the process of dipping and handling, the wax resist cracks in an irregular manner upon the cloth, forming a number of fine fissures; the indigo solution penetrates these fissures, which vary in depth, length, and fineness, and consequently dyes the cotton underneath, producing a curious sort of marbled effect instead of a plain white ground; the shapes thus formed and the shades of colour vary infinitely, being due to hazard, and are necessarily distributed in the most unsymmetrical manner.

The sarrong is then dyed in a colouring called *soga*, which is similar to catechu.

This brown colouring matter, which is soluble in ammonia, penetrates the fissures in the wax, and forms a blue-black with the indigo already fixed, but it is not uniform; in some places it is yellowish, in others blueish, and in others a proper catechu shade, depending, of course, upon fresh fissures formed in the wax after the indigo dipping, where the *soga* reaches a white bottom. This increases the irregularity and varied

character of the effect, giving a ground with an immense number of shades, and forms black, dark, and greenish catechu, and light catechu colour.

The cloth used is of English make, the sarrongs are from 6½ to 8 feet in length, and sell in Java for 30 to 40 Dutch florins each (say 50 to 70 shillings).

The English, Swiss, and Dutch printers make a variety of articles for the Indies called Batick, Lemenaias, Madras, Mabrouk, etc., which, do not obtain one-tenth of the price of the native manufacture because they are so greatly inferior in excellence to them; they have not the varied irregularity of the original style. The firm of Hofer-Grosjean, Mulhouse, have for several years produced this style, and their work has been the nearest to the native work.

When the Indians desire to replace the catechu colour by red, they proceed in the same way up to the dipping in *soga*, instead of which the cloth is dipped in solution of alum, dryed, and afterwards washed and dyed in the root *chayaver*, which is a species of munjeet, or madder.

Endeavours have been made to imitate the Batick style by printing with roller and plate, black and catechu colours upon damp cloth, and then dyeing in garancine. By this means grounds of an irregular nature can be obtained, but they form only a poor imitation of the native work. It is only by following a procedure similar to that used by the Indians that similar results can be obtained. M. Schultz, when engaged in the works of MM. Prèvinaire and Co., at Haarlem, worked a good deal of this style of print, and gives the following as the method found best.

The printing was done by cast-iron plates, into which proper metallic casts were let in. The sieves were kept warm by steam, the cloth was unbleached, the colour or mixture printed on was composed of 5 parts by weight of rosin, and 1 part of rosin oil, or 6 parts of rosin and 1 part of stearine; or again, 5 parts of rosin and 1 part of yellow wax.

After these resists had been printed hot the goods were dipped in a blue vat made up of—

Indigo	1 part.
Quick lime	4 parts.
Sulphate of iron	4 parts.

After the blue dyeing the sarrongs were rinsed and dried. For the styles where the blue was to be preserved, one of the resists above was blocked in, and then the cloth was padded in the following solution:—

Catechu Solution.

Catechu at 2° B	5 gallons.
Salammoniac	½ lb.
Sulphate of copper	¼ lb.

The sarrongs were well padded in the liquor, dried and padded again, dried and passed through cold bichromate containing 1 lb. salt to 10 gallons of water; they were left for an hour in the liquor, and then washed in the dash wheel.

It was next necessary to remove the rosin which had served as a resist for the blue and the catechu. To effect this the sarrongs were passed in a boiling liquid composed of 14 lb. of crystals of soda and 20 gallons of water. In from three to five minutes the rosin was dissolved off; the goods were then washed and dried.

When the sarrongs were to have red instead of catechu in them, they were passed into aluminate of soda instead of the catechu solution. The aluminate was at 20° B., and prepared by dissolving hydrate of alumina to saturation in caustic soda. The goods were twice padded in the aluminate, dried, and aged for forty-eight hours at a moderate heat; the mordant then fixed in the following mixture:—

Cow dung	8 gallons.
Chalk	10 lb.
Salammoniac	10 lb.

After being kept in this liquor for half-an-hour at 95° F. they were washed in the dash wheel and then dyed in garancine. After dyeing the rosin was removed in the manner before-mentioned, the goods washed and dried,

The finishing of this style was simple; the cloth was rubbed with the following composition to give it a smell which was desired ;—

White wax	7½ lb.
Incense	4 lb.
Olive oil.....	½ lb.

These ingredients heated together so as to melt them, and then cast in conical moulds. Afterwards the cloth was calendered and retained the smell of incense.

3. *Harley's Green and Madder Styles.*

In the last number of the Textile Colourist we gave a list of prizes offered by the Industrial Society of Rouen, and an account of the unfavourable adjudication of the society upon the claims of an inventor for an improved method of dyeing aniline black. In this paper we give an account of what the Chemical Committee of that society had to say concerning the application of Mr. Harley, of Massachusetts, for the gold medal offered as a reward for the discovery of a dark and bright green for printing on cotton along with alizarine colours, and which should be as fast as them.*

The account runs as follows:—Mr. Harley, of Lowell, Massachusetts, has addressed to the society a memoir competing for the prize No. 9. The terms of this prize are expressed as follows: *A gold medal for a transparent green, bright and deep, which can be applied to calico along with alizarine colours and be as fast as them. The price must allow of its practical use.* The Chemical Committee being charged with the examination of Mr. Harley's paper, named three of its members to enquire into its value as regarded the prize offered. The following is a resumé of their report:—

Mr. Harley's paper was written in English and translated by our colleague, M. Heilmann. It treats of a patented method by which green and purple colours can be obtained upon cotton goods by printing at the same time with mor-

* For Harley's English patent, see Textile Colourist, vol. ii., p. 285.

dants for dyeing in garancine, pincoffine, or artificial alizarine, being able to withstand the dyeing operations in these different substances without undergoing any sensible deterioration.

Mr. Hardy sent with his paper very fine samples of prints done by a five or six-coloured machine with red, orange, chocolate, green, and violet colours. The printing is excellent, and all the colours are bright and transparent. The red, orange, black, and chocolate shew that they have been dyed with garancine; the green and purple aniline colours which accompany them have been printed at the same time, and have supported the dyeing and clearing without any apparent alteration.

This process therefore solves one part of the conditions of the prize, by producing a transparent green, bright and deep, along with alizarine colours. But in order to fulfil completely the conditions required by the proposed prize, the green ought to be as fast as the alizarine colours themselves, that is to say, should resist as well as they do a long exposure to full daylight and a strong soaping.

Now, the colours which are associated with the alizarine shades of Mr. Harley, when subjected to sunlight and boiling soap, suffer the same alterations as aniline green fixed by the common methods. Again, the aniline green has been printed along with steam alizarine colours for a considerable time past.

The prize in question had for object to incite to the discovery of a new, fast, and transparent green to be applied along with alizarine steam colours, replacing the known aniline green which is too fugitive, and the Guignet's pigment green, the shade of which is too opaque and has too little depth.

The question, therefore, of a green colour capable of withstanding dyeing operations was only an accessory part.

From these reasons the reporters conclude: That the paper of Mr. Harley not meeting all the conditions laid down in the programme, the proposed prize cannot be accorded to the author.

However, as the patented process of the candidate appears to us interesting from the point of view of the application of aniline greens and purples which can resist the operations of dyeing in garancine or other colouring matters, and as the candidate has gone beyond the requirements of the rules of competition by making known his name, we propose to the society that it shall address its sincere thanks to him for his communication, and ask him to consent to the insertion of a portion of his communication in the society's proceedings.

Following this an account of Mr. Harley's specification is given, which, not differing in any essential from that given in a previous number of this Journal, is not necessary to reproduce. The reporters say in conclusion:—

In consequence of the trials which we have made, and to assist those who may try this process to arrive at a satisfactory result, we think it desirable to add a few observations.

(1) When printing, pay attention that the green and purple colours are not soiled or dirtied by the iron mordants; that can be effected by printing them after the aniline colours.

(2) A moist and hot ageing seems indispensable, so as to produce the effects of a kind of steaming, in order to fix the colours combined with the tannin.

(3) Regard must be paid to the amount of silicate used in fixing or dunging.

(4) In order to preserve as much as possible the depth and brightness of the green and violet colours, the processes of dyeing and finishing require several precautions to be learned only by experience.

The instructions given by the author in this respect are generally very vague and obscure.

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4. *Notes upon the Manufacture of Indigo.*

M. DEPIERRE having been requested by the Chemical Committee of the Industrial Society of Rouen to enquire into the

nature and properties of a plant called Jamblonier, which it was ascertained was used in the process of making indigo, gave a report upon the subject to the Society, which is accompanied by an account of the process of making indigo at Pondecherry and the Coromandel coasts.*

Jamblonier is the name of a tree (Syzigium Jambolanum) and its distinguishing character appears to be that it contains a portion of tannin matters in the bark and leaves. It is the bark which is used in the indigo manufacture, and, as will be found in the account of this manufacture, a decoction of it is added to the indigo when separating from the liquid, the precipitation being more rapid and complete than otherwise; older processes gave the addition of lime and acid fruits at this stage of the process. The advantage over any mineral addition, as of lime, is that the indigo cake is of a uniform texture, and exempt from the white specks which depreciate its commercial value. A decoction of the bark is also used to add to the indigo pulp during the boiling, it is said for the purpose of giving it a reddish reflection. In fact there seems strong grounds for supposing that the addition of the extract of Jamblonier is most useful in increasing the weight of indigo, that, in reality, it is a means and method of adulteration.

M. Dèpierre received several samples of indigo made by the help of this material; they looked well, and contained in three cases respectively 40, 38, and 23 per cent. of indigotine.

The extract of Jamblonier is also used in indigo dyeing, the last dip being given in a preparation of it; it is said that it makes the colour faster. In Europe indigo dyers sometimes dip first or last in other dyestuff, as annatto or catechu, but this is to give a different shade to the indigo, or to get up the appearance of a deep colour without using much indigo. M. Dèpierre proved that the idea of increased fastness of colour is illusory, all the Jamblonier extract, which increased the depth of shade, was removed by a little acid and alkaline treatment.

Jamblonier is not a very strong tannin matter, containing

* See Bull de la Soc. Ind. de Rouen, iv., p. 428.

less than half the quantity present in good sumach, or about 11 per cent. There is present also some kind of colouring, and probably also extractive matter. As an article for the dyer's use, M. Dèpierre does not think that Jamblonier is worth its freight from India ; but it is at least interesting to know that the indigo makers do use this kind of material, and that an uncertain amount of it may be found present in commercial samples of this dyestuff.

The method of cultivating and extracting indigo, which was communicated to M. Dèpierre, presents some interest. As being the latest in date, as well as concise, we therefore give it.

The land employed for indigo growing is in general high ground, which gets no moisture except from rain. The ground is prepared before the commencement of the rainy season, but it is a very superficial preparation, owing to the inefficiency of the agricultural implements.

The sowing does not take place until the ground is moistened to the depth of 1½ feet. The seeds are placed in small furrows, at a distance of a few inches from one another, the furrows being separated by a space of about 1½ feet. The roots of the indigo plant growing vertically, much of the success of the culture depends upon the nature of the subsoil. Therefore low and damp grounds, and exhausted soils, are unfit for the cultivation; argillaceous soils are those to which preference is given.

The ground being prepared, 8 lb. of seeds are sown for a beegah of land, about 27,000 square feet, and then harrowed in. The seed germinates about the third or fifth day ; when the plants are two or three inches high, and have six or eight leaves, they are weeded, and until they get to be six or seven inches high. In about ninety days the plant flowers and is ready to cut. It is cut at about six inches from the ground and is immediately carried to the steeping pits. The plants are placed horizontally, and held down by planks properly secured, so as to facilitate the fermentation by keeping in the heat. Well water, which in that climate has a temperature of

nearly 80° F., is added in sufficient quantity to entirely cover the plants. They are left thus for fifteen or eighteen hours, when the temperature may have risen to 95° F.; if the temperature is lower they are left twenty hours. The fermentation is more quickly accomplished when the plant is mature than when it is unripe.

The steeping is considered to be accomplished when the following signs are visible :—

(1) When the water begins to subside in the pit.

(2) When the bubbles that rise to the surface break immediately.

(3) When the surface of the water being stirred up shows a yellowish green colour.

(4) When the water has a sweet but sharp smell.

The water is drawn off into a lower reservoir, and subjected to the beating operation.

The Beating or Agitating.—The water is drawn off into a large basin ; after some minutes of settling, the beating is commenced by ten or twelve men, who go into the basin completely naked, each man being provided with a wooden bat similar to a cricket bat. They chant a monotonous song, and keep time with the action of their bats or paddles, the operation consisting in throwing up a quantity of the liquor with the bat to meet and dash against that thrown up by another of the workmen.

The liquor, which at first has a green colour, changes as it is stirred up; it passes into a light blue, then into a darker blue, with a scum or froth of the same colour. When the froth becomes too abundant a quantity of sesame oil is thrown upon it, which causes the froth to subside immediately and facilitates the regular carrying on of the beating. This operation is continued for one and a half to three hours, according to the ripeness of the plant.

The progress of the operation is tested by putting some of the liquor upon a plate and observing its appearance, when it has entirely lost its green colour it is completed; or a piece of cloth attached to a string is from time to time dipped in the liquor to ascertain the progress being made in separating

the indigo. The beating being completed the indigo begins to settle down in the liquor. To assist its precipitation some infusion or other is usually added, the decoction of Jamblonier bark being that which is most commonly employed. After this addition, and when the settlement has taken place, the clear water is drawn off by taps placed at different levels, and then lastly the thin liquid paste of blue indigo is drawn off. This is placed on cloth filters to drain and consolidate. A little water is added to wash away a gelatinous matter which in a subsequent phase would cause the indigo cakes to be dry and gravelly.

Boiling.—The boiling, which is an operation as important as the beating, presents no real difficulties; it is exactly the same as the treatment of rice. The indigo paste is put into a boiler with a small quantity of water to make it somewhat thinner. The heat is pushed on to boiling and kept at that point for four or five hours, the mixture being well stirred to prevent the indigo being burned at the bottom, and from boiling over. The indigo should be cooled before it is run on to the settling bed. It is left on this bed until all the water has run off, it is then taken up with knives and put into a cloth for pressing.

Pressing.—The pressing is an operation of some importance, as giving a good external appearance to the indigo. Care must be taken that it is regular and gradual so as to expel as completely as possible the water. This prevents the formation of empty places, cracks, or bubbles in the cake, which are the after cause of its breaking into pieces. The pressing is generally done in a negligent manner in most establishments, either from a fraudulent desire on the part of the growers to turn out an apparently greater yield, or from other causes which little pains are taken to obviate.

Cutting.—The cutting of the pressed cake is performed on a table by means of a thin blade into pieces of a nearly regular size, which are then conveyed on trays to the drying house.

Drying.—The drying is carried on upon planks covered by a layer of ashes, and then upon nets. The circulation of the

external air is prevented at first; it is gradually permitted to increase until the drying is completed, which takes at least sixty days.

There are three crops of the indigo plant in the year. The first is gathered in June and does not generally give a superior quality of indigo. The second crop gathered in September is the most productive, and the third crop in January is the least important of all. The quality of the two latter crops is usually very good.

The indigo costs the producer from 2 to 3 rupees (four to six shillings) per lb., according to the quality.

It is interesting here to note that the Society of Arts of London, so long ago as 1778, gave a gold medal for an importation of indigo from Tobago. There is a description of the method used in extracting it. The whole extract is short and to the point, and we extract it verbatim from the second volume of the Transactions of the Society, p. 233, giving a glimpse of how this old and useful society was working and encouraging art and manufactures one hundred years ago.

1778. The Gold Medal of the Society was awarded to John Robley, Esq., for the best Indigo imported by him from the Island of Tobago.

King Street, London, Jan. 30th, 1778.

Sir,—The island of Tobago having the misfortune to be infested with ants, many proprietors of estates have been obliged to abandon the culture of sugar, amongst whom were my brother and myself, after being at above £20,000 expense in erecting sugar works, mills, &c.

Having rooted out every cane, we planted cotton, indigo, and turmerick, all of which we hope to bring to some tolerable perfection. Last year we made about eighty thousand pounds weight of fine cotton, and upwards of ten thousand pounds weight of good indigo, and hope this year to make

more, as likewise to have some hundredweights of turmerick, equal to any brought from the East Indies.

My indigo having sold at seven shillings and ten pence, and ten shillings the pound, and being informed by the persons who bought it (Messrs. Coney and Wilson) that it is equal, if not superior, to any quantity that has yet come from his Majesty's plantations.

I take the liberty of troubling you with a sample of four pounds, the certificate, etc., with a plain account of the process, which you will please to lay before the society.

I am, sir,
Your obedient humble servant,
JOHN ROBLEY.

To Mr. More.

The sample of indigo sent was produced from plants raised from seed, sown on a plantation at Tobago in September, 1776, in runs,* at about fourteen inches distance, on good ground, well tilled by hand hoeing, and kept well weeded. When the plants were about six weeks old, they were cut, early in the morning, with the dew upon them, put into a stone cistern, well terassed, then filled with soft river water, and covered over with boards well screwed down. After fermenting about twelve hours, the liquor was let off into another stone cistern, and churned about two hours, throwing in a small quantity of oil to *fall* the froth occasioned by the churning. After being properly settled, the thin water is let off, and the sediment or indigo taken out and put into a frame lined with coarse linen,† set over a bed of sand to extract the water, and afterwards put into another small frame lined with linen, and pressed to get out all the moisture. The indigo

* The French and Spaniards sow their indigo seed in the broadcast way, like garden seeds, which makes it very difficult to weed and keep clean.

† The French and Spaniards, to get the water from the indigo, put it into small bags, like a jelly bag. This occasions the water to be a long time running off, and makes the curing very tedious and very offensive to the persons who attend it; hence it is that the manufacturing indigo has obtained the character of being unwholesome.

being then a very stiff paste, is cut into squares, and put on boards to dry in the shade, turning the pieces several times over till thoroughly dry and fit to pack in casks or boxes.

N.B.—Great care is required at the time of fermenting and churning.

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5. *Methods of Ascertaining the Quantity of Real Cotton in Yarns and Calico; Grey, Bleached, or Dyed.*

THE substance of the following remarks is a translation from the Bulletin of the Industrial Society of Rouen, and, as will be seen, it refers to the claim for a prize offered for some practical process for readily ascertaining the amount of foreign matters, including moisture, in commercial cotton goods. For a considerable time past there has been on the Continent a regular organised method and system for ascertaining the amount of moisture and other foreign matters in silk; this is known as conditioning, a not very suitable term in English, but one which may be accepted in default of a better, and understood as the name of a process which shews the "condition" of a sample of commercial silk with regard to water and other matters. A conditioning establishment for silk was somewhat ostentatiously founded in Manchester several years ago. We are informed that at one time experiments were made upon cotton goods, yarns, prints, etc., by the direction of this establishment, but are not aware that the results were ever published, owing probably to what seems a want of public spirit or an unconquerable diffidence or unwillingness amongst manufacturers in this country to communicate any information in a public manner upon matters which are themselves quite indifferent and unconnected with private enterprise. It is clear that the presence of even small quantities of moisture

beyond the normal quantity, in a costly fibre like silk, would influence to a notable extent its monetary value; in less costly fibres a few per cents. of additional moisture are not so important, but still in these days of close competition, small things have to be minutely examined and inquired into in large businesses, hence, probably, some easy method of ascertaining the actual amount of cotton in the raw material, or in manufactured goods, would prove of real utility to the trade, and be generally adopted. With these preliminary remarks, we may proceed to give the observations of our French colleagues :—

The conditioning of cotton yarns and woven goods is a question which has for some time past occupied the attention of merchants and manufacturers. It is, in fact, to say the least, useful in buying either yarn or cloth to know the real quantity of cotton that is in the material. Cotton always contains a certain amount of moisture, which is either natural to it, or may be the result of moisture drawn or retained by means of certain hygroscopic substances purposely added to it. Besides moisture, it is contaminated more or less by foreign matters which are acquired by it in the various processes of manufacture, or which are purposely added either to assist in the operations of weaving or simply to increase the weight of the cloth.

This question of conditioning appeared sufficiently important to the Chemical Committee to justify them in offering a prize last year for a method of conditioning cotton goods.

Only one paper, bearing the motto, "*Colamus semper aequitatem*," was sent in as competiting for the prize; the examination of this paper by a sub-committee led to their making a report, which in substance is as follows :—

The author of the paper commences by demonstrating the usefulness of conditioning; passing then to the subject, he shews that in conditioning yarns and calicoes the first step is to ascertain the amount of moisture in the cotton, which is found by a perfect drying of it in a proper apparatus, where it can be weighed both before and after exposure to heat. Upon this point the author agrees that the natural amount of

moisture allowed in cotton should be fixed at 8½ per cent., as decided by the International Congress held at Turin in October, 1875.

The moisture having been determined, the next step is to discover the weight of foreign matters which it has either accidentally acquired, or which have been purposely added.

The author for this purpose recommends a systematic cleansing.

(1) Washing fifteen minutes in water softened by addition of either carbonate of soda or lime water, heating gradually to 110° F. or 200° F., this is to remove substances soluble in pure water.

(2) Maceration for fifteen minutes in water heated to 110° F., and acidified by 2 per cent. of hydrochloric acid.

This acid treatment is with the intention of rendering soluble the soaps with a lime and magnesia basis, the resinous matters, the earthy matters, and the iron which may be present; to put the fatty acids in a free state, so that they can be dissolved by subsequent treatment with carbonate of soda.

(3) Passing for ten minutes in water heated to 110° F., and containing carbonate of soda in proportion of 8 parts by weight of the salt to 100 parts of the sample being tested.

(4) Washing for ten minutes in water heated to 120° F., containing soap in the proportion of 4 parts by weight to 100 parts of the sample.

(5) Passing for five minutes in a solution of carbonate of ammonia at 2° B. heated to 100 F.

(6) Washing off in soft or softened water.

After each operation the sample should be well pressed so as to expel as much as possible of the liquor in it.

Cotton cloth should be allowed a longer time in the liquids than yarn or loose cotton, on account of the closer state of the fibres, and their being less easily reached by the various solvents. This system, although it has a satisfactory appearance, is far from being simple and practical; for, as the author admits, including the drying, the weighings, and the preparation of the different liquids it requires more than two hours time.

The principle of the process is not new, for M. Alfred Renouard, junr., in a remarkable memoir upon "conditioning in general and its application to cotton and linen," read November 27th, 1873, to the Industrial Society of the North of France, and published in the Bulletin of December, 1873, gives the following process, not as a new one, but as one in use:—

(1) Cleansing by boiling about two hours in a solution of caustic soda at 2° B., followed by a passage in hydrochloric acid at 1½° B., then a treatment in carbonate of ammonia followed by washing; or

(2) Treating the cotton goods by a milk of lime composed of 1 part of lime to 30 parts water. Following this by a treatment with hydrochloric acid to decompose and dissolve the limy compounds; then by a treatment with carbonate of ammonia to take off the fats or rosin, and finally washing.

These two processes, though differing in detail from those laid down by the author of the memoir, are clearly based upon the same principles. Further, as M. Renouard justly remarks, and we quote his remarks literally, "I do not think this kind of treatment should be applied to cotton, for the substances which are dissolved from natural cotton by it form an integral constituent of the fibre of cotton properly so called. What are the substances which make up the composition of cotton? On the one hand cellulose, which is its principal constituent; on the other, a resinous matter which prevents its imbibing liquids, and a yellow substance present in excessively small quantity. I consider that the resinous matter which lines the cotton hair belongs as much to cotton as the gummy-resinous matter belongs to flax. In testing cotton it is not the pure cellulose which has to be determined, but the commercial and merchantable article of which cellulose forms a part. In fact, the substances which are removed may be looked upon as constituting, along with the length of staple, the difference in the varieties of cotton; and if these are removed there will be no difference between Indian cotton which contains much extractive matter and Georgian cotton which contains very little."

It is also well to draw attention to the fact that the process given by the candidate for this prize does not include any active mechanical treatment in washing, nor a sufficiently high temperature, except, perhaps, in the first treatment, when it is only gradually brought up to 200° F.; and that the starchy matters, such as flour, farina, etc., and earthy matters retained by them, would, in consequence, be only imperfectly removed from woven goods. Therefore, while congratulating the author of the memoir distinguished by the motto "*Colamus semper aequitatem*" upon his conscientious labours and the ideas he has expressed, the reporters do not advise the granting of the prize proposed, because the methods described are not quite new nor so simple and expeditious as required for the object.

The reporters consider that a more simple process of cleansing cotton tissues from foreign matters with which they may be charged, and to ascertain the exact weight of the fibre, would be, after the drying, to wash strongly in distilled or soft water, and to follow by maceration in a decoction of malt at 110° to 120° F. The first operation would remove matters soluble in water and a portion of the attached earthy matters; the second would dissolve the starchy matters which had been used in the warp sizing or finishing, which would be wasted away by distilled water. Thus the fibre would be cleaned of the foreign substances without any constituents of the cotton proper being removed. This process has been in use by M. Benner since 1867, and the trials which the reporters made of it have demonstrated its accuracy, and by it the figures which follow have been obtained.*

By burning a weighed portion of the cotton goods, and weighing the ashes, very useful information can be obtained upon its constituents, comparison being made with the weight of ashes left by a known pure quality of cotton. But this process requires very delicate weighing operations, and it might happen that a sample of cotton material weighted with organic matters only would give the same amount of ashes as an equal quantity of pure and unmixed cotton.

* Precautions must be taken to prevent any loss from the detaching of actual cotton fibres by untwisting or unravelling.

The following results were obtained by the washing and malt process :—

A sample of Cocanadah, weighing 13 kilos. for 100 mètres, lost by drying 7·63 per cent.; by the treatment given in the memoir it further lost 8·26 per cent.; total 15·89 per cent.

A sample of 7/8 calico, weighing 10 kilos. for 100 mètres, made in Normandy, lost by drying 7·14 per cent.; by the treatment prescribed in the memoir it suffered a further loss of 9·56 per cent.; total, 16·70 per cent. By the malt process the loss after drying was 8·96; total, 16·10; shewing a less loss by 0·60 per cent.

A sample of English cretonne, weighing 15 kilos. for 100 mètres, lost 9·2 per cent. by drying; when cleansed according to the process of the memoir it further lost 21·38 per cent.; total 30·58 per cent. Treated by the malt process it lost 20·77 per cent.; total, 29,97 per cent.; shewing a difference less of 0·61 per cent.

Another sample of English cretonne, weighing 16 kilos. for 100 mètres, lost by drying 8·75 per cent. After treatment as in the memoir it further lost 23·09 per cent.; total, 31·84 per cent. In the malt process the loss was 22·85 per cent.; total, 31·60; being 0·24 per cent. less than in the other process.

It is of course understood that after the washing the cloth is perfectly dried. The smaller loss by the malt process as compared with the acid and alkaline process is owing to the latter taking out some of the natural extractive principles in the cotton.

6. *Upon Silk Printing.**

Green Colours:—

Standard Green, No. 1.

Quercitron extract at 30° Tw. ..... 2¾ gallons.
Sulphate of alumina ..... 3¾ lb.
Heat to 113° F. to dissolve the salt, and mix with
Thick gum water ..... 2 gallons.
When cold, add
Sulpho-prussiate of indigo and potash. 3½ gallons.

Dark Green for Grounds, No. 2.

Standard green, No. 1 ..... 1¾ gallons.
Green, No. 3..... ½ gallon.
Sulpho-prussiate of indigo ..... ¼ gallon.

Green, No. 3.

Acetate of alumina at 10° Tw..... 2½ gallons.
Persian berry liquor at 14° Tw. ..... 2½ gallons.
Thick gum water ..... 2½ gallons.
Heat the whole to 160° F., and dissolve in the mixture
Yellow prussiate of potash .....14 lb.
Cool down to 104° F., and add
Tartaric acid ..... 3 lb.
Oxalic acid ..... ¾ lb.
When the colour is quite cold, mix with it—
Prussiate of tin ..... 8 lb.

Myrtle for Grounds.

Dark green (above) No. 2 ..... 4 gallons.
Standard lilac ..... 1 gallon.

Single Green, No. 4.

Persian berry liquor at 14° Tw. ..... 3 gallons.
Acetate of alumina at 18° Tw. ..... ¾ gallon.
Sulpho-prussiate of indigo ..... 1 gallon.
Thick gum water ..... 1½ gallons.

* Abridged from the work of M. D. Koppelin upon this subject. *Continued from p.* 130.

Single Green, No. 5; brighter.

No. 4 green	3 gallons.
No. 1 green	3 gallons.
Sulpho-prussiate of indigo	1½ gallons.

Second Green, No. 6; light.

No. 4 green	6 gallons.
Lilac standard	6 gallons.
Acetate of indigo at 22° Tw.	½ gallon.

Light Green for Two Greens, No. 7.

No. 4 green	4 gallons.
No. 3 green	4 gallons.
Sulpho-prussiate of indigo	1 gallon.
Acetate of alumina at 10° Tw.	4 gallons.
Gum water	28 gallons.

For green and blue colours we may remark it is better to use a good quality of soluble gum or dextrine than ordinary gum. The colours are brighter and not so expensive.

Indigo Green.—This new colour is only a modification of the carmine or sulphate of indigo; it has the same character as Chinese green, shewing its natural colour by artificial as well as by day light.

It is prepared by dissolving sulphate of indigo in ammonia; the liquid is filtered and placed in closed vessels, and exposed for twelve days to a temperature of 70° or 80° F. The change is complete when the precipitate obtained by addition of sulphuric acid diluted with water has a green colour, and does not change by addition of an excess of acid. The precipitate collected upon a filter is the green indigo.

This product is soluble in water and is employed to make a steam green, just as sulphate or carmine of indigo is used for steam blue, that is, by adding alum, tartaric acid, and gum water.

Picric Acid Green.—Greens can be obtained by employing picric acid as the yellow colouring principle, as in the following examples:—

Dark Picric Acid Green.

Picric acid	2½ lb.
Sulphate of indigo	1¼ lb.
Alum	1¼ lb.
Tartaric acid	1¼ lb.
Boiling water	1½ gallons.
Gum water	1 gallon.
Sulphuric acid (1 part strong acid to 2 parts water)	½ pint.

A lighter green can be made by reducing the above with 6 measures gum water to 1 of colour, and adding a solution of picric acid in water. These greens are steamed the same as other colours.

Yellow Colour:—

Jonquille, or Bright Yellow.

Warm water at 104° F.	1¼ gallons.
Alum	1½ lb.
Tartaric acid	¾ lb.

Dissolve the salts and mix the solution with—

Persian berry liquor at 14° Tw.	2½ gallons.
Thick gum water	1¼ gallons.

Orange Colour.—

Orange for Grounds, No. 1.

Persian berry liquor at 14° Tw.	3 gallons.
Gum water	3 gallons.
Crystals of tin	7½ lb.

It may be here repeated that this colour should be used as fresh as possible. The sieve cloths should be washed every day. Without these precautions the grounds will become uneven, that is, there will be spots, some parts lighter and some darker, the block joinings shew, and the work is altogether defective.

When the colour becomes thick in the pots, the printer should not use it for grounds, it can be used for sprigs after adding to it an equal quantity of gum water and berry liquor at 14° Tw.

Orange for Boundage, No. 2.

Berry liquor at 14° Tw.	1¾ gallons.
Water	1¾ gallons.
White Starch	4 lb.

Boil and add

Crystals of tin	2¼ lb.

Mix up well, and when cold stir in

Red for boundage	1¾ gallons.
Oxalic acid	1¾ lb.
Bichloride of tin	10 oz.

Annatto Orange, No. 3.

Paste annatto	12 lb.
Boiling water	¾ gallon.
Common potash	4 lb.

The mixture must be well stirred together and passed through a fine wire sieve, and add

Thick gum water	1½ gallons.

Annatto Orange, No 4.

Paste annatto	3 lb.
Boiling water	¾ gallon.
Common potash	1 lb.

Grind up together and pass through a sieve.

White starch	½ lb.
Dark British gum	1 lb.

Boil until the colour has acquired the proper thickness.

Orange from Bixine.

Bixine	¾ lb.
Potash	2 lb.
Boiling water	1 gallon.
Thick gum water	1 gallon.

Bixine is the colouring principle of annatto freed from the foreign matters which are usually present in the annatto paste. It yields brighter and purer shades than ordinary annatto. It is therefore an advantage to employ bixine, and especially because colours in which it is used do not dirty the printing blocks like annatto. The printer therefore does not lose time by the interruption of frequently cleaning them.

By reducing the orange colours from annatto and bixine with gum water made from dextrine gum, all the shades it yields can be obtained; as for example—

Dark buff, 2 measures orange and 1 measure gum water.
Light buff, 1 „ „ 4 „ „
Ground buff, 1 „ „ 2 „ „

Indian Red from Red Prussiate, etc.

Red wood extract at 14° Tw. ..... 6 gallons.
Berry liquor at 14° Tw..... 1 gallon.
Powdered alum..... 1 lb.
Red prussiate liquor at 28° Tw. ..... 1 lb.
Thick gum water ..... 6 gallons.

Heat the mixture to about 100° F. It will become red by the development of the colour of the first mentioned extract.

In this red colour the red prussiate serves as an oxidizing agent, replacing the oxide of copper usually employed for that purpose. By using it, better and more regular results are obtained; the colour does not become darker by keeping; the sieve cloths may be saturated with it previous to printing, and may be used as long as required without any unevenness of colour resulting, that is, the colour is unlike the common red which may give the right shade the first day of printing, and then becomes darker and darker every day.

The same observation is applicable to the purple and lilac colours from logwood, the composition of which we have given, and which for the the same reasons give more regular results.

Mixed Colours:—

Catechu, No. 1.

Decoction of catechu at 14° Tw. (p. 90) ..... 2½ gallons.
Gum in powder..... 12 lb.
Salammoniac..... 1 lb.

Dissolve with warmth, cool, and add—

Tartro-acetate of Copper..... 6 lb.

Wood Colour or Catechu, No. 2.

Catechu, No 1 ..... 1 gallon.
Dextrine gum water ..... 1 gallon.
Iron liquor at 11° Tw. ..... ½ pint.

Catechu, No. 3.

Catechu, No. 1	1 measure.
Gum water	3 measures.

Dark Wood or Mahogany Shade, No. 4.

Catechu, No. 1	1 quart.
Indian red	2 quarts.
Dark green (p. 179)	1 quart.

Dark Wood Shade, No. 5.

Red standard, No. 4 (p. 124)	1 gallon.
Green standard, No. 1	1 pint.
Jonquille (p. 181)	½ gallon.
Thick gum water	1 quart.

Light Wood Shade, No. 6.

Dark wood shade, No. 5	1 pint.
Dextrine gum water	3 quarts.
Jonquille, (p. 181)	1½ pint.

Light Wood Shade, No. 7.

Hot water	7 pints.
Alum	1 lb.
Oxalic acid	4 oz.
Dextrine gum	7 lb.
Cuba extract, at 12° Tw.	7 pints.
Ammoniacal cochineal	7 pints.

Dark Grey, No. 8.

Sumach liquor, at 7° Tw.	3 gallons.
Logwood liquor, at 7° Tw.	½ gallon.
Powdered alum	2½ lb.
Tartaric acid	½ lb.
Sulphate of iron	2 lb.

Heat all together to 120° F., and when the colour is cold add the following mixture:—

Ammoniacal cochineal	½ gallon.
Acetate of indigo, at 22° Tw.	3¾ lb.
Persulphate of iron, at 74° Tw.	2 lb.

This dark grey, for which no thickening is prescribed, serves for lighter shades by reducing with gum water.

Olive, No. 1.

Dark grey, above ..... 2 measures.
Berry liquor, at 14° Tw. ..... ½ measure.
Dextrine gum water ..... 2 measures.

Olive, No. 2.

Dark grey, No. 8 ..... 1 measure.
Berry liquor, at 14° Tw. ..... ½ measure.
Dextrine gum water ..... 4 measures.

Very Dark Olive for Grounds, No. 3.

Bark liquor, at 30° Tw. ..... 1 gallon.
Red extract, at 30° Tw. ..... 1 quart.
Acetate of alumina, at 18° Tw. ..... 1 gallon.
Iron liquor, at 20° Tw..... ½ gallon.
Tarto-acetate of copper, at 46° Tw.... 1 quart.
Thick dextrine water ..... 2 gallons.
Black No. 3 (p. 122) ..... ½ gallon.
Persulphate of iron, at 74° Tw. ..... 2 lb.

Drab Shade, No. 4.

Sumach liquor, at 7° Tw. ..... 3 lb.
Persulphate of iron, at 74° Tw. ..... ¼ lb.
Dark British gum water ..... 1¼ gallon.

Silver Grey for Light Ground.

Gum water..... 2 gallons.
Crimson No. 5 (p. 126) ..... 2 lb.
Sulpho-prussiate (p. 88) ..... 1½ lb.

Dark Grey for Two Greys.

Crimson No. 5 (p. 126) ..... ½ gallon.
Sulpho-prussiate (p. 88) ..... 3 pints.
Gum water ..... 4 gallons.

Greenish or Cinder Grey.

Crimson No. 5 (p. 126) ..... ½ gallon.
Sulpho-Prussiate (p. 88) ..... 3 pints.
Single green No. 4 (p. 179) ..... 1 quart.
Gum water ..... 1½ gallon.

By mixtures of the different colours which have been given an immense variety of shades may be made according to the requirements of the design ; these colours in which catechu

is a principal colouring matter, though not possessing much depth are very fast, and do not fade by the action of light.

Mourning Greys upon Unmordanted Foulards :—

Standard for Grey.

Acetate of alumina, at 18° Tw.	10 gallons.
Catechu liquor, at 14° Tw.	5 gallons.
Bark liquor, at 30° Tw.	3 gallons.
Logwood liquor, at 30° Tw.	14 gallons.
Boiling water	4 gallons.
Salammoniac	17½ lb.
Tartro-acetate of copper, at 28° Tw.	4 gallons.
Acetate of iron, at 22° Tw.	10 gallons.
Nitrate of iron, at 84° Tw.	25 lb.
Nitrate of copper, at 132° Tw.	10 lb.
Thick gum water	38 gallons.

Mourning Grey, No. 1.

Standard for grey, above	1 gallon
Berry liquor, at 14° Tw.	¼ pint.
Thick gum water	½ gallon.
Gum water	2½ gallons.

Lighter Mourning Grey, No. 2.

Standard for grey	1 gallon.
Berry liquor, at 14° Tw.	¼ pint.
Gum water	12 gallons.

Bright Chamois or Buff.

Standard for pink, No. 1 (page 125)	2 gallons.
Berry liquor, at 14° Tw.	½ gallon.
Gum water	½ gallon.

Flesh Colour.

Pink standard, No. 3, page 126	2 gallons
Jonquille (p. 181)	1 quart.
Gum water	4 gallons.

This part may be terminated by a reference to the *steam resist style* of silk printing, in which certain portions of the design already printed, as well as portions of the white or unprinted silk which are to remain white, are covered with a sort of mastic which, without preventing the fixing of the

colours underneath it, acts as a protection and opposes the fixing of the colours printed over it; these colours generally being applied by machine and roller forming a ground for the design, from which the design first printed stands out clear.

Resist for Steam Colours, No. 1.

Thick gum water	1½ gallons.
Water	½ gallon.
Pipeclay	5 lb.
Flour	5 lb.

This mixture is well rubbed up or ground together so as to form a smooth, fine paste, without previously boiling it. After the resist has been printed, the ground or cover is printed by roller, fixed and washed off as usual. This No. 1 resist will only throw off certain mixed light colours; it does not answer for other colours as lilac, blue, and green, for which the following are required:—

Resist for Blue and Lilac Covers, No. 2.

Thick gum water	1 gallon.
Ground chalk	10 lb.
Pipeclay	2½ lb.
Water	1 gallon.

Resist for Green Covers, No. 3.

Alumina paste	1 gallon.
Ground chalk	10 lb.
Powdered gum	8 lb.
Spirits of turpentine	3 pints.

The alumina jelly or paste is prepared by precipitating solution of alum by ammonia, and draining upon a filter.

[*To be continued.*]

7. *Notes from Mulhouse.*

THE Bulletin of the Industrial Society of Mulhouse for February, 1877, which is just to hand, contains no separate article in connection with textile colouring. In the proceedings

of the Chemical Committee there are a few subjects worth noting.

Aniline Black.—The unusual course taken by the Society in publishing the note of Koechlin Brothers upon the treatment of aniline black, without submitting it to the chemical committee, is explained by the urgency there existed for the immediate publication of the number of the Bulletin then due. M. Jeanmarie observed that an important point had been omitted in the note prepared by the secretary upon this process, and that was the necessity of employing a high temperature—higher than 180° F.—in the process of oxidation, in order that the black should be completely invulnerable to greening.* The committee agreed with M. Jeanmarie, and, considering the whole subject of aniline black sufficiently deserving of a thorough examination, begged M. Rosenstiehl to undertake to make a report upon the subject.

Nitro-alizarine. — At the meeting of January 3rd, Mr. Horace Koechlin drew attention to the fact that the editor of this journal had, in books published in 1860 and 1862, shewn the effect of nitrous gases upon madder red in giving rise to yellow and cinnamon colours. M. Rosenstiehl noted that, in the first volume of the Bulletin (1828), M. Kuhlmann, of Lille, had mentioned that nitric acid somewhat diluted gave an aurora colour to Turkey red cloth. In the annual report presented to the society by M. Charles Meunier-Dollfus, he reminds the members that M. Rosenstiehl first mentioned the action of nitrous vapours upon dyed cloth in September, 1875. Immediately afterwards the same chemist indicated a process for preparing nitro-alizarine, and again in March, 1876, when this new product was a manufactured article and offered for sale. These facts are held by the reporter as shewing how important it is to publish communications without delay, for what is a new laboratory product one day becomes an article of commerce in a few

* See this paper, Textile Colourist, iii., p. 18. What M. Jeanmarie means by oxidation is unfortunately not very clear. He may mean either the ageing previous to raising, or he may mean the oxidation by the persulphate of iron or other materials afterwards.—*Ed.*

months afterwards. The knowledge of nitro-alizarine and its tinctorial properties is, however, older than our Mulhouse friends seem to be aware of. It was investigated by Perkin in 1873, and a paper published in the Journal of the Chemical Society, vol. xxvi., p. 430, describing the colours it yielded with mordants; and further in vol. xxx., p. 578.

In the same address it is noted that M. Camille Koechlin has succeeded in preparing a solid hydrate of alumina from gelatinous alumina. It possesses the property of dissolving in dilute acetic acid. The same chemist has prepared a double chromate of lead and potassium.

A number of sealed packets having been lying in the archives of the society for many years, the society determined to have them examined. The contents of several are published, dating from seventeen to twenty years back. They are interesting from an historical point of view, and call up to remembrance some colouring matters which otherwise might be forgotten, so rapid has been the progress and so great the number of substances promising at first but unable to hold a place as tinctorial matters.

A sealed paper deposited the 11th of November, 1858, by Dollfus-Mieg & Co., treats of a new purple colour proposed by M. Gustave Schaeffer. It was formed from an intimate mixture of murexide lake and ultramarine blue. The paper states: "For some days past we have printed a purple colour upon cotton which appears to us superior in brilliance to any which have hitherto been produced. We make an intimate mixture of murexide lake (with a mercury base) and ultramarine blue. It is thickened with albumen and printed as usual. The colour is fixed either by steaming or passing in hot water; but the murexide part of the colour is so greatly injured by the treatment that the colour must be passed into a solution of salt of mercury to restore its brilliancy." A sample was enclosed, and it is further stated that by use of different proportions of the two colours every shade of purple may be made. On the 16th December, 1868, the same firm deposited another sealed paper in which it is stated, "We have succeeded in obtaining superb shades from *harmaline*

upon cotton, by thickening the solution in tartaric acid with albumen. After steaming the colour is perfectly fast, and withstands chemical agents much better than madder colours. Combined with much brilliance it has the advantage of being muscible with all other colouring matters which are not injured by the presence of tartaric acid. The authors of the process consider that the manner of applying hermaline upon textiles is not simply mechanical in its way, as the fixation of ultramarine by albumen, but that there is a real dyeing of the thickening previously fixed by coagulation. They believe they were the first to apply colours in this way.

A sealed paper dated December 28, 1858, deposited by Messrs. Steinbach, Koechlin, & Co., refers to the preparation of cotton goods which are to be printed with aniline colours. The preparation consists in animalising the cotton; but preferably to employing for the purpose fatty, resinous, or oily matters as they are used in other processes, they prefer albumen. The cloth is impregnated with this substance before printing upon it with aniline colours, or designs are printed with albumen and coloured by dyeing in aniline colours; or, thirdly, the albumen is directly added to the solution of the aniline colours properly thickened.

Another sealed paper dated February 4th, 1859, also deposited by Messrs. Steinbach, Koechlin, & Co., refers to a new purple colouring matter (French purple) which the house had introduced in the preceding January. The process was for using albumen as a fixing agent. The colouring matter, which was an improved sort of archil, came in and went out about the same time as murexide.

M. Cordillot, chemist at Messrs. Schwartz-Huguenin, in July, 1860, deposited a sealed document treating of the curious property possessed by caseine of increasing the power of resistance of certain colouring matters to light.

The five samples which accompanied the document really shewed that the reds and pinks fixed by caseine are much more stable to light than the ordinary cochineal reds and pinks.

Some other sealed packets were brought to light, but the

publication of their contents is deferred until it can be made in a more complete manner.

8. *M. Michel de Vinant on Dyeing, Printing, and Bleaching.**

THE third division of M. de Vinant's work treats of printing, and commences with silk printing. The first topic is a blue vat, made from tin crystals; this kind of vat has been long known, but we did not know that it was in practical use. Compared with other blue vats it is very expensive, but even as a matter of curiosity it will be interesting to give what our author says about it:—

Stannate of lime Blue Vat.

150 gallons water.
30 lb. hydrate of lime.
10 lb. ground indigo.

Rake up the vat five or six times in the day to secure a fine division of the indigo; the next day add 20 lb. of crystals of tin. Rake up well five or six times in the day, leave to settle, take off the froth, and it is ready for dyeing. For the rest it is to be managed like a copperas and lime vat, by freshening up with lime and tin crystals as required.

The blues obtained from this vat are very pure. After dyeing brighten with a little sulphuric acid, which removes the stannate of lime adhering to the surface of the cloth, afterwards wash.

This is a peculiar vat; it can dye cotton, yarn, and cloth; by heating to 120° F. it can dye wool, silk, and mixed goods.

White Resist for the above Vat.

2 gallons water.
10 lb. acetate of lead.
15 lb. pipe clay.
2 gallons gum water.
½ lb. Venice turpentine.
½ lb. spirits of turpentine.

* Continued from p. 35, vol. iii.

The two latter ingredients are separately dissolved and added to the previous ones. The whole is kept gently warm for thirty minutes, strained and stirred until cold. This resist is mainly intended to print upon madder colours which have to be protected from the blue vat, but it serves also for other purposes in cold dyeing.

Black Style with White and Grey.—The silk having been printed with resist No. 1 below, is first dyed black as follows:—Mordant by leaving twelve hours in nitrate of iron, at 4½° Tw., rinse well without beating, dye cold in a mixture of 2 parts of logwood extract and 1 part of fustic extract, rinse and dry. To obtain a triple effect, a portion of the black can be partly discharged by dipping in a mixture of bichromate and nitric acid, the parts to be protected being previously printed with the resist. The resist is cleared off by a soap treatment.

Purple two shades, or Purple, Grey, and White.—Print first with the resist No. 1 below, dye cold in the purple dye of tin salt and logwood, or any other similar shade, rinse off and dry; print the same resist and dry, discharge, or partly discharge with a warm bath composed of 40 gallons water, 3 lb. nitric acid, and 3 lb. bichromate of potash; keep in this liquor until the desired shade is obtained, then rinse and wash well; treat with soap liquor to clear off the resist.

Dark Chocolate with White on Silk.—Print the white with resist below, then pass cold in decoction of red wood at 1½° Tw. for half an hour; lift, drain, and pass for half an hour in green copperas water; lift, drain, and pass for half an hour in catechu liquor with sulphate of copper; rinse and pass in dilute of bichromate of potash; repeat, if necessary, the last two treatments; wash and clean off the resist with warm soap water.

Resist for Cold Dyeing Silk, No. 1.

10 lb. fine rosin.
½ lb. yellow wax.
¾ lb. spermaceti.
6 oz. tallow or suet.
½ lb. Gallipoli oil.

Melt in a proper vessel, and add

1¼ gallons spirits of turpentine.

It is advisable to have a thinner resist than this on hand in order to compensate for the evaporation of the turpentine upon the sieve cloths, which causes it to work thick, when it may be properly diluted. The resist must be from two to four days on the cloth before it is in a fit state for dyeing operations. The soap liquor for clearing off the resist after dyeing, is made as follows :—

Soap Liquor.

5 gallons warm water.
5 oz. strong ammonia.
½ oz. soap.

This solution is used at about 120° F., and the silk kept in until the resist is dissolved off; afterwards the silk may be passed in a very weak soap liquor without ammonia.

A number of shades can be obtained by this system of cold dyeing, and several effects produced by a second printing of resist and another dyeing or partial discharging. The colours so produced are not of a high class, but a good deal employed for the cheaper kinds of silk handkerchiefs, shawls, &c.

Since the introduction of aniline colours in dyeing silk resist styles, it has been necessary to change the cleaning liquor, because most of these colours are much injured by warm soap solution. Instead, it has been found practicable to use petroleum or mineral oil. The goods are passed into two successive baths of petroleum, which suffice to take off the resist, and leave the white good without acting injuriously upon the colours; the goods are well squozen, so as not to leave more of the petroleum than can be helped, and then dried. The spent petroleum can be in great part recovered by distillation, and the dissolved rosins and fats left behind.

Resist for Cold Dyeing Silk, No. 2.

1 lb. brown rosin.
1 oz. white wax.
1 oz. brown gum lac.

Melt together and add

10 oz. spirits of turpentine.

Heat together for fifteen minutes, and add, little by little,

4 oz. spirits of wine.

Heat again for ten minutes, and strain.

Resist for Small Objects, No. 3.

1 lb. brown rosin.

1½ oz. lard.

Melt together, and add, little by little,

8 oz. caustic potash, at 30° Tw.

Boil together twenty-five or thirty minutes in a gentle manner, then add

10 oz. spirits of turpentine.

And gradually afterwards

3 oz. spirits of wine.

Heat together again for ten minutes, and strain.

Cold Resist for Acid Dyes, Silk, No. 4.

1 lb. Burgundy pitch.

1 lb. common rosin.

3 to 6 oz. yellow wax.

Melt together, and then add

2½ lb. spirits of turpentine.

1¼ lb. spirits of wine.

The less wax there is in this resist the better it is suited for the red colour dyed with tin salts.

Resist for Massive Objects, No. 5.

1½ lb. Burgundy pitch.

1 lb. white wax.

½ lb. tallow.

Melt together. This composition is solid at ordinary temperatures, and must be worked hot.

[*To be continued.*]

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9. *Aero-hydraulic Dyeing.*

WE take the following from the "Times" of March 27th. The process described is probably the one patented in the name of George Cantrell Gibbs, of Brentford, in the county of Middlesex, and is entitled, "Improvements in machinery and apparatus for dyeing and colouring felt, silk, and other tex-

tile and porous materials."—Dated 19th September, 1875. Specification published, price 8d."—*Ed.*

"Mr. G. C. Gibbs has patented a valuable invention in the above system of dyeing. On Saturday a trial was made of the machinery just erected in his premises in Brewers' Yard, Bermondsey, and the results obtained were all that could be desired. By this process, all the colours of a pattern are driven at the same instant completely through the stoutest material, or through ten or more thicknesses of calico, silk, or similar goods. Mr. Gibbs claims for his invention that a much better and more durable article can be offered to the public at an actual reduction in cost. As regards carpets, he claims that by the aid of this machine half the expenditure of labour hitherto required can turn out quite three times the length of felt carpet in a given time as compared with the present processes, and that the carpet so dyed will remain bright until completely worn out, or it may be turned. There is no waste of dye—as in the ordinary process of stamping each colour separately—for every particle of the dye not fixed in the material flows back to the tanks and is used over again. All the colours in the pattern are driven together in this system, consequently there is no shifting; the machinery is simple, and to a great extent automatic. The machine on which the trial was made on Saturday is specially adapted for dyeing felt; for producing patterns in lighter substances, other machinery would be designed. The same principle, we are informed, can be applied to tapestry. One great difficulty which Mr. Gibbs had in working the machine, was in not being able to produce two colours of equal density, but by a peculiar arrangement of the valves—by which the dye, which at every stroke becomes partially exhausted, is replenished—he has perfectly got over the difficulty. Several pieces of extra stout felt were separately subjected to the process, and the impression produced almost the same colours on both sides; but when the felt is dried and pressed the inventor informs us that both sides of the material so treated will be exactly similar. Four thicknesses of bath coating were placed in the machine at one time, and in the two inside pieces the colours

were stamped exactly alike on both sides, while on the two outside pieces the impression produced on both sides was so nearly alike that the difference was almost undistinguishable. By this process too concentrated dyes are used, whereas in the ordinary system the dyes are very much diluted. The inventor also points out that while hitherto the production of a real good felt carpet had been practically discouraged, as the pattern was simply stamped upon the surface, by this process felts can be utilised which will equal in durability any other description of carpet, with the special advantage of remaining bright until the last. The machine already erected delivers more than 12 square feet per minute, and larger machines, Mr. Gibbs states, could dye fully double this quantity. The field to which this process is applicable is very large, as carpets and all kinds of rugs, woollen and silken goods, chintzes, curtains, matting, and all similar material can be printed through or dyed in patterns by it, and the principle, the inventor has no doubt, will be applied to other branches of the trade. The invention is patented in France, America, Saxony, and Great Britain."—For American patent, see No. 178,921, page 212 of this Journal.

10. *Abridgments of Complete Specifications of Patents Recently Published.*

A.D. 1876, May 13th.—No. 2016.

NEWTON, HENRY EDWARD. "An Improved Process and Apparatus for Removing Pieces of Straw, Wood, and other Vegetable Substances from Fabrics made of Wool, Silk, Hair, or other Animal Fibres." (See plate.)

"Woollen cloths are very often found to contain small pieces of straw, stick, wood, teazle, or other vegetable substances which were either originally mixed with the wool of which the fabric is composed, or have become added to the fabric during the process of manufacture. These extraneous vegetable

substances form blemishes in the fabric, and the object of the present invention is to remove them therefrom without damaging the finished fabric. This object has usually been effected by the action of a mineral acid on the vegetable substance adhering to the woollen or other fabric. Two methods of applying the acid to the fabric have been used. One is by dipping the fabric in an acid solution, and the other is by subjecting the fabric to the action of an acid gas. The first of these plans is called the wet method, and cannot be conveniently applied to dyed goods, as the wet acid would be liable to injure the colour. The second is called the dry method, and has been found the more convenient of the two, but as heretofore carried on is open to several objections.

"According to the present invention the fabric is first subjected to the action of an acid vapour and then to a very high temperature, the effect of which will be to char the vegetable substances or to reduce them to such a state as will admit of their being washed out or removed by beating, brushing, or otherwise.

"Hydrochloric acid gas, sulphurous acid gas, or sulphuric acid gas may be used for the purposes of the invention, but the inventor of the present improvements prefers to use hydrochloric acid gas, which may be easily and cheaply made either by the distillation of concentrated hydrochloric acid or by the decomposition of common salt or other chlorides by means of sulphuric acid at the strength of sixty-six degrees B., or by the direct action of heat upon any suitable metallic or earthy chlorides.

"In carrying out the invention, the fabric to be operated upon is first passed through a drying chamber, which is heated to about eighty degrees centrigrade, for the purpose of driving off any moisture from the fabric. The fabric is then coolep down by means of fan blowers or otherwise, and when quite cold is passed into another chamber into which the hydrochloric, sulphurous, or sulphuric acid gas from whatever source it may be obtained is admitted. The gaseous vapour attacks the vegetable substances or is absorbed by them but does not injuriously affect the animal fibres of which the cloth or fabric

is made, nor yet the colouring matter with which the fabric has been previously dyed. From this acid chamber the fabric is conducted to another chamber, where it is subjected to a high temperature, say about one hundred and twenty to one hundred and thirty degrees centigrade, which, with the addition of the acid that the vegetable substances have absorbed, will have the effect of charring these matters so that they may be easily removed from the fabric by washing, beating, or brushing.

"I would here observe that instead of generating the gas outside the apparatus and carrying it in in the state of vapour, the fabric may be soaked in a solution of any suitable chloride and passed in succession through two chambers in the first of which (being at a comparatively low temperature) the water alone will be evaporated from the solution with which the fabric has been wetted. The dried fabric will then pass into the second chamber and be subjected to a much higher temperature, whereby the chloride will be decomposed and the acid gas will be disengaged therefrom and in its nascent state will be made to act on the fabric under the most favourable conditions.

"I may here observe that other acids will produce the desired effect, and that if the fabric be soaked in a bisulphate or other suitable solution instead of the chloride it will (upon issuing from the heating chambers) be deprived of the vegetable matters previously adhering thereto. Inferior acids, such as sulphurous acid and the bisulphites, may also be employed, and when such is the case it will be necessary (when the fabric has been impregnated with the sulphurous acid or the bisulphite) to employ an oxidizing agent in order to convert the sulphurous into sulphuric acid, which by the action of heat will destroy the vegetable matters and convert them into products which can be easily removed from the fabric by beating or washing. As the acid will only act properly when in a dry state it is absolutely necessary that the fabric when it reaches the hot chamber should be perfectly dry; if not, there would be a combination of the acid with the water, and the fabric would then be subjected to a damp or wet acid which would

occasion the inconveniences already mentioned, and which it is the special object of the present invention to avoid.

"The apparatus employed for the purposes of this invention, and which forms part of the present improvements, is composed of three chambers, and a cooler and also an apparatus for producing the acid gas. In order that the several processes of drying, acidifying, heating, and cooling may have time to act on the fabric, the latter is passed slowly through the several chambers in a continuous manner and in a serpentine direction by being made to pass over and under supporting or carrying rollers, to some of which rotary motion may be given by means of any suitable gearing. Extraneous vegetable substances may be removed in a similar manner from all kinds of fabrics composed of wool, silk, hair, or other animal fibres.

"In the accompanying Drawings, Fig. 1, Sheet I., is a longitudinal vertical section of the apparatus. Fig. 2 is a transverse vertical section of the same.

"Fig. 3, Sheet II., is a sectional plan view of the apparatus complete, showing also the gas holder in horizontal section. Fig. 4 is a vertical section of the gas holder, showing some of the pipes connected therewith.

"A is the chamber for drying the fabric before it is subjected to the action of the gas. B is a refrigerator for cooling the fabric after it has been dried in the chamber A. C is the acidulating chamber. It is in this chamber that the fabric, after it has been dried and cooled, is brought into contact with the dry and cold acid gas. D is the chamber in which the fabric is subjected to a temperature of from one hundred and twenty degrees to one hundred and thirty degrees centrigrade, whereby the acid is made to act on the vegetable matters which adhere to the fabric. F is the apparatus for making the acid gas.

"The drying chamber A is constructed of masonry or brickwork, and it contains a series of wooden cylinders or rollers *a*, *a*, *a*, *a*, over which passes the fabric M. These rollers are placed horizontally in two parallel lines, the one at the top and the other at the bottom of the chamber, and are so arranged that the fabric in passing from the top to the

bottom series of rollers will be inclined about ten inches from the vertical line. The rollers have an uniform and continuous rotary motion given to them, and they revolve at the same speed as the rollers in the other chambers. The chamber A is warmed by a heating chamber E^1, from which the hot air passes through the openings *h*, *h*, on the floor of the chamber A. When the hot air comes in contact with the damp fabric it absorbs the moisture and is drawn off through openings *f*, *f*, in the roof by means of a fan or exhauster, and is discharged at N. The fabric M is introduced into the chamber A through a narrow slit or opening *m* provided with a grooved lip *n* for the purpose of removing any creases from the fabric after it has passed the rollers *c*, *c*, and the bar e^1 and before it enters the chamber. Just below the upper series of rollers *a*, *a*, there are three stretching cylinders *b*, *b*, which are grooved throughout their length, and have an independent rotary motion communicated to them by the pulleys *d*, *d*, *d*, and friction gear, as shown at Fig. 3, Sheet II. The object of these rollers is to keep the fabric strained out laterally, quite flat, and without creases throughout its whole width. By means of the rollers *a*, *a*, the fabric is made to travel forward through the chamber A from the entrance at *m* to the exit aperature m^1, from which it passes into the refrigerator B, which is constructed of an iron framework for supporting five ventilating fans *k*, *k*, *k*, between which the fabric M passes over and under the rollers a^1, a^1, c^1, c^1, and is cooled by the motion of the air produced by the fans. The fabric, after passing through the refrigerator, and having thus become quite cool, enters through the opening *m* into a second chamber C, where it is subjected to the action of the dry acid gas. This chamber, like the first, contains a series of carrying rollers a^{11}, a^{11}, and stretching rollers b^1, b^1, upon which the fabric M travels. The dry hydrochloric acid gas is introduced at the bottom of the chamber by the earthenware pipe *j*, and is drawn off at top by the earthenware pipes *f*, *f*, which communicate with a draught flue N^2 as shown at Fig. 2, Sheet I. The fabric, after travelling in this gaseous atmosphere, and having become saturated with acid, passes through the open-

ing m^{III}, m^{IV} into a third chamber D, where, assisted by a temperature of from one hundred and twenty degrees to one hundred and thirty degrees centigrade, the acid is made to act energetically on the vegetable matters adhering to the fabric.

"The chamber D is constructed in masonry or brickwork, and like the other two is provided with a series of carrying rollers a^{III}, a^{III}, and stretching rollers, b^{II}, b^{II}, over which the fabric passes. The stretching rollers b^{II} have an independent motion given to them by means of the pulleys d^2 and the friction gear O^2. The chamber is heated to a temperature of from one hundred and twenty degrees to one hundred and thirty degrees centigrade, by means of a heating apparatus E, which sends its heated air into the chamber D through the openings h^1, h^1, constructed in the floor. By means of the fan X, Fig. 3, the draught flue N^1 and the openings f, f^1, made in the ceiling or roof of the chamber a constant current of heated air is maintained therein. The acid then (under the action of this heat) continues to act on the vegetable matters, and disintegrates and completely carbonizes them, and in order to entirely remove them from the fabric, it will only be necessary to beat or wash it. From the hot air chamber D the fabric is conducted through the opening m^5 to a folder R. All the carrying rollers have an uniform rotary motion given to them by means of the bevil wheels z, z, and the horizontal and vertical shafts z^1, z^1, z^1, which are driven by the friction gear O^3, Fig. 3.

"The apparatus for producing the hydrochloric acid gas is composed of a bench F of several retorts placed over a fire. The gas is produced by the decomposition of common salt by means of sulphuric acid at sixty-six degrees B. To make the gas 1 equivalent of dry chloride of sodium=730·4 is placed in the retort and 1 equivalent of anhydrous sulphuric acid=612·5. Under the action of heat 1 equivalent=455·7 of hydrochloric acid gas is given off and is then cooled in the refrigerating apparatus G, which may be combined or arranged in different ways. In the drawing is shown an arrangement consisting of earthenware pipes connected together by elbows or junction pieces, the lower ones being provided with short

branch pieces for the purpose of from time to time running off any liquid that may accumulate there owing to the condensation of the gas by the refrigerating or cooling process. The gas after passing through the cooling apparatus is conducted by a pipe G^1 to a gas holder E, E, where it is stored ready for use. The gas holder consists of a tank constructed in masonry coated with a cement which is impermeable and resists the action of the hydrochloric acid gas. The bell or moveable holder is made of wood, and is plunged in a bath of oil *i*, *i*, (some dense hydrocarbon). This bell communicates with the gas generating apparatus F by means of the refrigerating apparatus G and a tubular channel G^1, also with the acidulating chamber by the pipe G^2 and a tube *j*, which opens directly in the floor of the chamber C. The channel may be stopped when desired by means of a cock conveniently placed for the purpose. The apparatus above described answers very well practically, and it is independent of the hot chamber so as to admit of the stopping of one part of the apparatus for a greater or less length of time without interrupting or interfering with the operation of the other. What is important in the process is that the fabric to be operated upon should pass through all the hot chambers and the cooling chambers in a constant and uniform manner, as any stoppage of the fabric might occasion accidents which it would be desirable to avoid.

"From what has been already said it will be understood that the operation of the whole apparatus is extremely simple. The fabric passes into the first chamber in order that any water or dampness it may have absorbed may be driven off. From thence it is conducted through the refrigerator, and when in a cool and perfectly dry state it is brought into contact with the acid gas, and when well saturated therewith it passes into another chamber which is heated to a high temperature, and by the action of the heat the acid is caused to act energetically on the vegetable matters so as to carbonize them and bring them into a state which will admit of their being easily removed from the fabric by washing or beating.

"It has been stated that although hydrochloric acid gas is preferred, another acid may be used in place thereof. In fact, the same result has been obtained (that is to say, the cellulose matter has been eliminated without affecting the dye or colour of any substance that is not cellulose) by simply using as the chemical agent sulphurous acid and sulphuric acid in a gaseous state.

"The apparatus above described for the use of dry hydrochloric acid does not require any modification of its essential features for the use of the new chemical agent. It will only be necessary to use, instead of the generator for producing hydrochloric acid gas, another apparatus capable of producing the mixture of sulphurous acid and sulphuric acid in a gaseous state.

"The apparatus which it is proposed to use for this purpose consists of a cast-iron retort in which sulphurous acid is produced by burning sulphur in the presence of a current of air forced into the retort by an air pump or other suitable blowing device. There is also a cast-iron condenser or worm submerged in a current of cold water and connected at one end to the retort, and at the other by means of a leaden pipe with a receiver containing sulphuric acid at sixty-six degrees B. This receiver is a close one and is lined with lead. It contains a bath of sulphuric acid in which the sulphurous acid gas is made to bubble-up. The gas chamber of this receiver communicates with the acidulating chamber by means of a leaden pipe. The action of this apparatus is as follows:—The retort having been charged with ignited sulphur and perfectly closed the air pump is set in action, and as the sulphurous acid is given off in the retort it is driven forward into the worm of the condenser where it is cooled, and from thence it descends to the bottom of the receiver containing the sulphuric acid. It passes through the bath and becomes charged with the acid vapours, which it carries forward into the acidulating chamber. The fabric to be operated upon being in a dry and cold state absorbs these vapours and passes into the hot air chambers where, excited by a temperature of from one hundred and twenty degrees to one hundred

and thirty degrees centrigrade, the sulphuric acid will act energetically on the vegetable matters without affecting the coloring matters with which the fabric was dyed previous to the operation.

"Having now described the invention of 'An Improved Process and Apparatus for Removing Pieces of Straw, Wood, and other Vegetable Substances from Fabrics made of Wool, Silk, Hair, or other Animal Fibres,' and having explained the manner of carrying the same into effect as communicated to me by my foreign correspondent as aforesaid, I would observe that the improved system and apparatus herein set forth is applicable for removing from woollen, silk, or other cloths or fabrics made of animal fibres, extraneous vegetable matters or cellulose which is capable of being acted upon by acid gas in combination with a dry heat. I therefore claim as the invention secured to me by letters patent as aforesaid the improved process herein set forth for removing extraneous vegetable matters from fabrics made of animal fibres, such improved process consisting in first drying the fabric for the purpose of removing any moisture it may have absorbed, then subjecting it to the action of a dry acid gas and a dry heat for the purpose of charring or carbonizing the vegetable matters that may adhere to the fabric as and for the purpose herein set forth.

"I also claim the construction, arrangement, and combination of parts herein shown and described and constituting an apparatus for effecting the object herein set forth."

A.D. 1876, July 17th.—No. 2916.

ALEXANDER, EDWIN POWLEY. "Improvements in the Treatment of Woolen and Silk Fabrics and other Goods composed of Animal Products with a view to the Removal of any Vegetable Substances contained therein, also in the Apparatus or Means employed therefor." (See plate.)

"The said invention has for its object the destruction and removal by a dry process of any vegetable substance that may be mixed with or contained in woven fabrics or piece goods of wool, silk, or other analogous products by the application

thereto of the combined action of heat and of the gas evolved from hydrochloric acid in a state of ebullition in a closed oven or chamber so constructed and arranged that the fabrics before mentioned may circulate continuously therein in presence of the said gas and during a sufficient length of time to effect a complete destruction of the 'knots' or other vegetable particles contained in such fabrics.

"And in order that the said invention may be fully understood I shall now proceed more particularly to describe the same, and for that purpose shall refer to the drawing hereunto annexed, which represents a longitudinal vertical section of a combined apparatus for carrying out the said invention.

"A is a carbonizing oven or chamber closed as tightly as is practicable, and filled with the vapours of hydrochloric acid. This chamber is heated by a heating apparatus, the flues of which extend over the bottom of the said chamber, and act directly upon pots or vessels F containing hydrochloric acid, which is maintained at the boiling point and dispersed in the form of vapour or gas throughout the whole of the interior of the said chamber. In the upper part of this chamber there are provided two series of parallel rollers R, which receive a regular rotary motion in any well-known manner. Their speed of rotation may be varied at will in order that the cloths or fabrics under treatment may occupy a longer or shorter time in traversing the chamber.

"The fabric to be operated upon is unwound from the beam or roller B and passed zig-zag fashion or to and fro over the several rollers R in the chamber A. On starting the rollers the fabric will be caused to circulate through the said chamber in a continuous manner by travelling horizontally from one series of rollers to the other, and descending successively from tier to tier of such rollers. During its traverse the fabric becomes impregnated with hydrochloric acid gas which by its burning property assisted by the heat developed by the heating apparatus destroys any vegetable matters or 'knots' which may be mixed with the said fabric.

"The speed of the fabric is regulated according to the nature of the vegetable substances so that they shall remain

inside the said chamber during a period of time sufficient for their complete destruction. By this time the fabric issues at D, passing between the card covered rollers E and a pair of guide or delivery rollers, which by their action cause the charred vegetable substances to fall in the form of dust, whilst the fabric finally passes to an ordinary folder P which disposes it at C in regular folds. This mode of treatment is applicable also to fabrics or piece goods composed of silk or of any other animal material having vegetable substances mixed therewith. In cases where the fabric to be operated upon is in a wet state it is first caused to traverse a heated chamber wherein it is dried before entering the carbonizing chamber A, care being taken that the rollers in both the chambers be caused to revolve at an uniform surface speed in order to obtain a continuous action.

"I am aware that it has been proposed to employ hydrochloric acid gas in a heated chamber for the destruction of vegetable substances contained in woolen rags or loose waste placed upon trays in such chamber, but such process or arrangement is not continuous, and is not so suitable for the treatment of fabrics or piece goods.

"Having now described and particularly ascertained the nature of the said invention, and the manner in which the same is or may be used or carried into effect, I would observe in conclusion that what I consider to be novel and original, and therefore claim as the invention secured to me by the herein-before in part recited Letters Patent is, the mode of and combined apparatus for treating in a continuous manner fabrics or piece goods composed of animal products, such as wool or silk, for the purpose of destroying and removing any vegetable substances or 'knots' that may be contained in or adhering thereto, as herein-before deseribed and illustrated by the drawing hereunto annexed."

A.D. 1876, July 20th.—No. 2956.

KEIM, JOSEPH, of Tharm, Alsace, Allemagne. "Improvements in Machinery for Stretching and Drying Textile Fabrics."

"This invention has reference to improvements in machinery used for stretching woven fabrics.

"The improved machine consists of a pair of cast-iron end standards bolted together by transverse rods, and thus forming the framing of the machine. Within these standards are arranged two cast-iron annular or internally toothed wheels which are driven by pinions in conjunction with friction pulleys arranged radially around the inner portion of the machine, the pinions deriving their motion from a main horizontal shaft fitted beneath. Outside the annular wheels and parallel thereto are fitted two circular guides, each of which is furnished with a series of radially disposed brackets, which in their turn carry a small carriage or adjustable sliding plate somewhat similar to the self-acting slide rest of a lathe, that is to say, the carriages traverse to and from the axis of the machine in dovetail grooves formed on the brackets. To the upper part of each carriage is fitted a bent plate which extends inward and over the periphery of its contiguous annular wheel; and on the outer surface of this plate is arranged the mechanical part by means of which the selvages of the fabric to be stretched are pinched and held on either side whilst the gradually diverging arrangement of the carriages beneath or around effect the required distension. The lateral movement of the carriages or sliding plates is effected by a screw movement arranged beneath or within the radius of each carriage, the whole being connected together by jointed rods so that the series may be actuated throughout at will. This is effected by means of a horizontal shaft in gear with one of the screws just referred to; the other end of the shaft extends beyond the framing, and terminates in a hand wheel under the control of the machine attendant. The series of tenters or stretching carriages may by the adjusting screw movements be so arranged that the fabric is stretched between or by any given number of the tenters, and in this manner a series of two, three, or four may form the stretching series, the rest being parallel to each other, or the whole series may be set gradually divergent. The fabric is passed into the machine in a wet or damp state between a pair of

horizontal guide rollers, and by an automatic mechanical arrangement is carried under the tenters or pincers around the periphery of the machine, and it emerges at an opening arranged also with an automatic movement over a roller fitted below the guide rollers before referred to, and thence to the winding beam. Within the interior of the machine is fitted a hollow annular cylinder, the inner part of which communicates by tubular radial arms with a central air shaft arranged horizontally and communicating with a suitable air-heating stove or furnace. By these means the fabrics under operation are rapidly dried, and in this way textile fabrics of all kinds, whether thin or heavy, may be stretched and finished in a rapid, economical, and satisfactory manner.

"Hitherto stretchers have been used having chains with points or with nippers which are liable to frequent ruptures. Now my nippers are fixed upon solid pieces of cast iron replacing the chains of the old stretchers, which allows of a very good division of the traction force in regard to the solidity of the machine and the possibility of stretching the heaviest fabrics, and to produce an amount of work which no other form of stretcher can give. Besides, all kinds of woven fabrics may be stretched, including calico and other materials, as well as silk, which cannot be done with the ordinary chain of points stretcher, because holes are made in the selvages, and remain in the material.

"In my invention there is a lesser number of carriages admitting of easy regulation commanding the pieces which support a series of nippers.

"The stretcher may be put to its widening power with extreme facility by acting on a single fly wheel which allows it to enlarge or diminish the width during the working of the machine. These movements allow of the widening enlargement of the fabric at the will of the operator, thus the fabric may be widened and then shrunk from its entry into the machine till it leaves it; or it may be stretched from its entry up to the second, third, or fourth carriage and be maintained at that width there until it leaves the machine.

"The narrow annular space parallel to the fabric receives

a supply of hot air which is injected and passes through the pores of the stuff and dries it. This constitutes an important improvement in this invention dispensing with the steam plates and drums usually employed. Or in place of this, a steam plate is arranged so as to communicate heat to a supplementary drum contiguous to the latter or outgoing portion of the machine, and so as to prevent the fabric from dropping at the centre."

The specification then refers to the drawings accompanying it. We have not been able to include the drawings in this number of the "Textile Colourist," and omit this part. The claims are stated as follows :—

"1stly. The construction and use of the machine hereinbefore described for stretching, making-ready, drying, and expanding fabrics of cotton, silk, wool, or other textile materials, and in which machine nippers are fixed on pieces of cast iron replacing the chains of stretchers now in use, and thus allowing of the stretching of the heaviest fabrics, and wherein a small number of carriages easy of regulation control the moveable pieces which support the nippers.

"2ndly. The arrangements for obtaining instantly a good opening by acting on a single fly which allows of changing the size during the working of the machine.

"3rdly. I claim the arrangements of machinery for allowing the stretching of the fabric to be varied at will, that is to say, to divide that enlargement from its entry to its discharge or to augment it only from its entry up to a third or fourth carriage or in all other proportions of its development and to maintain that width through the remainder of its development up to its exit or discharge.

"4thly. The arrangement in the machine for giving the annular narrow space parallel with the fabric receiving the injected hot air which permeates through the fabric and dries it."

11. British and Foreign Patents, from the Commissioners of Patents Journal, Feb. 23rd to March 20, 1877, inclusive.

Printing and Bleaching.

3248. ALEXANDER BROWNE, of the firm of Browne and Company, Patent Agents, of 5, Southampton Buildings, Holborn, in the county of Middlesex, for an invention of "A new or improved mode and means for producing paintings on all kind of textile and other fabrics."—A communication to him from abroad by Messrs. Gustave Cleis and Company, of Montrouge, France.—Dated 18th August, 1876.—This patent has passed the great seal.

3473. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, for an invention of "An improved method of and machine for printing woven and other fabrics."—A communication to him from abroad by Eugène Boeringer, of Paris, France.—Dated 2nd September, 1876.—This patent has passed the great seal.

4601. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, for an invention of "An improved process of softening, cleansing, and decolorizing fibres and fabrics."—A communication to him from abroad by William Maynard, of New York city, United States of America.—Dated 28th November, 1876.—This patent has passed the great seal.

4970. JAMES ASHCROFT, of Halliwell, near Bolton, in the county of Lancaster, for an invention of "Improvements in the construction of bleaching kiers."—Dated 23rd December, 1876.—This patent has passed the great seal.

179,059. LEWIS M. RANDALL, of Salem, N.J., and H. A. MOORE, of Brooklyn, N.Y., for "Machines for printing oilcloths."—Application filed 3rd September, 1875.—American patent.

Brief.—"The series of printing-blocks, and the troughs carrying the particular color for each block, are operated in unison by connections from the main shaft, from which the plunger is reciprocated. The gripers are opened and lifted to grasp the cloth by a crank pin, the weight of the griper-arms feeding the cloth forward."

Claim.—"1. The endless system of printing-blocks A, the endless system of color-troughs M, carrying color feed-rollers N, the plunger H, and the vibrating griping cloth-feed, comprising the rock-shaft P^1 and bar R, the whole combined and arranged for use by means of suitable connecting

mechanism, substantially as and for the purpose set forth. 2. The arms P and lever R^1, in combination with the bar R and rock-shaft P^1, having claws *u*, the aforesaid arms and lever being actuated in unison with the printing-blocks A and color-troughs M by means of the crank S, substantially as and for the purpose set forth. 3. The driving-shaft E, rod *b*, pin a^{11}, pawl and ratchet *h*, *i*, rod *r*, elbow-lever I, rod J, crank-pin b^{11}, pawl e^1, ratchet f^{11}, and spur-wheels F^1, G^1, the whole arranged to give motion to the endless system of color-troughs in unison with the movements of the printing-blocks, substantially as and for the purpose set forth."

114,870. KALLAB, for "Bleaching animal textile fibres."—Dated 5th October, 1876.—French patent.

554. JAMES BALLENY ELKINGTON and CHARLES EDWIN RYDER, both of Newhall Street, Birmingham, in the county of Warwick, for an invention of "Improvements in the manufacture of copper tubes, and also of copper rollers for calico printing, embossing, and similar uses."—Dated 24th February, 1870.—This patent has become void.

588. THOMAS CATTELL, Doctor of Medicine, 188, Strand, London, for an invention of "Improvements in preparing, treating, and purifying fibrous vegetable and fibrous animal substances."—Dated 28th February, 1870.—This patent has become void.

Colouring Matters, Pigments, and Dyeing Operations.

169. JOHN GARRETT TONGUE, of the firm of Tongue and Birkbeck, Patent Agents and Engineers, of 34, Southampton Buildings, Chancery Lane, in the county of Middlesex, for the invention of "Improvements in means and processes for obtaining colouring matters from cannel, anthracite, and other coals, applicable to various useful purposes."—A communication to him from abroad by Doctor Meusel, of Breslau, in the empire of Germany. —Provisional protection has been granted.

297. STEPHEN WILLIAMS, of Chelsea, in the county of Middlesex, Chemist, has given notice to proceed in respect of the invention of "Improvements in the production of pigments."

596. PETER CANNELL BUNN, of Stoke-Ferry, in the county of Norfolk, has given notice to proceed in respect of the invention of "Improvements in the production of pigments."

674. MICHEL EDMOND SAVIGNY, Chemist, and ALFRED CHARLES COLLINEAU, Doctor in Medicine, both of Boulevard St. Denis, 1, at Paris, for the invention of "The manufacture of an improved vegetable colouring substance and the derivatives thereof."—Provincial protection has been granted.

1056. WILLIAM JACKSON, of Urmston, near Manchester, in the county of Lancaster, Print Buyer, for an invention of "Improvements in treating fabrics printed with aniline colours,"—Dated 16th March, 1877.

4912. WILLIAM VIRGO WILSON, of 7, Cottage Grove, Bow, in the county of Middlesex, Manufacturing Chemist, and HEMINGTON CANT, of 8, Coborn Street, Bow aforesaid, Analytical Chemist, have given notice to proceed in respect of the invention of "Improvements in the manufacture of aniline dyes."

178,921. GEORGE C. GIBBS, of Brentford, England, for "Apparatus for dyeing woven or porous fabrics."—Application filed 28th February, 1876. American patent.

Brief.—"The dye is forced by means of pump through the fabric, a portion of which is stopped out by pressure applied to a pair of dies, between which the fabric is held. By reversing the pumps the dye is drawn back through the fabric, and then air is sucked through in order to dry it."

Claim.—"1. The lower dies g and the upper moveable perforated dies g^1, in combination with the pumps n, n^1, and the pipes o, o^1, substantially as and for the purposes described. 2. The combination with the dies g, g^1, and the pumps and pipes n, n^1, o, o^1, of the feeding rollers h, h^1, and driving gear r, all actuated from the driving-shaft c, substantially as and for the purposes explained."

179,939. G. MOLT, of Millbury, Mass., for "Blues-dyes."—Application filed 19th February, 1876.—American patent.

Claim.—"The blue dye described, composed of indigo, oxalere, ammonia, sal ammoniac, and potash or soda-ash, in the proportions substantially as above set forth."

103,817. ROBERT, sen., for "A dyeing process."—Dated 9th October, 1876.—French patent.

115,046. YART, of Darnétal, for "A fast dye for cotton and linen tissues."—Dated 18th October, 1876.—French patent.

115,003. ORR, for "Improvements in the treatment of tissues printed or dyed with aniline black."—Dated 13th October, 1876. French patent.

115,093. GIRAUD, for "Obtaining pile-tissues dyed after weaving." Dated 20th October, 1876.—French patent.

115,160. GRAWITZ, for "Unalterable aniline black dyes and prints." Dated 21st October, 1876.—French patent.

41,436. M. E. SAVIGNY and A. C. COLINEAU, for an imported invention of "Preparing a vegetable colouring substance."—Dated 5th February, 1877.—(French patent, 29th December, 1876.)—Belgian patent.

41,504. W. J. S. GRAWITZ, a Patent of Improvement for "An aniline black dye."—Dated 13th February, 1877.—(Original Patent, 21st October, 1874.)—Belgian patent.

216. ALBERT and Co., of Frankenthal, for "A machine for dyeing velvet."—3 years.—Dated 26th December, 1876.—Bavarian patent.

633. DAN DAWSON, of Milnes Bridge, in the county of York, Aniline Manufacturer, and CLAYTON SLATER, of Barnoldswick, in the county aforesaid, Cotton Spinner, for an invention of "Improvements in dyeing and in apparatus connected therewith."—Dated 19th February, 1874.—This patent has become void.

866. ROBERT POLLOCK, of the Milton Dye Works, Jamestown, in the county of Dumbarton, North Britain, for an invention of "Improvements in operations and apparatus connected with the dyeing of textile materials and fabrics."—Dated 10th March, 1874.—This patent has become void.

Yarn Treatments.

698. JOHN SIRLING ALSTOY, Merchant, and WILLIAM REID, Dye Works Manager, both of Glasgow, in the county of Lanark, North Britain, for the invention of "Improvements in apparatus to be used in connection with various processes of treating yarns with liquids.—Provisional protection has been granted.

849. FRANCIS JOHNSTON, of Peel Mill, Blackburn, in the county of Lancashire, Power Loom Cloth Manufacturer, for an invention of "The more economical and efficient dyeing, bleaching, or printing of cotton or other yarns, other than from the hank or chain."—Dated 2nd March, 1877.

964. ARCHIBALD STEWART BYERS, of the firm of "Campbell and Byers," of Paisley, in the county of Renfrew, North Britain, Dyers, for an invention of "Improvements in scouring, bleaching, and dyeing yarns, and in the machinery or apparatus employed therefor."—Dated 10th March, 1877.

1005. WILLIAM SUMNER, of Manchester, in the county of Lancaster, Merchant, for an invention of "Improvements in apparatus for drying yarn, woven fabrics, and other materials."—A communication to him from abroad by Messieurs Tulpin Brothers, of Rouen, France, Machine Makers.—Dated 13th March, 1877.

3502. SAMUEL GRAHAM, of Belfast, in the county of Antrim,

Ireland, Weaver, for an invention of "An improved method of treating yarns."—Dated 6th September, 1876.—This patent has passed the great seal.

Treatments of Wool, Silk, and Mixed Goods.

886. Oscar Low, of Chelsea, in the county of Suffolk and state of Massachusetts, in the United States of America, for an invention of "Process and apparatus for cleansing and washing wool or other material."—(Complete Specification.)—Dated 5th March, 1877.—Provisional protection has been granted.

3476. William Robert Lake, of the firm of Haseltine, Lake, and Co., Patent Agents, Southampton Buildings, London, for an invention of "An improved machine for dressing and cleaning skeins or hanks of silk and other spun materials."—A communication to him from abroad by César Corron, of St. Etienne (Loire), France, Dyer.—Dated 2nd September, 1876.

4318. Emile Gaudchaux-Picard, of Paris, Manufacturer, for an invention of "Improvements in chemically unweaving textile fabrics made of animal and vegetable fibrous substances, for the purpose of utilising by combing silk or wool filaments therefrom." Dated 8th November, 1876.—This patent has passed the great seal.

114,895. Durand, of Elbeuf, for "Neutralising acids employed in the chemical cleaning of woollen, silks, &c., by means of insoluble salts."—Dated 9th October, 1876.—French patent.

115,090. Gaudchaux-Picard, of Paris, for "A chemical process of undoing rags."—Dated 19th October, 1876.—French patent.

115,091. Gaudchaux-Picard, of Paris, for "Utilising the animal substances obtained in undoing rags by chemicals."—Dated 19th October, 1876.—French patent.

115,173. Pauthier, of Paris, for "Coloured gold and silver impressions on woollen and silk lace, braid, and tresses."—Dated 21st October, 1876.—French patent.

4619. J. Marchal, Pierron, and Dehaitre, of Paris, for "Restoring their original suppleness to re-dyed silks."—5 years.—Dated 13th September, 1876.—Saxon patent.

73. J. Marchat and Pierron and Dehaître, of Paris, for "A treatment of silks for rendering them soft and supple again after dyeing."—1 year.—(Secret.)—Dated 7th October, 1876.—Austrian patent.

386. John Petrie, junior, of Rochdale, in the county of Lancaster,

Machine Maker, for an invention of "Improvements in machinery or apparatus for washing or scouring and drying wool and other fibrous materials, and yarns or threads."—Dated 9th February, 1870.—This patent has become void.

821. EDWARD MASON and THOMAS MASON, trading under the style or firm of Hinde and Co., of Bulk, near Lancaster, in the county of Lancaster, Silk Spinners, for an invention of "Improvements in the process of cleaning silk waste, and in machinery to be used therein."—Dated 6th March, 1874.—This patent has become void.

Finishing, Folding, Drying, Steaming, &c.

854. JOHN HART TRACY, of Clerkenwell, in the county of Middlesex, for an invention of "Improvements in machinery or apparatus for plaiting or folding fabrics."—Dated 3rd March, 1877.

859. JOHN WILSON, of the firm of John Wilson and Company, and WILLIAM COCHRANE, both of Glasgow, in the county of Lanark, North Britain, for an invention of "Improvements in hot pressing textile fabrics and in the machinery or apparatus employed therefor."—Dated 3rd March, 1877.—Provisional protection has been granted.

1066. SAMUEL MILNE SMITH, CHARLES TELFORD SMITH, and WILLIAM BINNS, of the firm of Samuel Smith and Company, of Bradford, in the county of York, Dyers and Finishers, for an invention of "Improvements in finishing 'moreens' and corded fabrics."—Dated 16th March, 1877.

3574. HENRY LISTER, of Ashbrow Mills, near Huddersfield, in the county of York, for an invention of "Improvements in cooling woven or felted fabrics after the process of steaming or 'blowing' or boiling in water."—Dated 12th September, 1876.—This patent has passed the great seal.

3732. JAMES SHAW, of Galashiels, in the county of Selkirk, North Britain, Manufacturer, for an invention of "Improvements in rollers for expressing liquid from textile materials, yarns, and and fabrics."—Dated 25th September, 1876.—This patent has passed the great seal.

4435. HENRY DEWHURST, of Huddersfield, in the county of York, Woollen Printer, has given notice to proceed in respect of the invention of "Improved means or methods of embossing, in-

denting, or engraving shapes and designs on woven or felted fabrics."

4466. WILLIAM ELI SUDLOW, of Oldham, in the county of Lancaster, Engineer, has given notice to proceed in respect of the invention of "Improvements in machinery or apparatus for steaming and setting textile fabrics."

109,804. BEAUDUIN, for "A machine for drying fulled and other stuff."—Dated 9th October, 1876.—French patent.

115,203. MAGNER, for "A process of treating vegetable fibres to impart to them a silky appearance, and to prepare them for dyeing."—Dated 25th October, 1876.—(English Patent, 12th October, 1876.)—French patent.

115,253. CHABANEL and Co., of Rheims, for "A machine for widening woollen and other tissues."—Dated 4th November, 1876.—French patent.

41,541. MARLINOT, BROTHERS, for an imported invention of "A machine for rendering tissues fleecy."—Dated 19th February, 1877.—(French patent, 15th September, 1876.)—Belgian patent.

4727. PIERRON and DEHAITRE, of Paris, for "A tenter for tissues."—5 years.—Dated 29th November, 1876.—Saxon patent.

4729. E. R. FRIEDRICH, of Meerane, for "A machine for drying linen."—5 years.—Dated 21st December, 1876.—Saxon patent.

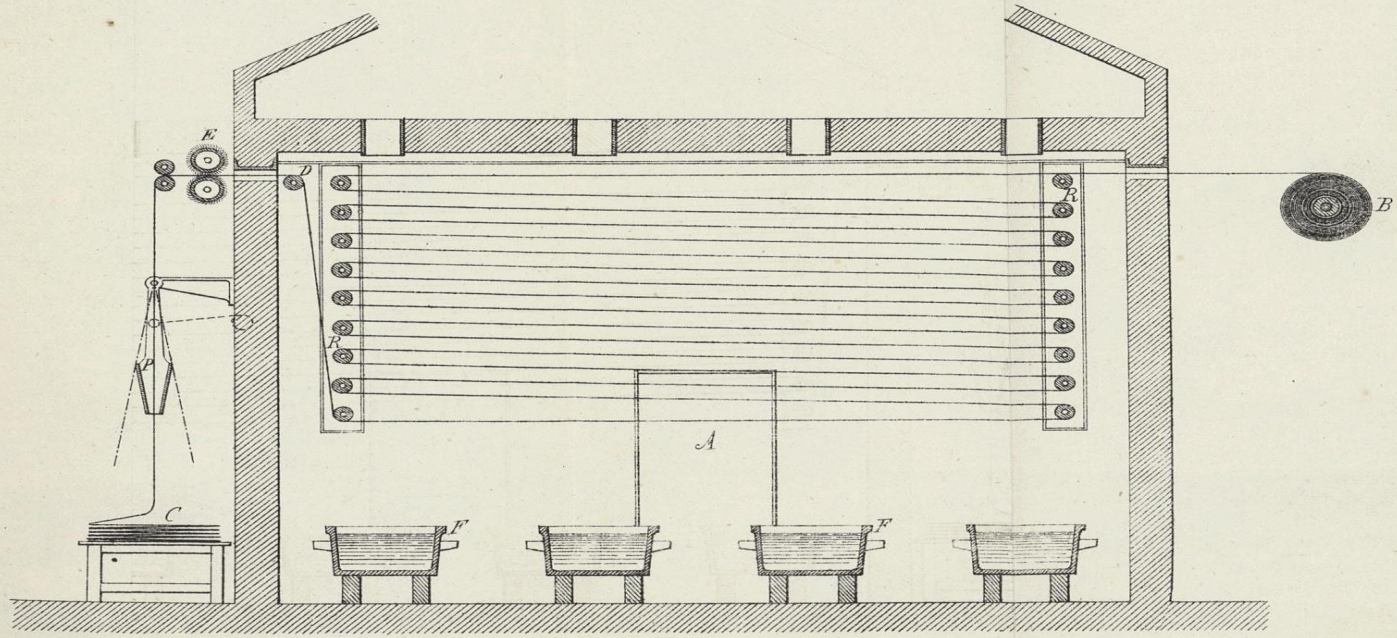
4677. P. MAGNER, of London, for "An improved process of treating vegetable fibres to impart to them a silky appearance, and to prepare them for dyeing."—5 years.—Dated 8th November, 1876.—Saxon patent.

27. F. DELAMARE-DEBOUTEVILLE, sen., Son, of Paris, for "A process of smoothing cotton yarn and other textile substances."—1 year.—(Secret.)—Dated 14th October, 1876.—Austrian patent.

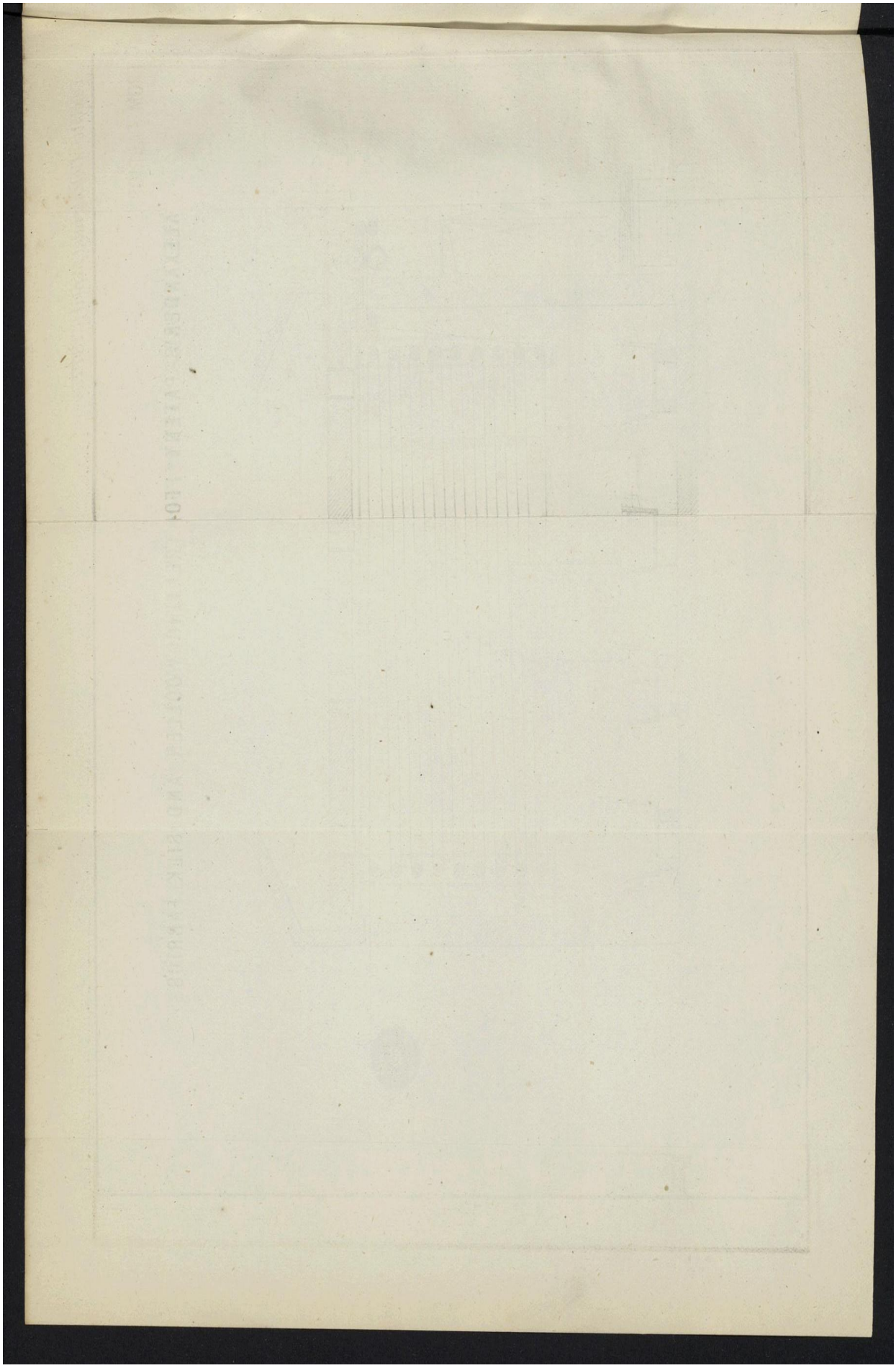
527. JAMES FARMER, of Salford, in the county of Lancaster, Engineer, for an invention of "Improvements in machinery or apparatus for drying woven fabrics and yarns or threads, and for 'ageing' woven fabrics."—Dated 23rd February, 1870.—Austrian patent.

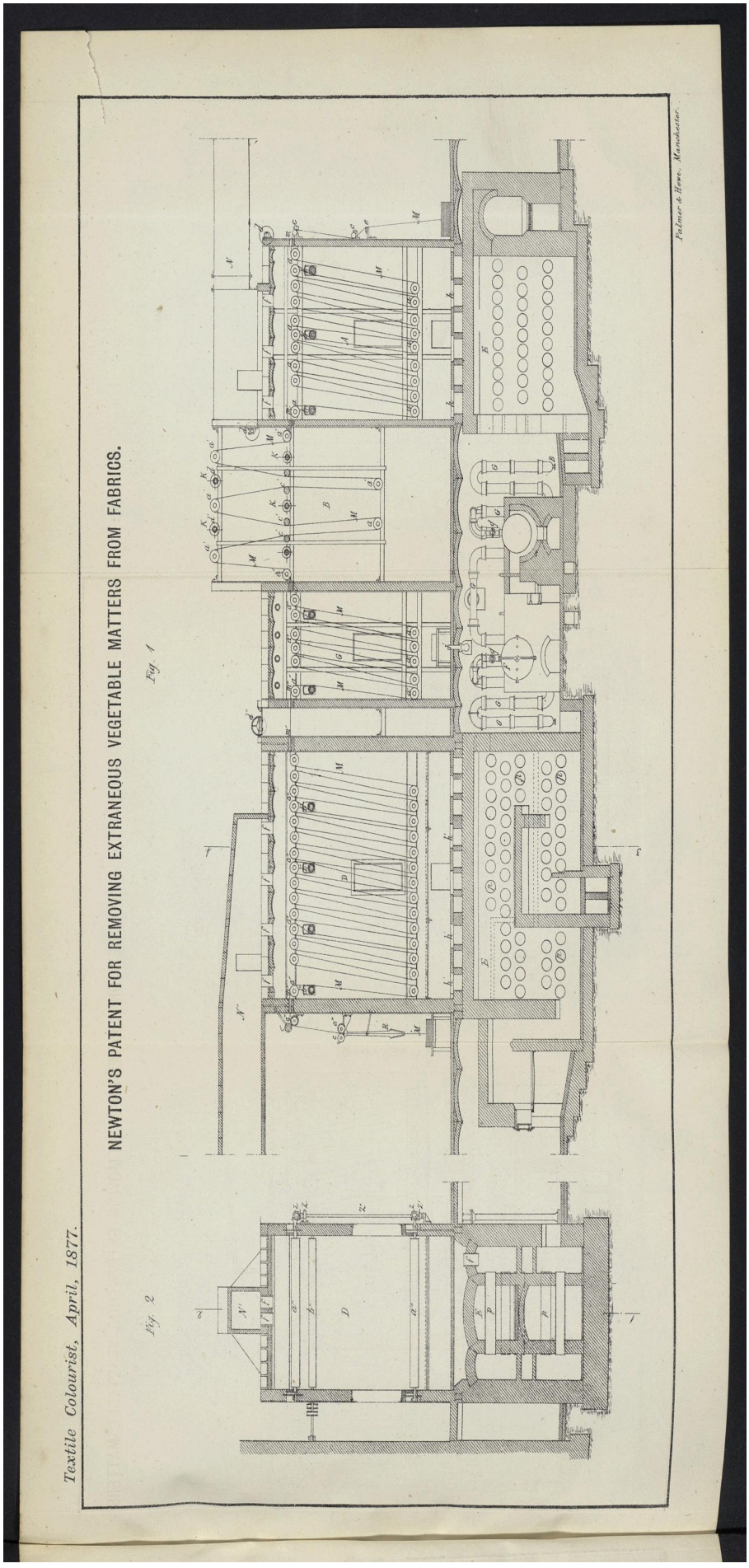
651. JAMES STRANG, of Glasgow, in the county of Lanark, North Britain, for an invention of "Improvements in dressing, stiffening, or finishing and printing textile materials and fabrics and paper."—Dated 5th March, 1870.—Austrian patent.

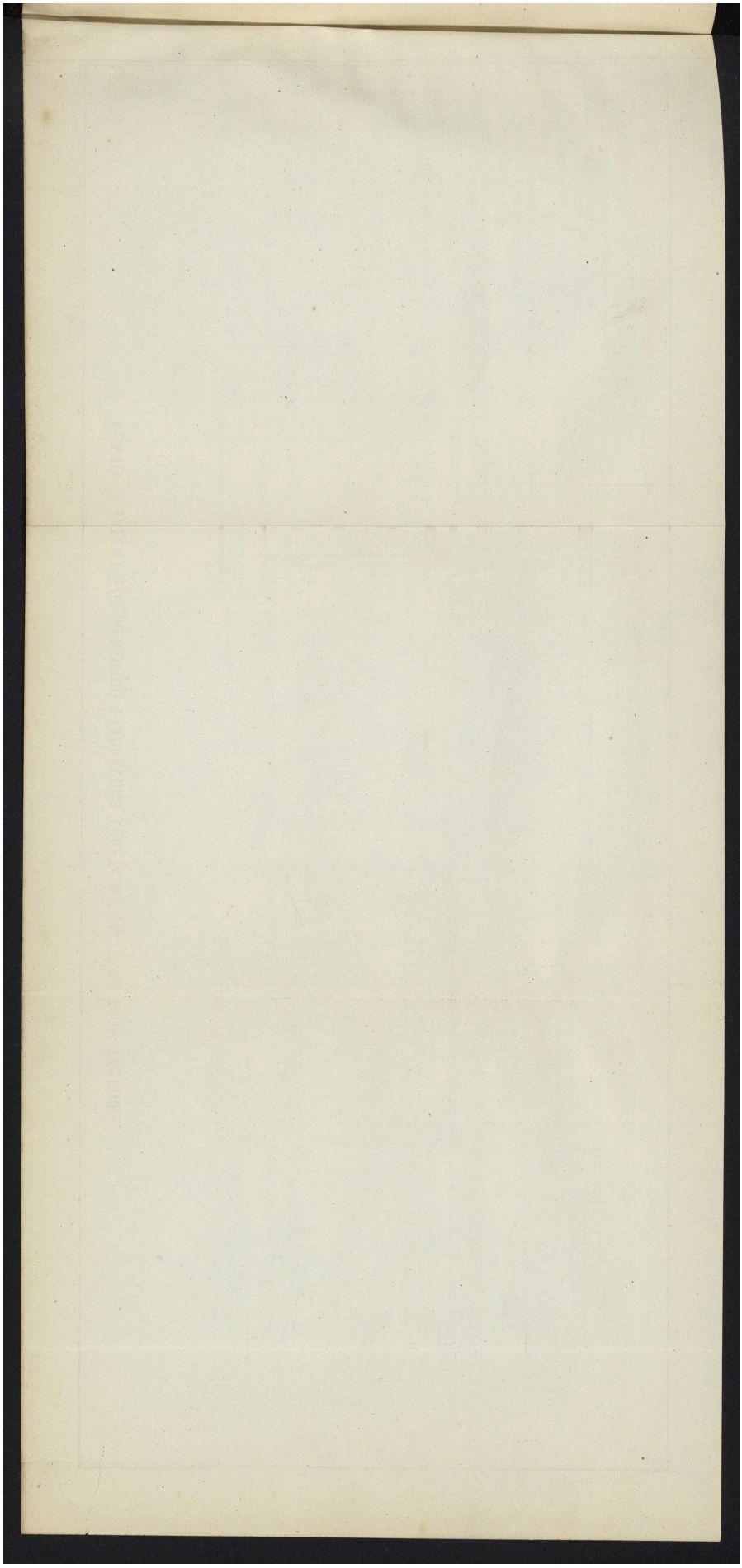
ALEXANDER'S PATENT FOR TREATING WOOLLEN AND SILK FABRICS.



Palmer & Howe, Manchester.







THE TEXTILE COLOURIST.

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1. *Upon White and Coloured Discharges on Indigo Blue.**

BY M. JOS. DEPIERRE.

THE indigo blue-dipped styles of prints which appeared to have been nearly abandoned have lately come again into vogue, and especially since the application of the hydrosulphites to the reduction of indigo.

In order to vary the dip-blue style from a simple uniformly coloured ground, and obtain white figures upon it, *resists* have been used from a remote period; but it is only within about the last half century that methods of *discharging* indigo were discovered. It was Thompson who first solved the difficulty which had defeated the attempts of his predecessors. His process, from which the most part of those since employed are derived, was applied for the first time in 1826. We will give a rapid account of it, then point out those afterwards proposed, and conclude this note by indicating the methods in use for discharging, and at the same time producing, a colour upon the blue ground.

There exist numerous methods of discharging indigo, but not all admit of useful application. They were employed according to the special requirements of the cases for which they were most suitable. We give an account of the best known.

* Communicated by the Author.

(1) Thompson's Process.—The pieces were padded in bichromate of potash, and dried in a warm chamber, with certain indispensable precautions. Thus it was necessary to avoid solar light, and to secure this the drying rooms were lit with yellow glass, and the temperature was not allowed to pass 120° F. The cloth being dried and made ready for printing, was printed either by cylinder, Perrotine, or block, attention being paid to the amount of colour communicated by the system of printing, the colour consisting mainly of oxalic acid. There was an immediate decomposition of the bichromate, the chromic acid being set at liberty, and the blue colour destroyed. We do not enter into the details of this process, which are well known to technical printers.

(2) Chlorate of Soda Process.—Persoz, in his well-known work, gives the following process, which, however, as far as we know has been very little employed:—The blue pieces were to be padded in chlorate of soda, and after drying printed with a mixture of tartaric and hydrochloric acid. In this process the discharging is due to the formation of chloric acid.

(3) Bleaching Powder Process.—This is the same process as that discovered by M. Daniel Koechlin, and applied by him to the discharging of Turkey red. It was executed as follows:—A colour consisting of or containing tartaric acid was printed; it was thickened with the smallest possible amount of thickening, so that the bleaching liquor might easily penetrate it, and the reaction be effected as quickly as possible, to prevent running. After printing, and the sooner the better, the goods were passed into a solution of bleaching powder at 7° to 8° Tw., the strength depending upon the depth of blue to be discharged. At the points where the acid and bleaching powder came into contact there was disengagement of hypochlorous acid, which instantly destroyed the blue. It is evident and superfluous to add that the bleaching liquor must have been always kept at a proper degree of concentration, without which the reaction would be partial and incomplete, leaving an imperfect white.

(4) Chlorine Gas Process.—This process, mentioned by

Persoz, is only included here as a matter of reference, for it does not appear that it was ever applied on the large scale.

Persoz proposed to print a resist which should not be permeable to cold water; then dry the cloth, pass it rapidly in a vessel full of cold water by which all the unprinted parts became wetted, then the cloth was made to traverse a box or vat filled with chlorine gas, where the discharging took place on the unprinted parts.

It is apparent that this process was specially adapted to produce designs with a large amount of white, leaving but a small proportion of colour in comparison. Experience has not shewn that this process was practicable, their being a danger of injuring the cloth by the action of the chlorine upon it.

(5) Oxalic Acid Process.—This, only a modification of Thompson's method, instead of padding in bichromate of potash, and then printing with oxalic acid, the oxalic acid was first printed, and then the cloth passed in the bichromate. This process is not satisfactory, and it is preferable to employ the following, which is more simple and more economical :—

(6) Process with Bichromate and Oxalic and Hydrochloric Acids.—This is one of the simplest and most employed processes; it consists in printing a colour containing bichromate of potash of a degree of concentration proportioned to the depth of the blue which has to be discharged; the cloth is then carefully dried and passed into a liquor containing oxalic and hydrochloric acids. Excellent results can be obtained in this way. Attention may be directed to it as a method which, with slight modifications, allows of other applications.

(7) Manganese Process.—This process has been a good deal worked in Normandy and in Germany; it is one of the most economical, but it requires very great care, or otherwise it will be often irregular, and sometimes the cloth tendered.

The blue cloth is printed with a colour composed of peroxide of manganese mixed with chlorate of potash. The pieces being properly dried, are then passed into a bath composed of sulphuric and hydrochloric acids. If the white

is not perfect, they are again passed in a bath containing pyroligneous acid and sulphite of soda.

The operation of passing in the acids is very delicate, and further, must be done in some place where the large evolution of fumes of hydrochloric acid will not incommode the operatives.

(8) The Red Prussiate Process.—This process was discovered by Mercer about 1845, and has been extensively employed in England ; a colour containing red prussiate is printed on the blue cloth, and then, after drying, passed into caustic soda.

(9) Prussiate Steam Process.—An ingenious modification of the last process is due to M. Ch. Zurcher, who discovered that by printing a mixture of red prussiate and bicarbonate of soda, and then steaming under proper hygrometric conditions, a white could also be obtained.

(10) Lastly, discharging can be accomplished by the following process, which is mentioned on account of its novelty :—Chlorate of chromium, containing a certain quantity of oxide or acetate of lead, is printed and steamed ; the blue is destroyed, and at the same time a quantity of yellow chromate of lead is produced, which can be readily removed by a passage in warm and weak hydrochloric acid. It may happen in this process that the cloth becomes somewhat tendered. M. Storck, who first prepared the chlorate of chromium, to avoid this recommends that a portion of prussiate should be added, which has the effect of absorbing the excess of chlorinated gas.

The different processes which we have briefly described can only give a white discharge, how should we proceed in order to obtain coloured discharges ? By means of some slight modifications in the foregoing processes, we shall easily be able to accomplish this point, and may proceed as follows :—

I will only indicate two of the methods; there are certainly others, but these are the most practical, and are perfectly successful when properly carried out.

(1) The Acid Process.—We have seen that by printing

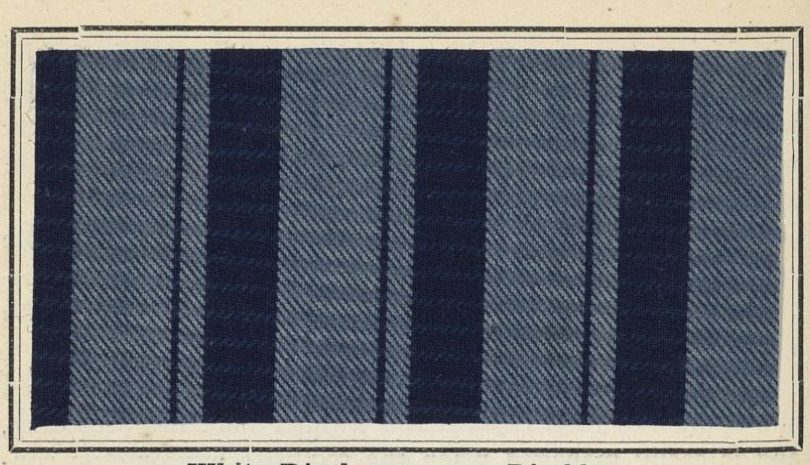
with bichromate of potash and passing afterwards in oxalic acid, it is easy to obtain a white; if instead of the bichromate we make use of the neutral chromate, we can add to it a body which by contact with the acid fixes any insoluble matters in the colour. The substance which is best adapted for this is albumen, with which may be incorporated various insoluble colouring matters, and we are then in possession of a discharging compound which can at the same time fix upon the white the colours which it contains.

(2) The Steam Process.—This process, which I discovered and applied in July, 1876, is still simpler than the preceding, and is easily managed when the requisite hygrometric conditions are secured. The colours are compounded as follows:—To a solution of red prussiate of a proper degree of concentration another solution of bicarbonate of soda is added. In the mixed liquors a proper amount of gum and egg albumen are dissolved; as much of the latter is used as is judged necessary for the fastness of the colours when it is proposed to fix pigments, or when it is intended to dye the albumen with aniline colours the quantity is proportioned to the depth of colour required. Among the colours added may be vermilion, various ochres, ultramarine blue, chrome orange, etc. The colour being printed, the goods are hung for a short time before steaming, so that they may become slightly humid. Lastly they are steamed for half an hour.

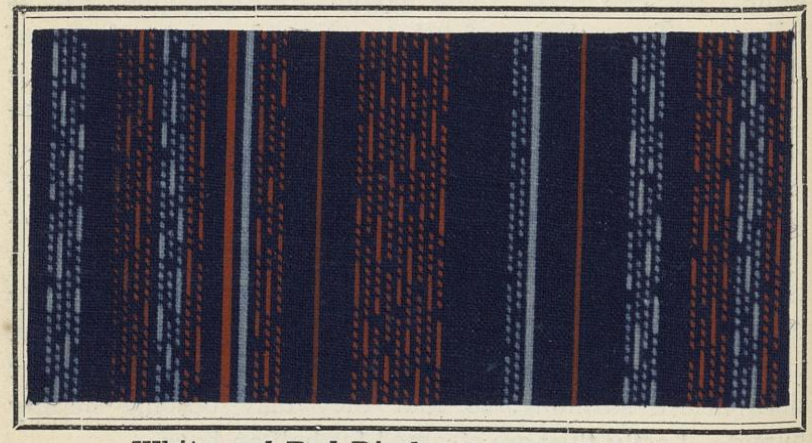
By the latter process a much greater variety of colours can be applied than by the former, which does not allow the use of substances acted upon by acids, and by which it is difficult to obtain good yellows.

The process, moreover, makes the albumen colours faster, this substance being better fixed by steaming than by coagulation with acids. In either case, if it is thought advisable, the coagulation can be finished by passing finally in boiling water.

The specimens on the other side are illustrations of the new method of discharging.



White Discharge upon Dip-blue.



White and Red Discharge upon Dip-blue.

White, Red, and Yellow Discharge upon Dip-blue.

2. *Materials for a History of Textile Colouring, No. 6.**

THE book which forms the subject of this notice was published in Paris during the fervour of the first Republic and bears for date the year VIII., which would be either in 1798 or 1799 of the Christian era. From a note of the author on p. 5, we find that the book was written, and ought to have been published in 1791 by a governmental department, but the government itself was suppressed in that year, which the book states was an obstacle to its appearing. With the restoration of some sort of tranquility in public affairs, it became possible to arrange for its appearance before the public, after having remained on its author's hands for the seven years which an ancient authority recommended writers on very different matters to retain their manuscripts. The work is entitled, "The art of Bleaching Cloth, Yarns, and all kinds of Cotton Goods, by Pajot-des-Charmes, formerly an Inspector of Manufactories." The interest attached to this treatise is that it is the earliest one upon the subject of bleaching after the application of chlorine, and reveals some of the difficulties which attended its introduction. It was mainly intended to popularise the chlorine process, and treats particularly of the production of the gas, and the difficulties which inexperienced operators had found in applying the methods described by Berthollet in the second volume of the *Annales de Chemie.* The first chapters are directed to details of the apparatus for making chlorine, the construction of the furnace for the still, an improvement by substituting lead communicating pipes for the glass ones at first used, and the composition of the lutes to prevent escape of gas at the joinings of different parts of the apparatus. There are several pages upon the question of lutes alone, which, the writer says, "is the soul of the distillation." He gives the preference to what was known to the

* Continued from p. 75, vol. iii.

older chemists as "fat lute," which was made by mixing finely powdered dry clay with boiled linseed oil until a proper consistent mass was obtained, and the author goes into very minute details about its preparation. It must be remembered that the retorts used to make the chlorine were of small size, and such as were employed in chemical laboratories. In order to obtain sufficient gas a considerable number were fixed in one furnace, there were consequently numerous joints, and the secure closing of them with a proper lute was of capital importance at this stage of the manufacture of bleaching liquid. It is not until we get to page 40 that we find details of the materials used in the actual making of chlorine. When muriatic acid was available for use the charge for one of the retorts is given at 2½ lb. of crystallized manganese and 7 lb. of muriatic acid at 25°. But muriatic acid was not generally obtainable in remote places, and attention is directed to the mixture of salt, manganese, and sulphuric acid, which was the most usual source of the chlorine. The salt is directed to be well dried, pounded, and sieved, so that it may be very intimately mixed with the manganese. The crystallized variety of manganese is preferred, as being of good quality, easy to break and grind, and offering a greater surface to the action of the acid.

In speaking of sulphuric acid, Charmes mentions an hydrometer for acids, which he quotes all through his works; it is called Mossy's hydrometer for acids, a name we do not recollect having ever met with previously. From the fact of Charmes stating that oil of vitriol ought to mark 60° at least upon this hydrometer, it would appear to be nearly the same as Beaumé's hydrometer, upon which strong vitriol marks about 66°. It is not unlikely that Mossy was the name of some local maker of hydrometers, who graduated according to Beaumé's scale, then and since in almost universal use on the continent. After saying that it was more economical to use the unrectified and unconcentrated vitriol direct from the manufactories, instead of mixing the rectified vitriol with water as was necessary; it gives a good idea of the detail into which the author enters to say that there follows a whole

page upon the proper method of mixing vitriol and water together.

The proportions of material recommended when using salt for the chlorine making are—4 lb. of salt, 20 oz. crystallized manganese, and 44 oz. of sulphuric acid at 60° with 3¼ lb. of water. This charge is for a retort which has a depth of 1 foot from the stopper to the bottom, and a diameter of 8 inches at its greatest width; it should yield chlorine enough to saturate sufficiently a tub of water containing 14 pails-full, each of 16 Paris pints. This was the scale upon which chlorine was practically made 80 years ago.

The author diverges at this point (page 44) to recount some experiments he made to manufacture sulphuric acid without the aid of nitre, simply by burning sulphur in heated air; though he appears to have thought he had succeeded on a small scale, it is evident from his own account that he got nothing but a solution of sulphurous acid.

In the sixth chapter the most minute detail is given about mixing the acid, water, salt, and manganese in the retorts, and commencing and carrying on what is called the distillation, the gas being led by a leaden pipe into the tub of water, which was well covered in; it took eleven to twelve hours to get off the chlorine from such a charge as mentioned above. When the operation was over, the chlorine water was at once run into the vessels where the goods to be bleached were ready waiting for this treatment; if there were no goods prepared we are told that the chlorine liquor might remain in the tub in which it was made, and not suffer any injury if it was carefully covered and luted down and pasted over the joints with paper, or it might be preserved in stoneware bottles, such as were used for storing nitric acid. In such bottles the liquid would remain good for several months, properly kept and well closed with luting. It is of course understood that the author is now speaking of a simple solution of chlorine gas in water. Upon the properties of the chlorine solution produced by this method, and of his own sufferings, the author says:—

"The oxygenated muriatic acid made by this process has a most

keen and penetrating odour, which no one can respire for more than an instant without running the danger of being troubled with a most obstinate coughing; it sometimes happens that its respiration is followed by fainting and insensibility if the operator persists in working with his face over the vapours. Affliction of the brain and chest, head ache, pain in the eyes, bleeding at the nose, roughening of the teeth, pains in the bowels, in the back, and the muscles of the thighs, and even spitting of blood, are the ordinary inconveniences which may be expected by the use of this strong smelling oxygenated muriatic acid, such as it is prescribed to be employed in the *Annales de Chemie;* it is quite impossible to stand for several days running at an occupation so injurious to the health if the lutes are not most perfectly applied, and if the condensing vessels are not well covered and placed in a free current of air. I am certain, moreover, that no one can have suffered more than I have done in this way, being possessed with a determination to perfect, or rather, render more easy, useful, and convenient this method of bleaching. It was more than the food I had taken which I was compelled to give up by the strong expectoration to which I was subject, unable to lie down for forty-eight hours at a time, spitting continually, an acrid and irritating running at the eyes and nose in such quantity—especially from the eyes—that I was sometimes five or six hours quite unable to open them, so greatly were the nerves enfeebled. My feelings, at such times, were so disagreeable that I could not lie down a moment upon my back, and but for a short time on my side. The best position was standing, but I was soon forced to sit or lie down by the fatigue I experienced from coughing, in the muscles of the back, the loins, and the thighs.

"The difficulty, or rather the impossibility, of enduring for a length of time so painful a position caused me to construct a paste-board mask, with glass eyes, which enabled me to a certain extent to work with my head over the tubs containing this liquor, so as to turn over, press, and wring the goods in bleach without suffering serious inconvenience. I made use sometimes of an handkerchief moistened with alkali, which I tied round my head, to preserve the nose and mouth from the smell; but either one or the other of these contrivances were, so to speak, nothing more than palliatives."

These sufferings of the writer had the good effect of making him, in his own words, try to make a bleaching acid without smell, and he immediately succeeded by dissolving in the condensing water carbonate of potash or carbonate of soda, at the rate of ¼ lb. for each pound of common salt used in generating the chlorine; this quantity was sufficient to perfectly arrest the smell of the liquor, and allowed the operator to work with uncovered face at the bleaching vessels without risk of being incommoded.

It would appear from this that Pajot-des-Charmes was the real discoverer of the alkaline bleaching fluid so long known, and even to this day, as Eau de Javelle; if this is so he deserves a credit only second to that given to Berthollet for the introduction of chlorine in bleaching, for the idea once started, and found good, of combining the chlorine with soda, the further development of it and substitution of lime seemed simple and easy.

As usual with our writer, he goes into the fullest details of all the methods by which the potash or soda should be added to the water, details, no doubt, of importance and value when everything connected with the process was new and obscure, but which seem now trivial to the last degree. He, however, insists with justice that the process of Berthollet, as given in the *Annales de Chemie*, which was the chlorine and water only, would never succeed, generally on account of the smell and unhealthy action of the gas which escaped from the liquid in working, and that it would most probably have been abandoned by the bleachers.

The seventh chapter treats of the alkaline liquors used for boiling the goods to be bleached. He follows, he tells us, the method which he has been assured was in use in Ireland, from which country the finest white goods came. He made use of various kinds of ashes, he speaks of the York potash (perhaps New York) as being as hard as stone, and also of Spanish soda; to increase the activity of the alkaline ley he prescribes the addition of a third or a fourth of its weight of lime, but it is useless, he says, to add lime to the foreign potashes, for there are very few of them which do not already contain more

or less, especially those from the northern countries and those from America.

Among other things in connection with the alkaline treatments, we find a process for recovering the alkali from the spent leys, the process consists simply in evaporating them by the waste heat of the various fires used on the works, and then roasting or calcining them in an iron pot.

In the eight chapter the preparation of the goods to be bleached before submitting them to the chlorine treatment is given. The first process is to steep the goods twelve hours in water, to dissolve or to detach the sizing matters, which it is said are commonly only potato starch, or wheaten starch. Too much care we are told cannot be taken to get away all the size, as then the cloth is much more easily acted upon in the subsequent operation, washing by the sticks is recommended as the best method.

The second operation consists in steeping the goods in old or partly spent leys for a space of forty-eight hours, or until a fermentation began in the liquid. It is interesting to note that the author mentions that instead of old leys he had sometimes used cold milk of lime, which in five or six hours caused the goods to be in a suitable state for the following operations. After this steeping a good washing is directed, by machine if possible, if by hand in flowing water it ought to be accompanied by beating of the articles; the materials are indifferently said to be linen, cotton, or mixed goods, and include made up articles, as gloves, drawers, stockings, etc., as well as cloth and yarn.

The third operation consists in a treatment with soap and with alkali together, or separately, or successively, according to the kind of goods operated upon, not much detail is given upon this point, but it is clear that our author knows the importance of the goods being well cleansed before going into the chlorine liquors.

The next process is steeping in the bleaching liquid, which our author invariably calls *the acid*, although it is alkaline, the time and manner of steeping are minutely detailed for all the various kinds of goods. Here it is evident that the operator

relied too much upon the chlorine treatment and did not sufficiently clean or boil out in alkali, for it is prescribed that two immersions in the bleaching liquid are required for fine cloths, four separate immersions for domestics, and six for thicker qualities; the exact strength of the chlorine solution is not given, but it is probable that it would be of a strength equal to a saturated solution of chlorine in water. The operation of treating with alkali and bleaching powder were sometimes done successively four or five times, but the alkali was used only lukewarm and could not have been very effective in its action. So we find, in fact, that Pajot-des-Charmes concluding upon this subject that it is neither safe nor economical to trust entirely to the chlorine bleaching, but that it should be combined with grass bleaching. He states that in many markets really pure and good white goods cannot be sold on account of the distrust entertained against them as being made rotten or tender by the processes necessary to obtain the perfect white, this he calls a prejudice, but clearly it is something more, for nothing is more likely than that the cloth should be injured in strength by four or six times steeping in pretty strong bleaching liquor as he prescribes. The use of acid in bleaching does not seem to have been recognised by our author as necessary, but it was in use extensively in the country at the time he wrote, and he incidentally mentions that the Irish bleachers preferred sulphuric acid to sour milk, using 1 part of strong acid to 100 parts of water, which mixture, he says, had the taste of strong lemonade. The custom of passing the goods direct from the bleaching liquor into sulphuric acid was also in common use; the bleachers of Mayence and the neighbourhood were at this time accustomed to leave their goods all night in a sours, made by mixing 1 measure of sulphuric acid with 60 measures of water; the author believes the acid is best when used at moderate warmth.

The author next describes the various finishing processes necessary for the miscellaneous goods he treats of. Cloths during the bleaching were found to suffer a loss in length equal to four or five per one hundred. Methods are described

by which, in the finishing, they can be restored to their original length. The loss in weight of linen during bleaching was found to vary. The Flemish and Artois cloths do not lose more than 20 per cent.; those of Picardy, which are less clean, lose generally 25 per cent. Coarse linen yarns lose more weight; they may be estimated to lose 25 to 30 per cent. In cotton yarn the loss in weight does not amount to more than 3 or 4 per cent. Cotton cloth will lose more, according to the weight of size put in the warp, all of which must be removed to have a good bleach.

The following extract referring to singeing is, we believe, the earliest account to be found of this process, and it will be seen that its utility was fully recognised :—

"After having treated of the common or French finish, I think it will be interesting to give some details concerning the singeing particularly employed by the English for light cotton goods. Every one knows that muslins, cambrics, and such goods, plain or figured, are so much the finer to the sight in proportion as they are deprived of the downy filaments upon them. Now the English, although they are careful only to use the long stapled kinds of cotton, take also the greatest pains to have their goods as clean from down as possible; and it is a matter of observation that in all their cotton goods, figured or plain, this is noticeable. The beauty of the white shows better in proportion to the absence of the fine downy particles which can be seen on all cotton goods as delivered by the weaver.

"I have, therefore, thought that it would be well to show how the English manufacturers proceeds, in order to remove this down, which upon fine calico is so injurious to the reflection and beauty of the white which has been given to it. The piece is sewed to an end cloth, which is nailed upon a roller, and a length is then stretched by winding on a frame presenting a horizontal surface quite tight. It is brushed to raise up the down, and then a bar of iron, bent so as to be easily handled, and heated to a greater or less degree of redness, is then rapidly and lightly passed over the surface. It is passed two or three times over the same place, according to its degree of heat, travelling from one selvedge to the other in a gradual manner. When the down of the first length stretched has been satisfactorily

burned off, which is ascertained by looking along the surface of the cloth with the eye upon a level with it, a fresh length is wound on, and the operation repeated.

"Cloths which are to have two faces are singed on both sides, but more quickly and lightly upon the secondary face than on the principal one.

"There must be at least two or three singeing irons, of which one is being heated while the others are employed in singeing; care is taken to clean them on a rag each time before commencing to use them, or else to rub them upon a fine grained stone every time they are taken out of the fire. This precaution is recommended to avoid the danger which might arise from the presence of any greasy matters, soot, etc., which cause flame on the cloth and burn it. The singeing irons can be heated either with turf, coal, or wood fires.

"The cloth thus singed is made bare and even on its surface, and acquires a rusty tinge, but this colour soon disappears in the first or second bleaching process.

* * * * * * *

"There is another method of singeing calicoes and muslins by means of the flame of spirits of wine, but this method does not singe as well or as evenly as the red hot iron, besides being more expensive; it may, however, probably be found applicable to some kinds of merchandise. The arrangement consists of a number of wicks inserted in a vessel containing spirits as wide as the cloth to be singed, which is then drawn regularly over the flames."

In order to test the strength of the bleaching liquor, use is made of the solution of indigo in sulphuric acid, as first applied by Decroiselle, and afterwards recommended by Berthollet. One part of indigo is dissolved in 4 or 8 parts of strong sulphuric acid, and the solution reduced with water until it marks one degree upon Mossy's hydrometer; three parts of this blue solution are bleached by a seventh or eighth part of the oxygenated muriatic acid (chlorine) as made by the author's process. A solution of cochineal made by simply boiling this substance in water also answers very well as a comparative test; several other colouring matters are mentioned as being used when indigo or cochineal are not ready at hand.

The fifteenth chapter is upon the accidents which may happen in the course of bleaching, and is divided into accidents in the distillation, accidents in the liquids, and accidents in finishing; in the first are such accidents as may come from breaking of the retorts or rupture of the lutings; in the second division we find only some account of discolourings or stains, which may be removed by a weak souring, and in the third the accidents appear to arise from allowing goods not free from acid to come into contact with soap, by which fatty matter is separated. The following chapter is devoted to methods of removing stains from cloth, all of which can be taken out with facility by acid and chlorine, except those made by red lead or lamp black to mark off the lengths of warps, which it is said appear to be made stronger by treating with chlorine instead, like others disappearing.

The seventeenth chapter treats of the cost of the bleaching process. It may be of interest to give some particulars to shew what the estimated expense of bleaching was nearly ninety years ago. We take the sol or sou as being equivalent to an English penny, and the livre (weight) as being the same as an English pound. The prices of some of the materials delivered at Abbeville in the year 1791 were as follows:—Rectified sulphuric acid at 66° (that would be as strong as English at 169° Tw.), 11d. the lb. wholesale; crystallized manganese, 8d. retail; common salt, 2d.; Dantzic or York potashes, 12d.; green or black soap (soft soap), 8d.; white Marseilles soap, 12d. the lb. It is unnecessary to say how much a tub of bleaching liquor came to, not knowing how much cloth it would bleach, but there is a statement of the cost of potash, fuel, and labour, for the preliminary treatment of 72 ells of cloth, or 72 lb. of yarn of medium quality; the potash 5 lb. at 12 sols equals 60d., the turf for fuel and the labour cost 4 sols, making 5s. 4d. The further cost of bleaching liquor and labour for the same quantity of stuff, giving four immersions in the chlorine with intermediate potash treatments, amounts to 39 livres 2 sols, or 65s. 2d., thus 1 lb. of Picardy yarn (linen) would cost nearly 11d.; the Flanders yarn being more easily bleached, taking only three immersions, costs 8d. per

lb. In the cloth 2 ells (a little over 2 yards) weighed 1 lb., so that to bleach 1 yard of linen cost about 5½d. Thus, says our author, "in fixing the price of bleaching Picardy yarn, where the flax has been retted dry or on the ground, at 12d. the lb., and Flanders at 10d., and cloth at 8d. the yard fine or medium, we shall be very fairly remunerated for our trouble; and these are the prices at the best bleach houses in Lille, Beauvais, Saint Quentin, Senlis, Rouen, Rheims, etc. This price does not include the finishing, which is charged extra." The above refers to linen yarn and cloth. For cotton cloth 180 yards, or of yarn 90 lb., cost for potash, chlorine, fuel, and labour 32 livres 8½ sols, which comes to 7½d. per lb. of yarn, and the cotton cloth to 3¾d. per yard. "If, therefore, a bleacher by the new method fixes the price of bleaching cotton yarn at 8½d. the lb., and of calico at 6d. the square yard for all sorts, fine or coarse, he will find his benefit, while the public will have no reason to complain, seeing that cotton yarn in general and muslins equally demand great care and attention on account of the delicacy of the tissues and the tenderness of the yarns, as the short staple cotton used requires close attention.

For bleaching men's linen stockings the cost is put down at 8¼d. per pair, and the proper price to ask 12d., and even 14d. if the make of them includes doubled seams, etc.; for cotton stockings the cost of bleaching is about 4½d. per pair. The author, however, does not doubt that in time the cost will be considerably reduced by economising and utilising the various residues which at that time were thrown away.

In the eighteenth chapter, amongst other things, we have given a method for clearing the white grounds of madder-dyed prints by means of the bleaching solution, the remarks upon this at so early a date as 1791 are sufficiently interesting to deserve translation at length.

"The fast-coloured prints (the loose colours are too difficult to treat by this method) which are intended to be cleared by the chlorine process should have the designs more charged with colour than those which are only to be exposed to the air, so that while the acid (chlorine) is acting upon the unmordanted parts of the cloth it shall

not destroy upon the mordanted parts more than the quantity which is in excess of what ought to remain properly upon the cloth to produce the effect, and should not therefore finish sensibly different from that cleared upon the grass. This precaution is especially necessary with respect to purples, blacks, and common browns, since they are more readily acted upon than reds, pinks, and dark browns.

"An essential preliminary operation for the preservation of the colours, and which assists greatly in the clearing, is to give the goods one or two boilings in bran water, and they may have a boil in soap and water. If these three boilings are properly given the grounds will be three parts cleared already, one or two dips in chlorine liquor will do the rest. Between the two dips (if required) care must be taken to give the goods a branning, and also after the last dip in chlorine, for this has the property of bringing up and raising the tone of the colours which may have become somewhat weakened."

It is evident from the remarks that follow that the system of chloring dyed goods was very imperfect and liable to serious accidents, simply from using very strong liquids in the cold, and, not as now, either weak liquids warm or a regulated quantity of a stronger liquid. On the whole, the author says it is better to bran the goods well and soap them and finish the bleaching on the grass. If they are cleared by chloring there must only be one or two pieces done at a time, so that there shall be no difficulty in moving them and stopping the process as soon as it is seen to be completed.

The account of this book may be concluded by an extract from a chapter treating of the dyeing of colours by "oxygenated muriatic acid," the subject has certainly very little connexion with the title, but it is no doubt a faithful account of the dyeing of a certain colour by very curious means.

"This is, perhaps, the place to speak of a method of dyeing a kind of black or grey which I have seen practised several times with success in glassworks where mineral alkali is employed either crude or refined. I speak only here of Spanish ashes, which contain, as is well known, a certain quantity of muriate of soda (common salt). Of this fact there is quite a particular proof at the moment of the fusion of the glass, when for the space of half an hour or less a dense

white fume of muriatic acid is given off, the vapour of which speedily affects the nose and throats of the workmen, who cannot avoid coughing and sneezing. Its presence is also shown by the rust which covers in an instant the blow pipes and other iron instruments which are in the neighbourhood. I consider that in the kind of dyeing of which I am about to speak I have observed a more distinct mark of the action of the oxygenated muriatic acid from the manganese, which is largely used to purify the glass of these establishments.

"This dyeing I have seen practised at the mirror manufactory of Saint Gobin and the glassworks of Tour-la-Ville. The first of these establishments use only the soda extracted from Alicant ashes, and burn wood; the second use the crude soda, and burn coal.

"The hanks of yarn, either bleached or not, are first rinsed, dried, and then steeped in a solution of alum or river water. They are then thrown with force upon the kind of blackish soot fixed with the volatile saline matters upon the places above the melting parts or crucibles in the interior of the furnace. After being thrown several times—changing the position—upon this kind of soot, the yarn becomes more or less charged with it. It is then steeped again in the same alum water, and then again beaten against the sooty places until it is judged that the colour is deep enough and equally distributed. It is then rinsed again in the same water, where the excess of soot is washed off; and then, after slightly wringing, it is dried indifferently either in the sun or the shade. The black or grey colour of a more or less deep shade which the yarn has acquired is singularly fast and adherent. I have stockings of yarn thus dyed which I have used for a dozen years, and which have been washed more than forty times in alkali, retaining their primitive shade without having undergone the least diminution of colour. It may be remarked that linen cloth or cotton can be dyed in the same way."

The author tried to imitate this dye in several ways, but it does not appear successfully. Chevreul informs us that many shades of colour in wool are obtained by working the wool with insoluble powders in a very fine state—such as oxide of iron, oxide of chromium, and ultramarine blue—and that even and regular shades can be got which are useful for tapestry

work, since they withstand the action of light; but it is not said that they are fast to washing in soap, which in the dye described by Pajot-des-Charmes is the most curious and unexplainable part of the account.

3. *Turkey Red Dyeing, New Mordant for.*

We find in the *Färber Zeitung*, Nos. 14 and 15, some details upon the application of a new preparation for Turkey red dyeing, which is said to be able to replace by a simple operation, the numerous successive treatments with oil emulsion, preparatory to the application of the aluminous mordant. If it be true that the substance indicated, but the nature of which has not yet been made public, enables the Turkey red dyer to dispense with the long and costly processes of oiling, there can be no doubt that its discovery is justly characterised as a most important improvement, probably the most important which has ever yet been made in this particular branch of dyeing. The discoverer is Storck, and the firm who manufacture this new so-called Turkey red mordant is P. Lhonoré and Co., of Havre. In introducing the matter, the editor of the *Färber Zeitung* draws attention to the often-mentioned experiment of Weisgerber, who is said to have extracted an oily matter from oiled cloth prepared for dyeing, which, when applied to unoiled cloth, gave it at once all the properties of a prepared cloth. It is such a material that the above firm purport to supply, and the process they communicate is as follows:—

The grey calico (or yarn) is passed in a soda solution at 3° B., washed, dried in the air, and padded in a liquor made by dissolving 3 or 4 parts of the new mordant in 100 parts of water. The goods are then dried in a stove. Next mordanted in acetate of alumina at 2° B., aged, dunged, and passed in chalk and water; then dyed for every 10 lb. of stuff with

1⅕ lb. artificial alizarine of 15 per cent., 2⅘ lb. of glue, and 15 to 20 gallons of water containing ½ lb. of the new mordant.

The dyeing is commenced cold, and the heat brought up in one and a half hours to 194° F. The dyebath must be as neutral as possible, therefore a water containing alkaline salts of lime must be corrected by addition of a small quantity of sulphuric or acetic acid.

After dyeing the pieces are washed, dried, and steamed for twenty minutes under some pressure. They are then treated in a closed pan once or twice with a liquor containing

4 lb. soap.
1 lb. soda.
3 oz. tin crystals.

washed. and dried in the air.

The red thus obtained, it is stated, is the finest obtained in the usual way, even, and exhibits a notable economy in cost, and especially in time.

By simply adding this new material to the dyebath, very good shades can be obtained, but not so fine as those obtained by following the process as given above.

Good results can also be obtained by first padding in acetate of alumina, then dyeing in alizarine and glue, drying, padding in the new mordant, steaming, and soaping.

The above process is, of course, equally applicable to yarn.

Use of the New Mordant in Printing.—The new mordant is of a fatty nature, mixable with water, and can be used for printing. Remarkable results can be obtained, it is said, by combining it with steam alizarine colours in the extract style of print. If it is added to the dyebath in which ordinary mordanted goods are being dyed, say reds and purples, the colours come out much finer; the proportions proper to use are 1 part of alizarine at 15 per cent., 2 parts of glue, and 1 part of the new mordant.

After dyeing, the pieces are washed, dried, steamed, and soaped in a liquor containing 100 gallons of water, 3 to 4 lb. soap, ½ lb. crystals of soda, and 3 oz. tin crystals.

This answers for red; for purples the goods are simply passed through boiling water and chlorined in the machine.

It is also observed that the addition of the new material to the dyebath prevents the unmordanted parts of the cloth from taking colour, consequently the whites come out of the dye as clear as if they had been soaped. Lhonoré and Co. state that their product can be applied as a preparation for any steam colours, by padding the cloth in a solution of 4 parts of it in 100 parts of water, and drying. Steam red and steam pink, from artificial alizarine, can be obtained of great brightness. Soaping is unnecessary, and a single passage in lukewarm alum solution (1 lb. to 50 gallons of water) gives the colours complete purity. It is thus seen that several steam colours, such as green and blue from prussiates, aniline black, steam yellow, etc., can be *printed at the same time* as the alizarine colours.

4. *Some Reactions of Vanadate of Ammonia.*

In Dingler's *Polytechnisches Journal*, for March, 1877, p. 631, Mr. Rudolph Wagner gives an account of some experiments he made upon the action of vanadate of ammonia upon various organic substances; he gives some historical notices of the various researches made upon vanadium compounds from the time of Sefström, the discoverer of the metal, to John Lightfoot, who discovered the most important application it has yet received*—the reaction with tincture of galls, observed and recorded by Berzelius in 1845, is almost the only one which has received any notice. R. Wagner states that it was the singular reaction of vanadate of ammonia, with regard to this substance and with aniline salts, that induced him to try its action upon a number of substances. It may be observed—for Wagner does not seem to notice it—that the action upon tannic acid and that upon

* In a single line of a footnote Wagner puts far back the first production of aniline black, and introduces a new name in the history of that colour; according to him, Fitsche, in 1843, produced aniline black, he refers to Journ. für praktische Chemie, 1843, v., xxviii., p. 202.

aniline are of quite different natures; in the first it is an action of itself, in the second it is an action rather of the vanadium through the alkaline chlorates, by which an oxidizing influence is effected. In his experiments Wagner did not use chlorates in conjunction with the vanadate of ammonia, and consequently the experiments have no analogy with the curious phenomena attending the production of aniline black by vanadium salts.

Pyrogallic acid gave a dark blue liquid, without precipitate, which forms a useful writing ink for steel pens.

Gallic acid does not act the same as tannic acid, giving a precipitate which separates; the liquid is black but wants the bluish hue of the tannin solution.

Hematoxylin and logwood liquor give the same reactions as with chromates of potash and ammonia—a deep black-blue liquid which may serve as an ink. With vanadate of ammonia wool and silk can be dyed a fine black in the same way as with chromates.

Brazil wood liquor at the boiling heat gives a black-brown mixture with vanadate; pure brasilin, however, in water solution, gives a dark violet colour without any approach to black.

Fustic liquor yielded a black-green colour; a number of other substances tried did not show any distinct reaction.

R. Wagner considers that vanadate of ammonia would be a good test for the presence of tannin matter in wine; pure red wines gave only a brownish-red colour with it, but Bordeaux, which contained tannin, gave an ink-like solution.

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5. *Alleged Poisonous Properties of Fuchsine.*

IN the Textile Colourist for September, 1876, there is an abstract of a paper by Messrs. Bergeron and Clouet, which goes to show that fuchsine is perfectly innocent when administered to animals. In the January and February

number of the Bulletin of the Industrial Society of Rouen these authors have a long paper defending their opinion against some medical men of Nancy, who had arrived at diametrically opposite conclusions. The paper is in great part physiological and medical in its treatment. The authors insist upon the correctness of their experiments, and declare their inability to verify or admit the phenomena adduced by their opponents as resulting from the administration of this colouring matter. One of the writers swallowed 8 grammes (122 grains) of fuchsine in sixteen days, and found no inconvenience, and experienced none of the symptoms described by the doctors of Nancy, who insist that several painful disorders may be caused by its intentional or accidental absorption into the human system. The paper concludes by saying "Fuchsine is quite harmless; if it was otherwise the numerous operatives engaged in its manufacture and application would be daily showing its ill effects. Now we know positively that there is nothing of the sort; what maladies they have are from quite other causes."

6. *Purpurine.*

In the April number of the Berichte der Deutschen Gesselschaft (p. 550) Messrs. Schunck and Roemer continue their investigations upon purpurine and alizarine, and show that the formerly accepted descriptions of the first body are open to correction. They have obtained pure purpurine by treating Kahlbaum's commercial purpurine, which contains a little alizarine, with alum solution, rejecting the less soluble matters, and then crystallizing several times from diluted alcohol. The analysis agrees fairly with the formula $C_{14} H_8 O_5$. Its properties are described as follows:—Easily soluble in alcohol with a yellow colour (Strecker and Wolff say with a red colour). Crystallizes from aqueous alcohol in long, brilliant

needles, which contain 1 molecule of water, their colour varying from orange-red to orange-yellow. From strong alcohol it crystallizes in small deep red coloured needles, which are anhydrous. At 212° F. the hydrated crystals become deep red and anhydrous, losing 6·32 to 6·56 per cent. of water, while theory indicates 6·56. It begins to sublime at a temperature of 150° C., and not at 250°, as Schützenberger states. The sublimate consists of feathery and needle-like crystals; a great portion of the purpurine is carbonized in the process. Purpurine is soluble in hot water, with a deep yellow colour passing into red, orange coloured crystals separate out. With alum water the well known yellowish red fluorescent solution is obtained. This description of the properties of purpurine differ considerably from those given by Schützenberger.

7. *M. Michel de Vinant on Dyeing, Printing, and Bleaching.**

White Resist for Nitric Acid Orange, No. 6.

1 gallon water.
5 lb. British gum
1 gallon water.
5 lb. Senegal gum.

Mix the two gum waters together, and stir in

5 lb. of powdered chalk.

If the resist is not thick enough it should be further thickened with British gum. This resist must be twice blocked.

Dahlia Resist for Nitric Acid Orange, No. 7.

This consists of purple archil at about 6° Tw., thickened with gum Senegal and pipeclay, to which an addition of chalk at the rate of about 7 lb. per gallon of colour is made, and lastly a quantity of albumen or white of egg. The dahlia resist, after printing, is steamed for an hour, and then goes through the

* Continued from p. 194.

nitric acid treatment given below. The colours are finally developed by a hot alkaline treatment.

Yellow Resist under Steam Blue, etc., No. 8.

1½ gallons berry liquor at 14° Tw.
5 lb. gum.
1¾ lb. acetate of lead.
7½ lb. pure sulphate of zinc.

Dissolve and separately mix

14 lb. pipeclay.
1 gallon berry liquor, at 14° Tw.

Mix together, and when cold add

1 lb. crystals of tin.

Strain very well, and in printing block twice.

Nitric Acid Orange Style.—In this style the colour is due to the action of nitric acid upon the silk itself. The strength of acid prescribed is from 30° to 45° Tw. A white resist, composed of chalk and gum water, is printed on. The method of passing the silk in the acid is as follows :—The nitric acid is contained in a trough made of wood or earthenware ; a wooden roller revolves in the acid, and in contact with another roller placed above it ; the bottom roller brings up sufficient acid to impregnate the silk when it passes between the two rollers. The silk being well wetted with the acid then passes directly into a shallow box, into which steam is admitted by a copper pipe, a uniform distribution of the steam being assisted by a woollen cover over the steam pipe ; the course of the silk piece is directed by glass rods ; the whole time of exposure to the steam does not exceed ten or fifteen seconds. When the silk comes out of the steam it has a pale yellow colour ; it is led immediately into a vessel of water containing chalk or soda, to neutralise the acid retained by the fibre ; it is then washed, the reserve cleared off by the ammoniacal soap solution, and the orange colour developed by heating to 120° with weak caustic potash, or raising it to the boil with carbonate of soda.

Orange Discharge upon Dip Blue Silk.—Thicken nitric acid

at 30° Tw. with dark British gum and pipeclay and print on the blue ; dry and pass the goods through a steam box ; rinse and pass through weak warm soda, which developes the orange. Another receipt directs fuming nitric acid at 25° to be thickened and printed ; 25° Beaumé is equal to about 40° Tw. That is, however, far below the strength of fuming nitric acid properly so called ; but it seems very strong acid to thicken and print on any textile material where it must necessarily remain some considerable time.

White and Black Discharge upon Prussian Blue for Silk.—The silk being dyed uniformly blue, a white discharge, made by thickening caustic potash at 50° Tw. with dark British gum and pipeclay, and adding a little arseniate of potash, is printed on and dried upon the cloth ; then, without washing, a common spirit black is printed over. The silk is then washed, and the whites cleared from the oxide of iron by treatment with dilute sulphuric or hydrochloric acid.

Preparation for Steam Colours on Silk.—The following mordant or prepare is recommended as being superior to any other, especially with regard to the feel or touch of the silk.

2 parts of cream of tartar.
1 part oxymuriate of tin.

Dissolve in hot water to mark 4° Tw., leave the silk in two hours at a temperature of 120° F., rinse out and dry.

The usual treatment for silk steam styles is to hang them up for twenty-four hours after printing, and then steam for an hour at the pressure of one atmosphere ; some hours after steaming wash off ; after washing brighten by giving two ends in water which just tastes of sulphuric acid, and dry without rinsing.

[*To be continued.*]

8. *Abridgments of Complete Specifications of Patents Recently Published.*

A.D. 1876, July 19th.—No. 2947.

SMITH, CHRISTOPHER WEBB, of Barnwood. "Improvements in and Apparatus for Scouring or Cleansing Woollen Cloth, Yarns, and Wastes, and in Recovering Valuable Products from the Materials which have been used in Conducting the said Scouring or Cleansing."

"My invention has for its object to supersede the tedious and uncertain process of scouring or cleansing woollen cloth ordinarily employed, and substituting therefor a process which is shorter and more efficient, and which permits of the recovery of a considerable quantity of the indigo or other dye and oil which are removed from the cloth during the scouring process.

"My invention has the further advantage that the principal material employed can be purified after use, so as to permit of its being used over again, instead of being converted into a waste or refuse material, as is the case with respect to the material commonly used in conducting the scouring or cleansing process.

"My said invention is practised by the use of the apparatus herein-after described.

"In scouring or cleansing woollen cloth of coarse or low quality, according to my invention, I proceed as follows:—

"The cloth to be operated upon is spread out on the floor of the room in which the process is conducted, and a layer of matting or other like coarse and cheap material is placed upon the cloth. The cloth and matting are rolled into a loose coil, which is placed in an upright cylindrical vessel of a size and figure proper to receive it. The said vessel has a removeable head similar to the head of a still, and after the introduction of the cloth into the vessel the said head is fixed

on the vessel. Through a funnel in the said head I fill the said vessel with amylic alcohol, or common petroleum spirit, such as is commonly burned in lamps. The spirit is allowed to remain undisturbed in the vessel from twenty minutes to half an hour, during which time it dissolves all the oil contained in the cloth, the matting rolled with the cloth favouring the passage of the spirit to every part of the cloth. A considerable quantity of indigo is also removed from the cloth. After the expiration of the time indicated the spirit is drawn off from the vessel containing the cloth by means of a tap at its bottom, and is conducted into a second vessel at a somewhat lower level than the first. That portion of the spirit which is retained in the pores of the cloth is removed by volatilization or by centrifugal force. When I employ volatilization the still head of the vessel containing the cloth is connected with a condenser or worm, and steam is passed into the said vessel in small jets from a pipe until the spirit is driven off. The spirit contained in the cloth is volatilized and condensed in the worm or condenser and collected in a third vessel. The cloth is now removed from the vessel, when it will be found to be dry and clean, and ready in most cases for fulling.

"When, however, it is thought desirable the cloth may be passed through the 'washer' machine with fuller's earth in the ordinary way. The spirit drawn off and that obtained by distillation may be mixed together and used again. After, however, the spirit has been used two or three times it is desirable to purify it by separating the suspended indigo and the oil which it has dissolved.

"In order to separate the indigo or other dyes or impurities the spirit, when drawn off from the first vessel into the second, is allowed to rest there for several hours, when the whole of the indigo or other solid subsides, and by decantation and filtration the spirit and indigo or solid may be obtained separately. The said indigo and spirit are, however, impure. To purify the spirit, that is, to separate it from the fixed oil which it has dissolved, I subject it to distillation, whereby the spirit is obtained in a state of sufficient purity for use again in the cleansing process, and the fixed oil remains in the

still. The fixed oil is purified by being placed in an open vat together with one third its volume of water. Steam is passed into the said vat, and the whole is boiled for about an hour. After allowing the contents of the vat to rest for a time the oil can be run off, and can be used again in treating the wool.

"The impure indigo may be treated by filtration and distillation to remove all the spirit adhering to it. The indigo thus obtained is sufficiently pure to be used in dyeing. When, however, it is required still further to purify the indigo the impure indigo may be washed once or twice with petroleum spirit, and boiled in an open vat first with lime and then with hydrochloric acid, or deoxidized by any of the well-known agents, such as orpiment, chloride of tin, protoxide of zinc, sulphate of iron in the presence of lime and alkalies. After the deoxidation of the indigo the liquid is allowed to stand at rest to permit of the solid impurities to precipitate. The supernatant liquor is run off into another vessel and oxidized by exposure to the action of the air, or by the addition of sulphate of copper, which hastens the oxidation.

"Although my invention is especially applicable to the scouring or cleansing of woollen cloth, yet it is also applicable to the scouring or cleansing of woollen and other yarns and wastes.

"Although amylic alcohol is an excellent solvent of fixed oils, I only use it in treating goods where its objectionable odour is of no consequence.

"For treating woollen cloths, yarns, wools, and oily cotton waste I prefer to use petroleum spirit instead of amylic alcohol.

"Instead of employing the apparatus described for cleansing cloths, yarns, and wastes, according to my invention, the said cloths, yarns, and wastes may be treated in a centrifugal machine, the bottom of the outer shell or casing of the said machine being fitted with a tap for the exit of the spirit. The centrifugal machine should be fixed at such a level that the spirit can be run into it from a tank above.

"The centrifugal machine having been filled three-fourths full of spirit, the goods are pressed under the liquid by sticks, and allowed to remain soaking for half an hour for the perfect solution of the fixed oils. A large proportion of the spirit can be run off while the machine is stationary, most of that which remains in the goods being collected by centrifugal force. This method of treatment I prefer.

"For most goods the treatment described will be sufficient, and the spirit sufficiently recovered. When, however, the goods are of such a nature that the spirit is removed with difficulty, a jet of water may be thrown in at the centre of the centrifugal machine while in motion, which will secure the collection of all that remains. When water is employed for this purpose it should afterwards be conducted into another vessel for the easy separation of the water and oils. Oily goods which have been soaked in spirit and deprived of the spirit by centrifugal force, as described, can be further completely cleansed by injecting spirit into the middle of the centrifugal machine during its action.

"I also, in some instances, treat the goods in an upright cylindrical vessel of the kind herein-after described. The cloth being packed in the upright cylindrical vessel with coarse canvas intervening, as before explained, spirit is run in at the bottom, which ascends through the cloth. When the vessel has been filled with the spirit it should remain from twenty minutes to half an hour to act upon the cloth. Water is then made slowly to flow into the vessel by the same entrance at bottom by which the spirit was introduced, which water forcing its way upwards drives the spirit before it, the said spirit flowing out at a spout or pipe provided for the purpose. The water by which the spirit is displaced must be admitted slowly into the vessel. In treating oily cotton waste it should, when very foul, pass twice through the process described. The said cotton waste after it has been treated will only require shaking on wire hurdles or dusted by machinery to free it from any dust or insoluble impurities not removed by the spirit. When very much stained by iron, the cotton waste can be treated by very dilute hydrochloric acid,

and afterwards washed in a centrifugal machine, but this treatment is rarely necessary."

The drawing accompanying this specification shews a cylindrical vessel, steam jacketed, with a false perforated bottom, and provided with a moveable still head which is in communication with a worm immersed in a vessel of cold water.

A.D. 1876, July 26th.—No. 3018.

PERINAUD, JEAN and MARCHAL, JUSTIN, "A Process of Suppling Dyed Silk Fabrics."

"Formerly in the weaving of silk it has been customary to treat both the warp and weft yarns separately for the purpose of removing therefrom the gummy and resinous matters to render them supple, but this treatment had the effect of considerably diminishing the weight and volume of the yarn, the loss amounting to nearly 40 per cent. in Chinese silks, and 25 per cent. in European silks. Afterwards in order to reduce this loss the treatment was confined to the warp yarns, which alone are visible on the face of the fabric, but the weft yarns being thus left in their crude condition, when the fabric was exposed to moisture or dyed it became greatly deteriorated in quality owing to the gumming together of the yarns and consequent stiffening of the fabric rendering it comparatively inflexible, harsh, and brittle.

"The same inconvenience, but in a greater degree, results when the silk fabrics are dyed a second time, for giving to it a different color, or after being used the action of the mordants and dye baths having a very disastrous effect on the weft threads, which become stiffer, harsher, and more brittle.

"It will be understood that fabrics of which the threads are thus defaced or clogged are considerably altered in texture; it is also known that the fibres of silk, as all other animal fibres, are formed of a multitude of small filaceous hooks which engage with each other or are hooked together and present an ensemble perfectly uniform when woven. When the silks are treated or scoured these small hooks, which are the chief elements of homogenity of the fabric, will project outwards in such wise that in the treated warp and weft

threads no appreciable change will be produced by friction, dipping in liquid, or by being exposed to dampness. On the other hand in fabric formed of treated warp threads and of crude weft, the warp threads being alone furnished with the small projecting filaceous hooks, are not capable of engaging with the weft threads which are not so furnished. Thus soaking, bathing, dressing, and dampness increases the defects and further isolates the weft threads from the warp threads, and increases the facility of the threads to glide upon each other, which accounts for such fabrics fraying so easily and cracking at a pleat or fold, such cracking as is well known being totally irreparable and causing in consequence the casting aside of silk dresses and garments and other articles made of silk which would otherwise be valuable and be more generally used.

"The object of this Invention is therefore to effect the removal or destruction of the gummy and resinous matters which spoil or stick the fibres together after dyeing, and to separate the fibres without loss of weight or volume while imparting the desired qualities of suppleness, softness, brightness, and finish.

"Our improved process is essentially a mechanical one, and consists in submitting the dyed or re-dyed fabric to the action of a card brush, the effect of which is to beat or brush out all the elementary gummy and resinous matters contained in the fibres.

This carding, brushing, or rubbing is preferably effected by means of an apparatus figured in drawings accompanying the specification. The drawings shew a circular brush driven by proper gearing; the silk piece to be treated passes over a block which brings it into contact with the bristles of the revolving brush; instead of a fixed block a revolving roller may be used or other similar contrivance. The silk travels continuously over the block the brush revolving, "and the gummy resinous matters which are broken, beaten and whisked out."

A.D. 1876, Aug. 19th.—No. 3270.

TONGUE, JOHN GARRETT, "Improvements in Means and

Processes for Obtaining Coloring Matters from Cannel, Anthracite, and other Coals, Applicable to Various Useful Purposes." *(Provisional protection only.)*

"According to this Invention fossil coal or cannel coal, or anthracite or boghead coal are treated advantageously in fine powder with oxydising chemical compounds by ordinary or higher temperatures in suitable vessels.

"The most advantageous method of carrying out these improvements is to heat the different coals finely powdered with nitric acid, or with potassic or sodic nitrate and sulphuric acid. Also potassic chlorate or potassic chromate, or hypochloride of lime or compounds of manganese may be used for the reaction with or without an acid.

"By the action of nitric acid or nitrates with acids compounds of nitrogen with oxygen are developed, which are to be used in the manufacture of sulphuric acid or of salts containing nitrogen bound to oxygen.

"Coals treated in the above manner undergo a great change. A great part of the coal can now be extracted by caustic alkalis, and by ammonia or by the carbonates of soda or potassium or ammonia advantageously, by heating the solution of alkalis with the product of the above treatment. A deep brown colored solution, and a black residue is so obtained. The black residue is a deep black covering color, which may be used for lime color (glue color) or oil color, or with bone black, or instead of bone black soot or graphite; it may also be applied for the black for printing, or for blacking and washing, painting, besprinkling, or other like purposes. The brown solution of the alkali salts may be used directly for coloring, for instance by fluids, by soap, or otherwise. The solutions give by evaporating the alkali salts and by decomposition with metallic salts new salts of metals which are to be used as colors.

"By this method of decomposition the salts of strontian, of barium, of magnesia, of aluminium, of manganese, of iron, of cobalt, of nickel, of zinc, of cadmium, of lead, of tin, of copper, and chromic oxyde are obtained.

"All these bodies are black or black brown, or brown colors,

which may be mixed with other coloring matters; they can be used for painting, printing, and coloring. These colors are obtained as precipitates, and can be purified by water.

"The alkali solution can also be decomposed by the soluble metallic salts above, cotton or wool, and may so be used by the dyer.

"The alkali solution can also be decomposed by acids. A black brown precipitate is obtained which may be washed in water, and which may also be used as a coloring matter. This black precipitate is the acid in which the coals are partly converted by the treatment with oxydising compounds.

"By the above described means fossil coal is oxydised, and the black residue obtained by the decomposition of the oxydised fossil coal may be applied to various useful purposes.

"The product of the oxydation of fossil coals soluble in alkalis and the compounds of this product of oxydation may be applied to various useful purposes."

A.D. 1876, September 2nd.—No. 3473.

CLARK, ALEXANDER MELVILLE, "An Improved Method of and Machine for Printing Woven and other Fabrics." A communication from Eugène Boeringer, of Paris, France.

"This Invention relates to an improved method of and machine for printing in colors on woven fabrics, paper, and other materials.

"The means ordinarily employed for the above purpose have hitherto been as follows :—

"Hand Printing.—The fabric is stretched upon a table or slab, and blocks charged with color are applied by hand, the effect being varied according to the degree of pressure with which the blocks are applied upon the fabric. It is essential that two conditions should be observed, viz., the accurate register of the parts of the pattern, and a degree of pressure corresponding with the effect to be obtained. This mode of operation is slow and expensive, and also renders success dependent more or less upon the skill and care of the workman.

"Machine Printing.—The fabric instead of remaining

stationary, as in hand printing is made to travel, and receives during its progress an impression either from engraved plates having alternate rectilinear motion, or from engraved cylinders having rotary motion. This mode of operating is more rapid and economical than the preceding, but is attended in practice with many well known disadvantages, viz., the difficulty of obtaining and mantaining an accurate register, and the liability of blurring by the contact of the colors whilst still moist.

"The new process and machine of this Invention occupies an intermediate position between the two methods above referred to, combining as it does certain features of both.

"According to this Invention the woven fabric, paper, or other material to be printed is spread out and remains stationary upon a flat table, along which one or more carriages are made to travel, each provided with one or more engraved cylinders working either simultaneously or alternately, and which in rolling upon the woven or other fabric imprint thereon the design in colors. Thus in this improved process it is not the fabric that is moved along so as to present itself to the engraved surfaces, as in color printing, by the machinery now in use, but on the contrary it is the engraved surface itself which is brought with mechanical precision to the proper position for printing upon the fabric.

"The surfaces of the cylinders may be engraved in intaglio or in relief, and their pressure upon the fabric may be so varied as to produce effects comparable to those obtained by varying the force of the blow in printing by hand. By this method the cylinders are made to register with mathematical exactness, so that all the parts of the pattern may be combined with the utmost accuracy, and the machine may be so arranged as to allow time for each color to dry before another is applied, thus admitting of the production of effects by the superposition of moist upon dry colors hitherto only attainable by hand work."

The machine does not admit of description without the drawings accompanying the specification which are four in number.

A.D. 1876, September 2nd.—No. 3476.

LAKE, WILLIAM ROBERT, "An Improved Machine for Dressing and Cleaning Skeins or Hanks of Silk and other Spun Materials." A communication.

"This Invention relates to an improved dressing and cleaning machine for silk and other spun materials in skeins or hanks, and is designed to replace hand work in certain operations either before or after dyeing, which operations are; before dyeing, treating of the scoured dressing for the skeins or hanks, and after dyeing the diminishing of the threads and drying.

"The said machine has a double reel or horizontal shaft supported in two frames, whose form may be varied according to the nature of the materials to be treated. This double reel or horizontal shaft has imparted to it a continuous rotative motion by means of two pulleys, oue of which is mounted upon the driving shaft of the machine. At the two extremities of the said reel are place discs which have a special curvature. These discs are designed to prevent the escape of the thread during the operation of the machine. A horizontal shaft parallel with the said reels is supported on the same frames, and receives motion either through a special motor or through gearing by means of the said two pulleys, one of which is fast and the other loose. Upon this shaft are mounted two cams having a spiral form and which are intended to give a reciprocating movement to a beater or board which carries upon two journals the stretcher, which with the aforesaid reel serves for treating the textile materials. The aforesaid beater or board oscillates upon one of the said journals, and the said cylinder describes an arc around the same as its centre. Upon this journal is mounted a sector, upon which is a belt or band which carries at its free end a cylindrical rod whereon is fitted a number of cast-iron discs, whose weight added to the weight of the said beater and of the stretcher permits the augmentation or diminution of the effect produced by the beater in its descent. The said beater when stopped is suspended by a tappet on the frame, and while in this position one of the said cams passes around

without causing the movement of the said beater; then the skein or hank to be treated is taken by one hand and presented to the reel. With the other hand the said stretcher is raised and introduced into the skein and returned to its place. This operation finished, the aforesaid tappet which holds the beater is disengaged; the stretcher left to itself and subjected to the weight falls and stops remaining suspended by the skein or hank in which it is engaged, thereby giving a jerk to the entire skein and causing the fall of refuse particles and all matters desired to be separated therefrom. The repeated action of the beater and the rotative movement of the skein upon the reel effect the parallelism and straightening of the thread. This action of the beater is imparted to it by one of the said cams acting on a roller thereon. It is necessary to vary the force or intensity of the blows, and this variation is effected by means of counterweights, whose number may be varied as desired.

"As before mentioned the said stretchers have imparted to them a continuous rotary motion but very slow; this continuous motion may be replaced by an alternating rotary motion which may be obtained as follows, that is to say:—A cam is provided on the driving shaft of the machine, which cam in its motion meets the said roller and causes it to rise with the part on which it is mounted. At the extremity of this part is fixed a pawl which acts on a tooth of a ratchet each time the cam rises the roller; the ratchet will turn at an angle determined by the course of the cam and the position of the levers with regard to the part carrying the roller.

"On the axis of the ratchet wheel is a wheel which works with it and gears with a pinion keyed on the shaft of the reels, and thus will be given to the said shaft and to the reels an alternating rotary motion. By means of this arrangement the said stretchers will be at rest when the skein or hank receives the blow or jerk.

"The form and arrangement of the machine may be varied; the said stretchers or holders may occupy different positions with regard to each other, and may be placed in a horizontal or vertical or an oblique plane.

"The movement of the cylinder may be produced by cams, levers, eccentrics, or by any other suitable means."

The above is a reprint of the provisional specification, the complete specification mainly referring to drawings accompanying it would not be intelligible without them; the concluding words of the full specification are as follows:—"I wish it understood that the main objects of the said machine are the mechanical disentanglement and dressing of the threads in skeins of silks or other textile materials, and that I claim a machine in which the method of mechanically jerking or heating the skeins or hanks of silk or other textile materials is carried into practice for the purposes above specified."

A.D. 1876, September 12th.—No. 3569.

WILDE, HENRY. "Improvements in the Manufacture of Metal Rollers for Printing Calico and for other Purposes."

"Whereas Letters Patent were granted to me on the 28th day of December, 1875, Number 4515, for an improved method of depositing copper on iron rollers for printing calico and for other purposes by which the process was greatly accelerated without detriment to the quality of the metal deposited.

"Now my present improvements consist, firstly, in a method of securing a sufficient amount of adhesion between the iron and deposited copper surfaces, to enable the roller to withstand the various engraving and other operations without the separation of the metals. For this purpose the iron roller before receiving a coating of copper from a hot cyanide solution of copper is heated to a temperature ranging from 150° to 212° Fahrenheit, by plunging it into boiling water or by other means. The said roller after receiving a film deposit of copper from the cyanide solution is then transferred to the bath containing a sulphate solution of copper where it receives one or more thin coatings of copper. These coatings are subjected to considerable pressure by the action of a burnishing roller of hardened steel for the double purpose of forcing the deposited copper into closer contact with the iron, and detecting any want of adhesion between the two metals. The burnished coppered roller is then replaced in the bath of

sulphate of copper solution and subjected to the action of the electric current until the desired thickness of copper deposit is obtained. Before each of the depositing operations the surface of the roller is thoroughly cleansed by scouring and washing in clean water as is well understood.

"My Invention consists, secondly, in a method of constructing iron printing rollers to be electro-coppered in such a manner as to prevent their splitting at the ends by the conical wedge mandrills of the engraving and polishing machines; or when split to prevent the fracture in the cast iron from extending to the engraved copper surface of the roller. For this purpose the ends of the rollers are turned down externally for a short distance, and hoops or rings of malleable iron or steel are either shrunk or forced over the ends, and the copper is deposited over the hoops uniformly with the surface of the roller. Hoops of copper or brass may be forced over the ends of cast-iron rollers to prevent the fracture of the cast-iron from extending to the electro deposited surface.

"Having thus stated the nature of my Invention and described the manner of performing the same, I declare that I claim,—

"First. Heating iron rollers to prepare them for receiving a film deposit of copper from a cyanide solution.

"Secondly. Depositing one or more thin coatings of copper from a sulphate solution and burnishing the same before the final coating is deposited for the purpose described.

"Thirdly. The methods described, whereby the ends of cast-iron rollers coated with copper are prevented from splitting."

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9. British and Foreign Patents, from the Commissioners of Patents Journal, March 23rd to April 24th, 1877, inclusive.

Bleaching, Washing, Drying, Squeezing, Engraving, etc.

3896. FRANK WIRTH, of the firm of Wirth and Company, Patent Agency, of Frankfort-on-the-Maine, in the empire of Germany,

for an invention of "Improvements in bleaching animal fibre.' —A communication from Ferdinand Victor Kallab, Chemist, a person resident at Wiese, in the empire of Austria.—Dated 9th October, 1876.—This patent has passed the great seal.

4552. EDWARD GRIFFITH BREWER, of Chancery Lane, in the county of Middlesex, has given notice to proceed in respect of the invention of "Improvements in centrifugal drying machines or extractors."—A communication to him from abroad by Messrs. Boulieu, Brothers, and Charlon, of Lyons, France.

1005. WILLIAM SUMNER, of Manchester, in the county of Lancaster, Merchant, for the invention of "Improvements in apparatus for drying yarn, woven fabrics, and other materials."—A communication to him from abroad by Messieurs Tulpin Brothers, of Rouen, France, Machine Makers.—Provisional protection has been granted.

1107. CLAPHAM HOLMES, ISRAEL PEARSON, WILLIAM HENRY MURTON, and NATHAN MIDGLEY, all of Keighley, in the county of York, Machine Makers, for an invention of "Improvements in washing machines." — Dated 20th March, 1877.

1356. WILLIAM BIRCH, of Salford, in the county of Lancaster, Machinist, for an invention of "Improvements in squeezing machines."—Dated 6th April, 1877.

1033. JAMES EDMONDSON, WILLIAM EDMONDSON, and FREDERICK WILLIAM EDMONDSON, of the firm of Messieurs Edmondson Brothers of Manchester, in the county of Lancaster, Engravers to Calico Printers, for an invention of "Improvements in machinery for etching or engraving cylinders used in printing and embossing."—Dated 8th April, 1870.—The £100 stamp duty has been paid.

115,464. KNAB and FOURNIER, for "Bleaching wool and other animal fibres and substances, worked or not."—Dated 13th November, 1876.—French patent.

115,517. BROCHOCKI and Co., for "A decoloring product, called 'concrete of bleaching liquid.' "—Dated 15th November, 1876. —French patent.

90. T. D. BROCHOCKI and Co., of Paris, for "A decoloring product called 'concrete of bleaching liquid.' "—15 years.—Dated 1st December, 1876.—Italian patent.

86. E. GESSLER, jun., of Metzingen, for "A centrifugal machine

for washing and drying fabrics."—5 years.—Dated 16th May, 1876.—Wurtemburg Patent.

Colouring Matters and Dyeing Processes.

4625. JOHN ROGERS ASHWELL, of New Basford, in the county of Nottingham, Bleacher, has given notice to proceed in respect of the invention of "An improvement in the process of dyeing hosiery goods."

4912. WILLIAM VIRGO WILSON, of 7, Cottage Grove, Bow, in the county of Middlesex, Manufacturing Chemist, and HEMINGTON CANT, of 8, Coborn Street, Bow aforesaid, Analytical Chemist, for an invention of "Improvements in the manufacture of aniline dyes."—Dated 20th December, 1876.—This patent has passed the great seal.

596. PETER CANNELL BUNN, of Stoke-Ferry, in the county of Norfolk, for an invention of "Improvements in the production of pigments."—Dated 13th February, 1877.—This patent has passed the great seal.

1056. WILLIAM JACKSON, of Urmston, near Manchester, in the county of Lancaster, Print Buyer, for the invention of "Improvements in treating fabrics printed with aniline colours."—Provisional protection has been granted.

1096. EXLEY WOODCOCK, of Elland, in the county of York, and JOHN WILLIAM WOODCOCK, of Dewsbury, in the same county, for the invention of "Improvements in 'hawking machines' for indigo dyeing."—Provisional protection has been granted.

1374. FRANCOIS LECOURT, Manufacturer, and ACHILLE GUILLEMARE, Chemist, of 1, Rue Laffitte, Paris, for an invention of "Improvements in the manufacture of chlorophylle, and in its application for imparting a green colour to preserved vegetables and fruits."—Dated 9th April, 1877.

878. GEORGE JAMES HINDE, of Wolverhampton, in the county of Stafford, Manager of Works, for an invention of "Improvements in utilizing a certain waste or residual product obtained in the manufacture of aniline dyes."—Dated 11th March, 1874.—This patent has become void.

1269. GUSTAV AUERBACH and THEODORE GESSERT, of Elberfeld, in the empire of Germany, for an invention of "Improvements in manufacturing alizarin and isopurpurin out of anthracen."—Dated 13th April, 1874.—This patent has become void.

181,479. J. T. RICE, and D. A. ARNOLD, of Pawtucket, R.I., for "Machines for coloring cotton, wool, &c."—Application filed 26th June, 1876.—American patent.

Claim.—"1. In a coloring-machine, the combination of a concave tank D, the plunger L, the slotted uprights L^1, L^1, and the shaft K with the actuating mechanism, all operating together, substantially as described, and for the purpose set forth. 2. The combination of the pitman M^2, the lever N^1, N^2, link P, lever Q, Q^1, and link R with the cross-piece M^3, and plunger L, all operating substantially as described, and for the purpose set forth."

41,687. J. RAVE, of Schaerbeek, for "A colouring substance for dyeing and printing."—Dated 12th March, 1877.—Belgian patent.

115,311. SIMPSON, BROOKE, and ROYLE, for "Improvements in the preparation of alizarine and other analogous colouring matters made from anthracene."—Dated 2nd November, 1876.—(English patent, 2nd May, 1876.)—French patent.

Yarns and Hanks, Treatments of.

3929. WILLIAM CRAWFORD, of Paisley, in the county of Renfrew, North Britain, Dyer, for an invention of "Improvements in bleaching, washing, and dyeing yarns in hanks, and in the machinery or apparatus employed therefore."—Dated 11th October, 1876.—This patent has passed the great seal.

4741. WILLIAM LLOYD WISE, of Chandos Chambers, Adelphi, in the county of Middlesex, has given notice to proceed in respect of the invention of "Improvements in machinery for drying yarn."—A communication to him from abroad by C. H. Weisbach, Engineer, of Chemnitz, Saxony, German empire.

5036. GEORGE HARWOOD, JOHN BOLTON SCHOLES, and EDWARD ROOCROFT, all of Bolton, in the county of Lancaster, have given notice to proceed in respect of the invention of "An improved process of, and apparatus for, clearing yarns or threads."

849. FRANCIS JOHNSTON, of Peel Mill, Blackburn, in the county of Lancaster, Power Loom Cloth Manufacturer, for the invention of "Improvements in dyeing, bleaching, or printing of cotton or other yarns, other than from the hank or chain, and in apparatus for effecting the same."—Provisional protection has been granted.

964. ARCHIBALD STEWART BYERS, of the firm of "Campbell and Byers," of Paisley, in the county of Renfrew, North Britain, Dyers, for the invention of "Improvements in scouring, bleaching, and dyeing yarns, and in the machinery or apparatus employed therefor."—Provisional protection has been granted.

104. E. GESSLER, of Metzingen, for "An apparatus for bleaching and dyeing thread on bobbin-reeds."—10 years.—Dated 27th June, 1876.—Wurtemberg patent.

Wool and Silk Treatments.

4923. ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the county of Middlesex, Patent Agent, has given notice to proceed in respect of the invention of "Improvements in the treatment of wool and apparatus for the same."—A communication to him from abroad by Jules Raulin, Professor of Chemistry at the Faculty of Sciences, of Lyons, France.

913. EDWARD THOMAS HUGHES, of the firm of Hughes and Son, Patent Agents, 123, Chancery Lane, in the county of Middlesex, for an invention of "Improvements in the treatment of the liquors used in scouring or cleaning wool."—A communication to him from abroad by Louis Gustave Ghilain Daudenart and Edmond Verbert, of Rue du Progrès, Schaerbeck, Brussels. —Dated 13th March, 1874.—This patent has become void.

41,615. J. RAULIN, for an imported invention of "Improvements in the treatment of wool."—Dated 1st March, 1877.— (French Patent.)—Belgian patent.

41,626. S. BERENGER, for an imported invention of "Using sulphate of ammonia in the chemical cleansing of wool."—Dated 3rd March, 1877.—(French Patent, 2nd September, 1876.)—Belgian patent.

41,627. BLAY Brothers and Co., for an imported invention of "Using steam washing apparatus for dyeing wool, woollen yarn, and goods."—Dated 3rd March, 1877.—(French patent, 5th February, 1877.)—Belgian patent.

41,702. O. LOW, for an imported invention of "Improvements in processes and apparatus for cleaning and washing wool or other substances."—Dated 13th March, 1877.—(French Patent, 12th March, 1877.)—Belgian patent.

115,643. RAULIN, of Vallerangue, for "Improvements in his treatment of wool by chemical agents, chiefly for the purpose of cleansing, as patented 18th March, 1875."—Dated 28th November, 1876.—French patent.

180,895. LEWIS LEIGH, of Pittsfield, Mass., for "Apparatus for boiling and dyeing silks, &c."—Application filed 26th May, 1876.—American patent.

Brief.—"The rods upon which the material to be dyed is placed are laid parallel with each other upon the side edges of the vat, and are agitated by a series of fingers, which are pivoted near their centers to the side of the vat, and the lower ends of which are pivoted to a connecting-rod. This rod is moved back and forth by means of a crank and short bar. A box is connected with the space between the vats, to receive the wash from the ebullition of the liquid."

Claim.—"1 The combination of the series of fingers E, their connecting-rods F, and operating mechanism, with the vat B, substantially as herein shown and described, for moving the rods that support the material being boiled or dyed, as set forth, 2. In an apparatus for boiling or dyeing silk, the combination, with the outer and inner vats A B, of an expansion-chamber I, attached to the outer vat, communicating therewith, extending above it, and having a closed top, as shown and described, to operate as specified."

Finishing Processes; Stretching, Glazing, etc.

4756. ROBERT WILSON, of the Bridgewater Foundry, Patricroft, in the county of Lancaster, Engineer, has given notice to proceed in respect of the invention of "An improved mode of finishing cotton fabrics."

854. JOHN HART TRACY, of Clerkenwell, in the county of Middlesex, for the invention of "Improvements in machinery or apparatus for plaiting or folding fabrics."—Provisional protection has been granted.

1015. EDWARD JAMIESON and HENRY COLLINS, both of Salford, in the county of Lancaster, have given notice to proceed in respect of the invention of "Improvements in and apparatus for shrinking textile fabrics."

1066. SAMUEL MILNE SMITH, CHARLES TELFORD SMITH, and WILLIAM BINNS, of the firm of Samuel Smith and Company, of Bradford, in the county of York, Dyers and Finishers, for the invention of "Improvements in finishing 'moreens' and corded fabrics."—Provisional protection has been granted.

1210. WILLIAM EDWARD NEWTON, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, Civil Engineer, for an invention of "Improvements in machinery or apparatus for stretching fabrics."—A communication to him from abroad by Alfred François Lacassaigne, of Paris, in the republic of France.—Dated 27th March, 1877.—Provisional protection has been granted.

1340. CHARLES JAMES COX and JOHN PEARSON COX, trading as Charles Cox and Sons, of the Queen's Road Works, in the town

and county of the town of Nottingham, Bleachers and Lace Finishers, for an invention of "Improvements in and connected with machines or mechanism for surface glazing or glossing lace, calico, and other like fabrics."—Dated 6th April, 1877.

1386. FERNAND DEHAITRE, of the firm of Pierron et Dehaitre, of Boulevard Saint Denis, 1, at Paris, Mechanician, for an invention of "An improved machinery or apparatus for enlarging fabrics of all kinds."—Dated 9th April, 1877.

1476. NEWTON WILSON, of High Holborn, in the county of Middlesex, Sewing Machine Manufacturer, for an invention of "Improvements in machinery or apparatus for plaiting fabrics."—Dated 16th April, 1877.

180,705. C. S. DAVIS, of Manayunk, Philadelphia, Pa., for "Cloth-finishing machines."—Application filed 26th April, 1876.—American patent.

Brief.—"Slotted rollers, through which the fabric is passed, are connected, so as to move in unison and be held by pawls. Deflecting the slots from the vertical increases the contact of the cloth with the emery and brush rollers. Tension devices are applied to the let-off and the take-up rollers."

Claim.—"1. The tension bars or rollers R, R^1, with their ratchets H, I, and coupling *x*, in combination with the emery and brush rollers 1^1, 2^1, 3^1, and 4^1, arranged in the manner and for the purpose substantially as herein specified. 2. The elevated frame B, C, when provided with slotted cross-bars *m*, *n*, adjusting-clamps *v*, and traction-roller O, the whole combined and arranged substantially in the manner shown, for the purpose set forth. 3. In combination with the bearings of the cloth-roll K over the bearings of the calender-rolls in D, the weighted rod E and slide-plate *f*, arranged substantially as and for the purpose mentioned."

71. F. KNELLER, of Ingelfingen, for "A machine for measuring and folding tissues."—5 years.—Dated 10th April, 1876.—Wurtemburg patent.

37. P. MAGNER, of London, for "Improvements in the treatment of vegetable fibres for giving them a silky appearance and preparing them for dyeing."—6 years.—Dated 28th October, 1876.—Italian patent.

224. P. MAYNER, of London, for "A process for giving vegetable fibres a silky appearance."—5 years.—Dated 18th November, 1876.—Wurtemburg patent.

98. J. S. BUTLER, of London, for "New processes for giving vegetable fibres a silky appearance, and for preparing them for certain dyes."—6 years.—Dated 20th November, 1876.—Italian patent.

THE TEXTILE COLOURIST.

No. 18.] JUNE, 1877. [Vol. III.

1. *Upon the Superheating of Saline Solutions by Low Pressure Steam.*

An article in the *Färber Zeitung*, No. 14, 1877, "Zur Färbung in Holzkufen," draws attention to a phenomenon which appears to be little known, and less understood, but which may explain some obscure points in dyeing and calico printing, and the study of which may possibly lead to some useful application. The immediate cause of notice being directed to this subject is some papers in the "*Berichte der Deutschen Chemischen Gesellschaft*," upon the temperature of steam evolved from boiling water containing salts in solution. Müller in criticising a paper by Wüllner, states as if it were a new and original observation, that when steam at a temperature of 212° F. is led by a pipe or tube into a solution of any salt, the boiling point of which is above 212° F., the steam heats the saline solution *higher* than 212°. This observation is however somewhat old, and may be traced to Faraday, who so far back as 1822 in the *Annales de Chemie* pointed out that if the bulb of a thermometer be covered with any salt in powder and then held in the steam of boiling water the thermometer will indicate a temperature several degrees higher than that of the steam. The experiment was repeated by Faraday in various ways, but not as far as we can gather by actually passing steam into saline solution. Gay Lussac,

at that time editor of the *Annales de Chemie*, confirmed the statement as a matter of fact, but did not accept it as a proof of what Faraday seemed to be advocating, namely, that the steam evolved from a boiling saline solution had only a temperature equal to that which was evolved from pure water boiling under the same pressure. Further, Gay Lussac enunciates distinctly a quite opposite doctrine which is the true one, namely, that the steam evolved from any solution has exactly the temperature of the film of solution immediately in contact with the vapour. These experiments are mentioned in the English translation of Gmelin's Handbook, but except in so far as shewing that the phenomenon had been observed, they have very little bearing upon the point we are directing attention to; the controversy was mainly as to what was the temperature of steam or vapour given off by saline solutions.

Some twenty years ago Mr. Peter Spence, of Manchester, drew the attention of the members of several learned societies to the fact, which he deemed new, that steam could heat saline solutions to a temperature several degrees higher than its own. If we recollect rightly, being at some distance from books, Mr. Spence, who is an alum manufacturer on a very extensive scale, had occasion to heat a strong solution of sulphate of alumina, and for this purpose blew steam into the liquid by pipes leading from a low pressure boiler; he was very much astonished to find that when the steam began to blow through the liquor the temperature indicated by the liquor was some 15° or 20° F. higher than that of the steam in the boiler. He afterwards repeated the experiments with various saline solutions, and found a confirmation of his observation in every case. Nothing is easier to prove than the exactness of this observation, and yet it is met with general incredulity because there is no satisfactory explanation of it, and scientific men so far as we know have not pursued the subject. It is very easy to say it is owing to the latent heat of the steam, as Dr. Reimann explains it, but this is really no explanation. The latent heat of steam when not in actual contact with the liquid it is acting upon, as in coils of piping

or in double-cased pans or vessels, shews its existence by the the great weight of fluid which a small weight of steam can raise to its own temperature, but under these conditions it never raises the temperature of the fluid any higher than the temperature it possesses itself. We must wait longer for a rational explanation of this curious phenomenon.

We are indebted to Dr. Reimann for drawing attention to the use which can be made of this property of steam in dyeing operations, for he shews that in woollen dyeing especially it would not be possible to dye many colours in wooden becks heated by bare steam unless a temperature higher than could be reached by simple water could be attained. For the purpose of obtaining a temperature higher than 212° F., it has lately been the custom to add apparently useless salts to the dyebath, such as common salt, sulphate of soda, sulphate of magnesia, etc.; choosing, of course, such salts as have no injurious action upon the dye. By this contrivance steam heating in wooden vessels can yield a temperature equal, if not superior, to that obtained by fire-heated metallic vessels and thus greatly facilitate the dyeing of some colours, aniline violet for example.

In the steam colours used in calico printing, we think also, there can be no doubt that this phenomenon of superheating has unknowingly played a very important part, and may be made of still more useful application. In a steaming chamber where the temperature, say, does not exceed 212° F it is certain that the colours containing saline substances acquire a considerably higher temperature, because the steam acts upon them in a more or less perfect manner as if they were saline solutions, or exactly as in Faraday's experiment, when putting powdered salts on the bulb of a thermometer increased the temperature, so does the existence of salts upon calico enable it to acquire a higher temperature than exists in the atmosphere surrounding it. It follows, therefore, by adding such salts as sulphate of soda, nitrate of soda, nitrate of potash, salammoniac, or common salt to colours, though seemingly useless, they may, in many cases, prove of great service by enabling the colour to acquire a higher temperature by several degrees

and so effect combinations more perfectly between the colouring elements than could take place at 212° F.

2. *Upon some Decompositions and Reactions of Aniline Black.**

BY M. FREDERICK GOPPELSROEDER.

THE base of the aniline black obtained by electrolysis at the positive pole, when purified by boiling water and alcohol, dissolves, as I have previously stated, in fuming sulphuric acid. By well stirring heat is developed; after the evolution of heat was over, the mixture was warmed in a water bath. According to the proportion of acid and the activity of the reaction, the solution becomes a violet blue or a dark green. The treatment should be continued until the liquid is perfectly homogenous, and the solution then thrown into water. If the action of the fuming sulphuric acid has been complete, there should be formed a pure green precipitate, while the liquid should be either colourless or of a faint reddish violet. The green precipitate is washed with water until it ceases to shew an acid reaction. If the washing be continued beyond this point, the precipitate dissolves with a green colour, and the more readily if the water be warm. This solution does not dye cotton even if mordanted, but it dyes wool. It becomes blue in the cold upon the addition of ammonia; if the temperature be raised, changing to blue-violet. Neither the green nor the blue solution gives up anything to ether. The fixed alkalies, caustic potash, and soda, change the green colour to blue, which changes to violet by heating; addition of hydrochloric acid restores the green colour. None of these solutions give up anything to ether or chloroform. The green solution is bleached by hydrosulphite, also by zinc powder

* Abstracted from a Memoir presented to the Chemical Society of Paris, and published in the number for May 5th, 1877, under the title "*Sur la reduction du noir d'aniline et sur son changement en colorant rose*."

and by metallic zinc and acid. By addition of fuming nitric acid, the bleached liquid becomes again green. With sodium amalgam the liquid becomes violet-blue, and is then slowly bleached. Protosulphate of iron (ferrous sulphate) even when heated does not effect reduction. Sulphurous acid has no action, neither the hydrosulphite of ammonia acidified with sulphuric acid; but by addition of the hydrosulphites of zinc or calcium, the solution is immediately turned green.

With hypochlorite of soda the solution becomes of a dull red violet, going gradually redder; by heating it becomes orange, by addition of sulphurous acid, yellow. Heated with bichromate of potash it remains green; but it is bleached by permanganate acidified with sulphuric acid. Chlorine water at first makes the green more intense, then changes it to blue-violet, blue, violet, and finally to a wine-red colour; with ammonia the liquor becomes brown. By addition of a hot mixture of red prussiate and caustic alkali, the green liquid becomes brownish. With sulphate of copper there is a green precipitate; this precipitate was washed, suspended in water, and treated by sulphuretted hydrogen. The liquid filtered from the precipitate was of a very light brown, almost colourless, and became at first green, and then violet, by addition of chlorine water. The green liquid supersaturated with baryta water, gave a violet precipitate, which gradually became green when exposed to the air, while the filtered liquid remained of a light violet. The green solution retains its colour when treated with sulphuretted hydrogen, and becomes violet by addition of chlorine water. Acetate of lead gives a green precipitate; bichloride of tin (stannic chloride) gives also a green precipitate, which, with chlorine water, becomes at first blue, then violet, and finally dissolves with a blue violet colour in caustic soda. The protochloride of tin (stannous chloride) gives likewise a green precipitate, which dissolves in caustic soda with a yellowish green colour. When the green liquid is treated with bichromate of potash, it gives a black precipitate, which becomes first blue-violet, and then red-violet when heated with hypochlorite of potash; the red-violet solution recovers its original green by sulphurous acid, and

becomes again violet by the action of the hypochlorites. With an excess of hypochlorite the solution becomes reddish-yellow, and by heating yellow. It no longer returns to green by sulphurous acid, but the hyposulphite of soda changes it firstly to blue-violet, and finally to brown, but then it recovers its violet colour by the action of hypochlorites.

If in the first treatment of the aniline black the sulphuric acid has not been sufficiently concentrated, the solution, when thrown into water, gives a green precipitate which is insoluble in water. Neither of the green precipitates are oxidised by ozone, nor by oxidising agents such as the bichromates, chlorates with addition of chloride of copper, or the per-chloride of iron.

The green precipitate, or the green liquid, gives a blue-violet solution, after neutralising with alkali. The most interesting property of this blue violet liquid is its reduction by glucose or other deoxidising agents. If the alkali in solution be mixed with glucose and gently heated it becomes yellow or brownish yellow, but recovers its blue colour rapidly by the action of the air. Paper dipped in the solution and then placed in an atmosphere of nitrous vapours, becomes coloured blue-violet instantaneously.

The glucose solution is changed to blue-violet by the hypochlorites and chlorine, and to red violet by permanganate.

If vegetable and animal fibres be impregnated with such a solution of aniline black in a concentrated state, upon exposure to air they become rapidly coloured, and more rapidly still in ozone, becoming violet, blue-violet, and blue; all these shades become green by the action of dilute acids.

If the blue-dyed fibres be treated by oxidising agents, the black is developed. If the blue be light, the result of oxidation is only grey; but if dark, black is produced.

According to the strength of the solution, the most varied shades may be obtained, from a very light grey to the darkest black.

In this manner aniline black can be fixed upon fibres in a manner analagous to indigo dyeing; the fibre is impreg-

nated with the colouring matter in a colourless state, which oxidises quckly in the air, changes into a coloured body, which remains fixed upon the fibre. A compound vat may be formed of indigo and aniline black, which will give very dark shades. After dyeing in this mixed vat, the goods may first be treated as if indigo alone, and afterwards the black may be oxidised by acidulated ferric chloride, according to the excellent method discovered by M. Jeanmaire. The black solution may also be printed in the same way as dissolved indigo, with dilute solutions greys being obtained.

The blue-violet alkaline solution can also be reduced by hydrosulphite of lime, or by metallic zinc; the alkaline solution of hydrosulphite of lime furnishing the best result. The liquid becomes yellow, and the cotton dipped in it becomes rapidly blue when exposed to the air.

I have not yet succeeded in preparing an aniline black vat with copperas (ferrous sulphate) and lime as an indigo vat can be made. I have only obtained by this method a black deposit, on which was found a blue-violet precipitate, formed by a lake of the black with lime and iron, as was proved by its decomposition with hydrochloric acid, which, dissolving the iron and the lime, precipitated the black unchanged.

The following treatment may be adopted to obtain a very deep black:—Dip the fibre in the solution, and expose it to the air alternately for several times, until a dark blue is obtained; then oxidise it to obtain a black which does not become green; afterwards repeat the dipping and exposure to the air, and oxidise again; and so on, until the black has arrived at the required depth.

The blue solution is also rendered colourless by the mixture of glycerine, stannite of soda, and soda proposed by M. Prudhomme for the reduction of indigo.

The solution of reduced aniline black, when used as ink, writes very pale, passing to blue and deep black; such a liquid can be used for writing, and may be of importance as a marking ink for the use of bleachers, dyers, and printers.

The reduction by glucose in the presence of alkali, takes place equally well upon the commercial aniline blacks, as it

does with the black obtained by electrolysis. It is, however, necessary to liberate the base of the black by means of alkali before submitting it to the other treatments. I have, up to the present time, worked upon an excellent black manufactured be d'Andiran and Wegelin.

The commercial aniline black must be first purified by a treatment with boiling water and alcohol; it is then to be treated with a hot solution of caustic potash, the base thus liberated is washed and dried; the alkaline solution of the black has a red violet colour.

The base is next dissolved in fuming sulphuric acid; the solution thrown into water gives a precipitate which is separated from the brownish fluid; the precipitate when washed seems black, but in thin layers it is green; it is dissolved in caustic potash and reduced by glucose or hydrosulphite of lime.

I have to make another communication concerning the change of aniline black into a substance which possesses the physical and chemical properties of naphthaline pink.

I melted an intimate mixture of acid sulphate of potash and aniline black obtained by electrolysis; the melted mass was treated by boiling water, which became pale yellow coloured and was not found to contain either sulphite, hyposulphite, or sulphuret. The gases evolved during the fusion were nitrogen and sulphurous acid. The residue insoluble in water was then treated by concentrated sulphuric acid, and the acid solution thrown into water.

The water was coloured red-violet, and by addition of ammonia, became beautifully fluorescent; an abundant black precipitate was formed at the same time, which was insoluble in boiling water, but when treated with alcohol, yielded a pink or rose colour, having the fiery red fluorescence of naphthaline pink, and shewing the same spectral and chemical reactions as that body. The quantity of this pink colour produced is considerable, besides which there is formed a violet colouring substance. When separated from the accompanying violet colouring matter, the pink colour dyes silk in shades

which are precisely similar to those dyed with naphthaline pink.

I look upon this transformation of the black into a fluorescent pink colour as a dehydrogenation of the substance.

I am continuing the study of the action of the acid sulphates of the alkalies upon different substances and colouring matters, believing that the bisulphates and certain sulphates may find a much more extended application than at present as oxidising or dehydrogenising agents.

If the commercial aniline black be treated with bisulphate of potash, the mixture swells, and, besides, sulphurous acid gives off a gas burning with a blue flame; the results are quite different from those obtained by treating the base of the same black.

If, after having melted the base of the black with bisulphate and treated the mass obtained by boiling water, the residues not treated by strong sulphuric acid but directly with alcohol, this vehicle dissolves only a yellow brown colouring matter; if dilute sulphuric acid be added to the alcohol, it acquires a pale violet colour. If then the residue be treated with caustic potash, the alkaline solution becomes rose-violet and the alcoholic extract of the residues blue.

3. *Fixing of Indigo upon Fibres.**

BY M. PRUDHOMME.

INDIGO can be fixed upon printed goods in various ways, but the principle which governs the fixation is the same in all cases, and may be defined as follows:—The colouring matter must be reduced from the blue to the colourless state, so as to be soluble in alkalies, and capable of penetrating the fibre to rest there while resuming its original blue colour by oxida-

* Moniteur Scientifique, vii. (3) p. 542.

tion. The processes practically in use fulfil the necessary conditions in different manners.

In *China blue* the blue indigo is in a very fine powder. The printed calico is dipped alternately in vats containing sulphate of iron (green copperas), and milk of lime. This gives the conditions of the most generally used indigo-blue vat in which indigo, lime, and copperas are mixed together. The so-called *fast blue* or *precipitated blue* contains indigo in the white state along with oxide of tin. The fixing of this colour may be reduced to a simple passage in milk of lime, which causes the indigo to dissolve and penetrate the fibre. By placing the goods in a stream of water the indigo becomes oxidised to its blue state.

The colour known as *pencil blue* may be named and defined as a reduced indigo vat properly thickened for printing.

Lastly, *steam indigo*, which like the last contains within itself all the elements necessary to fix the colour. The indigo may be previously reduced, and in any case there must be present an excess of the reducing agent, which comes into action at the time of steaming. The conditions which ought to be found united in a steam indigo colour, and which up to the present time have not been discovered, are defined by M. Schützenberger, as "a combination which will allow the printing of indigotine, and cause it to become soluble for a time upon the cloth when exposed to steam. An alkaline reducing agent which does not act in the cold, but only at the temperature of steaming would fulfil the conditions."*

The nearest approach in this direction has been made by M. C. Zurcher,† with a mixture of indigo blue, alkaline carbonate, and oxide of tin in paste. Unfortunately the results obtained in practice by this process have not been satisfactory.

There are few colouring matters, so long known as indigo has been, which have been the subject of so many researches;

* Traité des Matières Colorantes, ii. p. 600.

† Bull. de la Soc. de Mulhouse, xlv., p. 576. Textile Colourist, i., p. 382. Underwood's process with amorphous phosphorous is still a nearer approach. Textile Colourist, ii., p. 163.—*Ed.*

and still it is but recently that Schützenberger and Lalande discovered a new and powerful reducing agent in the hydrosulphite of soda, the application of which has been successful in practice.

We have recently discovered a new method of reduction and fixation, which though not of great practical importance, still presents some points of interest.

A mixture of glycerine, carbonate of soda, and protoxide of tin in paste perfectly reduces indigo by heat. The reduction is complete at 248° F. If water is used instead of glycerine there is only a very imperfect reduction of the indigo. How can this reaction be explained?

The carbonate of soda is decomposed in the presence of the protoxide of tin, forming a stannite of soda. The liquid becomes strongly alkaline, and the free soda reacts upon the glycerine, and gives a mixture of acetate and formate, hydrogen being liberated.

We have proved experimentally that soda and glycerine heated together can very well reduce indigo.

With this action another is found accompanying:—

The oxide of tin in paste and the glycerine reduce the indigo by heat, probably by a similar decomposition.

If account is taken at the same time of the solvent properties of glycerine, which serves as a vehicle for the oxide of tin, and puts it into intimate contact with the indigo, it can be understood that such a mixture as the one indicated may be an excellent reducing compound.

By printing a mixture of indigo blue, oxide of tin, and carbonate of soda, and then passing the calico into glycerine heated to about 248° F., the indigo becomes reduced, and by withdrawing it immediately from the action of the glycerine, so as to avoid running of the colour, and then oxidising in the air, the blue can be fixed. M. Jeanmaire has shewn that upon cloth prepared with glycerine, indigo blue has an increased depth.

This process, not very practical in itself, has, however, some points of interest. It is, in a certain way, a resumé and synthesis of all the means known by which indigo can be

fixed. The mixture contains the indigo in the blue state, and in so far resembles the China blue colour. The reducing elements which it contains, in some sort make it like the fast blue; and, lastly, the elevated temperature required for the reaction and the fixing of the colouring matter connect it with the steam-indigo blue.

4. *Upon Pasting Ends of Pieces.*

THE following communications of M. F. Rhem and M. J. Reber to the Industrial Society of Rouen* are of interest as referring to a paste composition which is able to resist hot or cold water or steam for a time. Portable sewing machines have, however, rendered the use of such pastes almost wholly unnecessary, and have greatly contributed to the success of continuous operations. There may be, however, some cases in which a sewed end is deemed yet undesirable if a smoothly pasted end could be got to stand the operations, and the knowledge of a paste said to answer may be found useful.

M. Rhem says:—The pasting of the ends of pieces has always been a matter of importance in print works, some operations especially requiring a very perfect pasting, as for example chlorining upon drums, or in drying by the hot flue. If the ends are badly pasted, or if a bad kind of paste is used, very annoying accidents may happen; the ends come undone, the machine is stopped, the piece drags, perhaps gets burned in the drying, etc.

The condition necessary for this kind of pasting is that the paste will not get wet or soft during the short space it has to travel, for example from the chlorine padding machine to the steam tins, or to the hot chambers.

The chlorining and bluing wet the pieces and the ends very much, and it is necessary that they should hold until they are again fixed by heat.

* Journal of the Society, i., p. 121, 124.

Many trials have been made to find a composition which should be regular and not subject to frequent accidents, and presenting at the same time simplicity and promptness in its application.

Several systems have obtained in the experiments, and been adopted in most works, such are:—

(1) A simple pasting with a paste made of white starch, a long stitch being run through the ends at the same time. The paste moistens very quickly, but the ends keep together by the stitch, and do not often come undone; but the ends get into folds and wrinkles, and do not keep the full width as if the paste had not been softened.

(2) A double flat stitch, without paste, is preferable; but to work rapidly a sewing machine is required, which is often difficult to put just where it is wanted, and which, moreover, requires a good deal of sharpness in the working, so that there shall be no stoppage. Sometimes, also, the sewing machines work badly when the ends are in an irregular state of dryness—partly wet and partly dry—which is not rare; and, besides, we do not think that even with a double stitch the ends of the pieces come so straight as they do when well pasted.

(3) An excellent paste may be composed of a mixture of starch paste and albumen; but we do not approve of it, especially as we have many times observed that it requires the best quality of egg albumen to give a good result. The price is very high, and such a mixture soon spoils, especially in summer, on account of the rapidity with which the albumen decomposes. The paste hardly keeps good for two days together.

(4) Other kinds of paste, such as resinous compounds, have been tried, but they seldom answer their end.

We propose the following composition, which we have used for several years with excellent results. The pasted ends never come undone, the paste keeps very well, and it can be made at a moderate cost. The ends hold so well that it is nearly impossible to undo them when wanted, and we have for a long time adopted the cutting of them with scissors.

The composition of the paste is as follows:—

1 gallon water.
1¼ lb. white starch.

Boil, and when cool add

2½ lb. white starch, mixed with
1 quart sub-acetate of lead at 14° Tw.

Mix the whole and strain.

The sub-acetate of lead is made with the following proportions of material:—

16 lb. water.
2 lb. acetate of lead.
10 oz. litharge.

Boil fifteen minutes.

The tenacious nature of the paste is due to the contraction and coagulation which the sub-acetate of lead effects upon the starch under the influence of heat, and the method by which the paste is obtained smooth and homogenous resides in adding the raw starch mixed with the sub-acetate of lead. If the whole was boiled together the composition would be no good. It is necessary that the contraction of the starch should take place when the paste is on the cloth.

The ends are pasted by hand with a brush, and immediately afterwards are placed in close contact upon the steam plate to dry them.

The use of this paste is not confined to the operation of chlorining. We employ it for all kinds of pasting, and especially for white pieces for printing. The paste never gives way in the drying after printing. For this purpose a much smaller proportion of the sub-acetate of lead may be used in making the paste than when it is intended for chlorining.

It is probable that the paste may be found of service for pieces to be padded, provided the colour is not acted upon by the subacetate of lead; for example, black and white styles, catechu browns, etc. It has not yet been tried upon wool or mixed goods.

The foregoing paper is followed by a report upon it by M. J. Reber, who made some experiments upon the paste in

comparison with a paste which he had employed for the same purpose. This paste, which has been several years in use in some works in Alsace, is composed of—

3 lb. blood albumen dissolved in
9 lb. water,

and gradually mixed with a starch paste composed of

4 lb. water.
6¼ oz. starch.

The cost of this paste is rather high; it was applied in the same way as the acetate of lead composition to the ends of the pieces.

The mixture should be fluid enough to impregnate the cloth, and be applied in rather considerable quantity; it then perfectly supports several successive passages in liquids with intermediate dryings, such as in chlorining, padding, and finishing. Its inconveniences consist in its thinness, the disagreeable smell it emits in drying, and its cost.

The paste recommended by M. F. Rhem is free from these drawbacks, it is easier to apply, not liable to putrefaction, and costs only about one-third that of the albumen composition.

It can be used with advantage as a substitute for the albumen mixture; it holds perfectly well during several passages through liquids if followed immediately by drying; if it is not soon dried it does not hold so well as the albumen composition.

M. Reber tried a mixture of boiled starch with raw starch to ascertain whether the sub-acetate of lead was necessary. He took a starch paste made with 1¼ lb. of starch per gallon of water, and added an unboiled mixture of starch and water, consisting of 4 lb. water and 4½ lb. starch, and well mixed up. This composition furnished a paste which was as adherent as the orginal one, which proves that to obtain a good result, the introduction of raw starch which becomes boiled or swollen on the steam drying plate, or by itself, almost sufficient for the purpose without the addition of acetate of lead; the salt, however, cannot fail to increase the insolubility of the paste.

5. *Orr's Process for Treating Aniline Black.*

WE hope, before going to press with the last sheet of this month's number of the Textile Colourist, to be in possession of the complete specification of Orr's English patent, No. 3,731, which passed the great seal nearly six months ago, but which has not yet been published. It would appear that the French specifications of patents, at least in some cases, are published much earlier than the English, for we find in the *Moniteur de la Teinture* for April 5th, 1877, an account of this patent, though deposited some three weeks later than the date of the application for the English patent. The editor of the French journal, in introducing the process, remarks that in the number of his periodical for July 5th, 1876 (page 149), he indicated that by passing cloth dyed with aniline black through a boiling solution of bichromate of potash, the after greening of it was prevented. As taken from the French, the specification is as follows:—

When the cloth has been printed and aged for twenty-four or forty-eight hours, as is customary in printworks, it is treated as follows:—(1) Passed in a boiling solution of bichromate of potash at a strength of 112 grammes of salt to 4½ litres of water. A little acid added to the bath is an advantage, and helps to liberate the chromic acid; or, instead of bichromate of potash, chromic acid of an equivalent strength may be used. The cloth should be passed through the solution by means of rollers, and the passage should take at least one minute. (2) Afterwards, the cloth is washed with boiling water and soap and (3) dried; then (4) submitted to a cold bath of chlorate of alumina or other chlorate, such as the chlorate of ammonium, containing 1 part of salt in 60 parts of water and (5) again dried.

(6) The pieces are next steamed for about half an hour, or the steaming may be replaced by passing the pieces for thirty or sixty minutes in a boiling solution of chlorate of

alumina or any other chlorate, such as chlorate of ammonia, containing 1 per cent. of salt.

(7) The bichromate bath is preserved, and can be repeatedly used for the passage of fresh goods.

(8) It is preferred to submit the goods to steaming as soon as possible after the drying which follows the treatment with chlorate.

(9) Care must be taken that the chlorate is not too strong, 1 part to 60 of water, or for light goods, 1 part to 100 is sufficient.

(10) The above treatments not only preserve the colours from greening, but render the black more perfect and the white clearer.

For dyed goods the same process is employed, but the chlorate baths are to be used weaker; it is to be understood that besides the chlorates of alumina and ammonia, other chlorates which are decomposed by steaming, without addition of acid, may be used for the same purpose.

6. *Notes from Mulhouse.*

THE Bulletin of the Mulhouse Society for some time past furnishes but a small amount of matter interesting to dyers and printers. In the number last to hand, which covers the three months of March, April, and May, there is a report by a commission upon the Centennial Exhibition in Philadelphia, and a long and no doubt valuable memoir upon experiments connected with steam engines. The only paper which contains anything useful from the point of view of the Textile Colourist, is a necrological or obituary notice of M. Hartmann-Liebach, compiled by M. Matthieu Mieg. The subject of the notice, who died recently at the advanced age of 82 years, is described as the Dean of Alsatian Industry, one of the last of a generation of able and energetic men to whom Mulhouse owes much of its prosperity and position. M. Hartmann-

Liebach left a collection of notes upon the history and development of the industry of Alsace, which are now in the Archives of the Mulhouse Society, from which M. Matthieu Mieg, at the suggestion of some of its members, prepared an abstract. In that part referring to printing, there are some points of interest in an historical view, which are worth translating. The statements do not always agree with what has been written by M. Dollfus-Aussett and others, but no doubt they are made upon good grounds, and deserve full consideration.

"The printing industry, which has elevated Mulhouse to such a high rank, commenced with cottons. The first printed goods came from India, and the processes were also derived from the same source, whence printed goods received in French the name of Indiennes. The industry was imported into England in the seventeenth century, and from there passed to the continent. The first works at Altona was soon followed by others at Augsburg. Schulé, Schaeppler, and Hartmann, the first who printed in the latter place, employed metallic powders, principally brass and tin, which, printed and calendered, produced an effect something resembling gold and silver.

"About 1736—1740, Jean Jacques Schmalzer the younger, who acquired a knowledge of printed calicos at Bâle, went to Altona to become acquainted with their manufacture. Having brought with him some workmen, he took Moser as a partner, to commence a print works at Mulhouse in the main street; but these young men were soon short of funds.

"In 1745 Samuel Koechlin, who had money, joined with Schmalzer and Jean-Henry Dollfus, an artist, and thus was established the first works in Mulhouse which printed with success.

"The second works was founded in 1752, by Antoine Hartmann, the grand-uncle of Mr. Hartmann-Liebach, whose father was later on apprenticed to him. The third works was begun in 1754, under the name of Anthès-Fehr and Co., but had only a short existence.

"Afterwards works increased in such a manner that

according to the account of Mieg and Graf, there were in 1770 fifteen existing. Amongst them is found the name of Jean-Henri Dollfus, who separated from his former partners and started business with his son. This firm, under the name of Dollfus and Son, took the first place, from the excellence of its productions and the beauty of its designs, which were obtained from their designer, M. Malaine, of Paris. The house was at first very successful, but its prosperity did not long continue. In 1794 they combined paper printing with calico, and dissolved partnership.

"In 1814 Jean-Georges Dollfus introduced into the house of his relative (the originator and head of the firm of Dollfus-Meig and Co.) printing upon light woollen goods; but, whether from want of goods or other cause, this branch was soon afterwards abandoned.

"M. Hartmann-Liebach, with regard to this style, states that he learned from M. Josue Dollfus, son of George Dollfus, that previous to 1813 the latter knew and applied the process of fixing by steam, a process which, the text states, was unknown in Alsace up to 1825."

Of course for a long time block printing was the only method in use. The firm of Henri-Dollfus, however, printed by plate, their designs, large furnitures, coming from England. A fast blue was applied by pencil, as is well known.

The first printing machine in Alsace was set up at Wesserling, in 1803; in the following year two machines were put up, one at Dollfus-Mieg and Co.'s, and the other at Nicholas Koechlin Frères. These machines were constructed of wood, by Lefebvre, of Paris; others were set up later. In 1818, MM. Risler, in partnership with an Englishman named Dixon, founded at Cernay the first machine shop, and in 1820 they supplied to Liebach-Scherer and Co. the first printing machine with an iron frame.

Up to 1820 the engraving of rollers was done by punching; a design repeating at 5 millimètres (? about $\frac{1}{5}$ inch) was reckoned large, and required at least two punches, and sometimes more. In 1819, Risler brought from England an engraving machine, with two English engravers, named

Compsté and Weinreith*; Risler soon tired of his engraving business, and sold the machine to Liebach-Hartmann, and the English engraver Compsté passed into their employ. Weinreith was engaged by the Wesserling firm, who had also procured an engraving machine.

About 1823, Dupasquier sold in Alsace the first rollers engraved by an eccentric machine; the Wesserling house immediately had an eccentric engraving machine put up in their establishment.

It was in 1830 that M. Daniel Dollfus-Ausset introduced at Dollfus-Mieg and Co.'s the first two-colour machine which ever worked in Alsace.

In the same year Perrot, of Rouen, invented the printing apparatus called from him the Perrotine, which, having four or five printing blocks as wide as the cloth, enables the calico to be printed at once in as many different colours. These machines did not last long; in the course of a few years they were completely supplanted by roller printing machines.

The introduction of Turkey red into Mulhouse dates from the commencement of the century. At this time the Sundgau peasantry wore scarlet petticoats, half wool, half linen, the warp being wool and the woof linen; they were dyed separately, and woven in the domestic looms.

Dyers were induced to come from Mosevaux, where Turkey red dyeing was well understood, and Weber commenced dyeing yarn successfully, which was sold for weaving; the same establishment wished to dye calico also, but they did not succeed. About 1809 and 1810, the two houses of Dollfus-Mieg and Co. and Nicholas Koechlin Frères, at nearly the same time, commenced dyeing calico with Turkey red.

At the commencement of this dyeing, the dyed cloths were so full of fat that the oil might be said to almost drop from them. They were dyed uniformly in red, without resists or discharges, or printed with simple designs in black. Soon Koechlins produced better work than their uncle

* So in the French, but certainly incorrectly spelled, and difficult to correct; probably the latter name is for Wainwright.—*Ed.*

Dollfus-Mieg, their cloth was not so greasy and their colour brighter.

With regard to the knowledge of chemistry possessed by the printers at this time in Alsace, M. Hartmann believes that in 1810 there were only three—Daniel Koechlin, Hausmann of Colmar, and Bernard at Wesserling—who had any chemical education. In nearly all the works they went on old receipts handed down to them, which were modified to suit the circumstances. It was only about 1811, and especially after M. Koechlin had made several chemical discoveries, that the great utility of chemistry in calico printing was recognised. About 1820, a school of chemistry was founded at the College of Mulhouse. M. Dégenne, of the Parisian Normal School, was the first professor. He discovered how to prepare dry chloride of lime about 1824, and died soon afterwards; his process remained almost unknown.*

M. Daniel Koechlin, from the beginning of the century, was always at the head of the printing business. After successfully introducing Turkey red dyeing at his establishment, he commenced the discharging of reds by means of acids and bleaching powder. He improved also the lapis or neutral style which he had introduced from Glasgow, and of which the house for a long time held the monopoly. A little later on he produced a beautiful dark purple, made by dipping red dyed goods in an indigo vat, in which style resists were introduced, to be afterwards discharged and blocked.

Hausmann Frères were the first in Alsace to discharge iron and alumina mordants upon cloth by the use of acid salts. Sehné, of Munster, succeeded in imitating the lapis style done by Koechlin. This house was the first to produce the manganese brown or bronze from manganese residues. Wesserling had a well-deserved reputation for fine reds and pinks printed by roller. In 1822 the secret of their process was communicated to Liebach-Hartmann and Co., by a workman in the colour shop. The process consisted in

* What M. Dégenne's process was we do not know; but Tennants, of Glasgow, commenced making dry chloride of lime in 1799.

printing a mordant of alumina, dunging, and dyeing at 100° F., with an excess of madder. After dyeing, the goods were well washed, then soaped and crofted or grassed; and these treatments repeated two or three times, so as to have good whites. Then the pieces were brightened by placing them for three hours in a boiler of tinned copper, inside of which was a basket. The boiler was filled one-third full of water, to which was added 100 grammes of nitrate of tin.

In 1827 a foreman with Robert Bovet and Co., of Thann, discovered by chance that very weak sulphuric acid gave brightness to madder red. He perfected the process, which his son afterwards sold to various houses.

In 1813 there were twenty-three printing establishments in the department of the Haut-Rhin, and their whole annual production was estimated at 350,000 pieces, measuring each 16 ells or 20 metres. At the present time there are only twelve printworks in the same department, but there are several of them each of which produce annually more prints than all the twenty-three works did in 1813.

7. *M. Michel de Vinant on Dyeing, Printing, and Bleaching.**

Chocolate from Woods.

9 gallons sapan liquor, at 7° Tw.
7 gallons bark liquor, at 7° Tw.
2 gallons logwood liquor, at 7° Tw.
6½ lb. dark British gum.
12 oz. sulphate of alumina.
6 oz. salammoniac.

Boil, and when cold add

9 oz. nitrate of copper.
1 oz. nitro-muriate of tin.

It is remarked that these wood chocolates are almost as good as those obtained from archil, but they are more difficult and uncertain in the washing off.

* Continued from p. 243.

Colours for Silk Printing.—Many of the steam colours used for calico printing are also applicable to silk. A few of those specially intended for silk are here taken from De Vinant's collection.

Archil Chocolate.

5 gallons archil, at 18° Tw.
2 lb. sulphate of indigo.
1½ lb. alum.
1 lb. tartaric acid.
3 lb. boiling water.
18 lb. gum substitute.

Heat the whole up to 104° and strain.

Coralline Red.

1¼ lb. coralline red.
2 lb. pure acetic acid.
1 lb. alcohol.
1 gallon boiling water.

Dissolve at a gentle heat, and add 1 gallon of gum water.

Scarlet for Grounds.

1 gallon water.
1¼ lb. ground cochineal.
2½ oz. oxalic acid.

Boil together for five minutes, and then thicken with 1 lb. 6 oz. of white starch mixed in 1 lb. water. After boiling, cool and add

2½ oz. crystals of tin.
2½ oz. oxymuriate of tin.

In order to have a more yellow shade, there may be added to the above 2 oz. of bark liquor at 140° Tw., with ½ oz. of acetic acid.

Cherry Red.

1 lb. ground cochineal.
2½ oz. oxalic acid.
8 lb. water.

Boil for five minutes, and add

2¾ lb. gum, dissolve, and add
4½ oz. oxymuriate of tin.

Orange.

1 gallon berry liquor, at 14° Tw.
6¼ lb. gum.
½ lb. crystals of tin.

Keep warm for forty-five minutes, cool, and add

4 oz. acetic acid, at 10° Tw., or
8 oz. weaker acetic acid.

Discharge Orange upon Blue.

1 gallon annatto solution, at 12° Tw.
3 lb. gum substitute.
6 oz. pipeclay. Dissolve, and add
4 oz. alkaline solution, below.

Strain, and after printing steam ten minutes.

Alkaline Solution for above.

4 lb. caustic soda, at 50° Tw.
1½ lb. white wool waste.

Dissolve.

This curious alkaline fluid is called in the original De Vinant's soap.

Madder Colours upon Silk.—Fast madder colours upon silk are obtained from mordants of iron and alumina, which are aged in a moist chamber, where there is a circulation of air, for twenty-four hours, after which the goods are hung in a warm dry room ; they are then dunged.

A process of fixing alumina mordants by ammonia gas is stated to have been employed with success by several calico printers in Rouen, which was effectual in preventing marking off in the dunging.

In a box about 10 feet long and 3 feet interior width, provided with rollers, there were placed two pots containing strong liquid ammonia, which diffusing in the air of the box produced an alkaline atmosphere, through which the pieces were passed slowly, so that a given portion should be four or five minutes in the box ; afterwards these goods were dunged in the usual way. The ammonia box was of course closed in, except slits to allow of the entrance and exit of the piece.

The mordants given by our author differ in some respects from those used in calico printing.

Black Mordant.—In 1 gallon of boiling water dissolve 10 lb. of sulphate of iron, and add by degrees 4 lb. of strong nitric acid. In another vessel in 2 gallons of boiling water dissolve 15 lb. acetate of lead. Mix the two solutions together and let settle; reduce to 6° Tw. For black printing thicken with gum, for plate printing use the mordant at about 8° Tw., thickened with starch.

[*To be continued.*]

8. *Purpurine and Alizarine Derivations.*

IN the *Berichte der Deutschen Chemischen Gesellschaft* for the 23rd April and 14th May of the current year, Plath, Vogel, Schunk, and Roemer contribute papers upon what we may still call the madder derivatives. For the most part the articles are of purely scientific interest, and unsuitable for insertion at length in a technological journal. Though there is still a controversy as to the nature, composition, and even existence of some bodies described, it is evident that the labours of the above-named and other chemists are gradually simplifying a very complicated question, so that in a short time we may expect to arrive at a correct knowledge of what exists in artificial alizarine, and the connection between the different bodies. The progress at present is in proving that several differently-named substances discovered by various chemists are identical, and must hereafter be known by some one name instead of several. There is, however, much yet to be done before a final conclusion can be arrived at, and it seems useless for the present, and somewhat pedantic to say, for example, that Plath proves, or seems to prove, that Schunck and Roemer's xanthopurpurincarbonic acid, which they say is identical with Rosenstiehl's ε-purpurine, is also identical with their purpuroxanthincarbonic acid. It is more interesting to know that Schunck and Roemer have clearly proved that the munjistin which Stenhouse extracted from munjeet, an Indian variety of madder, is identical with

purpuroxanthincarbonic acid. At first it seemed unlikely that this should be the case, although the bodies evidently possessed many points of similarity, for Stenhouse had said that munjistin could not be got from common madder, and further, that it gave a yellow lake with baryta, while the other body gave a red lake. Stenhouse very liberally sent a fine sample of munjistin to Schunck and Roemer, who found that it behaved exactly the same to reagents as their purpuroxanthincarbonic acid, stating that there must have been some mistake about its giving a yellow lake with baryta, for it actually in their hands gave the same crimson red lake as the new product. The honour of the discovery of this substance, therefore, belongs to Stenhouse, and to Schunck and Roemer the credit of defining its exact composition, formula, and relation which it bears to the other colouring matters of madder. The latter chemists by no means agree with Rosenstiehl that his ε-purpurine is the same as their purpuroxanthincarbonic acid, and express their opinion that Rosenstiehl's substance is not a definite compound, but a mixture of various bodies.

Hermann W. Vogel notices Schunck and Roemer's observations upon the destructive action of alkali upon purpurine. He first stated that it was destroyed chiefly under the influence of light. The latter chemists state that it is destroyed by oxidation with or without light. Vogel admits this to be true, but insists upon the correct results of experiments which demonstrate that the bleaching takes place very much more rapidly when the solutions are exposed to diffused light than when in the dark.

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9. *Coloured Discharges on Dip-blue.*

WITH respect to the article by M. J. Depièrre in the May number of this Journal, we have received a communication

from M. Horace Koechlin, of Loerrach, in the Grand Duchy of Baden, in which he states that the specimen of white, red, and yellow discharges upon dip-blue inserted at the bottom of page 222 was done at the works of MM. Koechlin Baumgartner, of Loerrach, and that the method is due to M. Camille Koechlin. This process, which gives good results, is the one indicated in the paper of M. Depièrre, and consists in adding to an albumen colour a quantity of neutral chromate of potash. After printing, the cloth is passed in acid, which coagulates the albumen, and, liberating chromic acid, discharges the blue. M. Koechlin states that the process with red prussiate claimed by M. Depièrre as his discovery can only be applied upon blue grounds of medium depth of colour. With regard to the specimen in question, it was obtained at a retail house in Manchester, and was inserted simply as an illustration of the style, without reference to any particular process of obtaining it, and without any communication with M. Depièrre. We are glad to have the opportunity of making public the claim in favour of M. Camille Koechlin as the originator of this new and interesting style of print.

In the Bulletin of the Industrial Society of Rouen for April and May, which is just to hand, M. Depièrre, in a paper read to the society on March 16th, 1877, claims as his own the idea of obtaining the coloured discharge by means of red prussiate and bicarbonate of soda, dissolved in an albumen colour to be steamed; and neither in this paper nor in the one which he contributed to the Textile Colourist does he claim anything else in connection with this style. In the Bulletin referred to, p. 121, M. Depièrre, after stating that Zürcher first suggested a mixture of red prussiate and bicarbonate of soda as a steam discharge on indigo blue, continues:—

"I had observed that red prussiate dissolved in pretty large quantity in a solution of albumen, and that the mixture underwent no change for several days; bicarbonate of soda dissolves equally well in albumen. Mixtures of these salts in water without albumen cause a slight effervescence, due to the disengagement of carbonic acid; but in albumen solu-

tion, which is nearly always alkaline, with ammonia, this effervescence is not observable. The albumen does not interfere with the reactions of the two salts, but in steaming becomes fixed, while the blue is discharged.

"I made several experiments on the best method of operating, and I found that by printing a colour containing prussiate, upon cloth padded previously with bicarbonate of soda, I only obtained uncertain results. By proceeding in an inverse way, that is, by printing a colour containing bicarbonate upon cloth padded in prussiate, the result was much better; but the simplest and quickest method is to mix the two salts in one colour, avoiding the long and costly operation of padding.

"As the albumen is not injured by the salts, and coagulates upon steaming, as could be proved by a trial of dyeing it, I tried the incorporation with it of insoluble colouring matters, choosing those least likely to be attacked by the mixture.

"I have used vermilion, ultramarine blue*, green, or violet, Guignet's green, and the chromates of lead, zinc, and baryta."

M. Depièrre exhibited to the society specimens of these colours, fixed so as to be fast to washing and soaping.

10. *Auerbach's Work on Anthracen.*†

THIS is one of those monographs which distinguish the present era of chemical science, and which are called into existence by the enormous commercial importance which

* The acid process only permits the use of pigments completely insoluble and unattackable by acids, while by this process it is possible to fix ultramarine and the basic chromates.

†Anthracen: its constitution, properties, manufacture, and derivatives, including Artificial Alizarin, Anthrapurpurin, etc., with their application in Dyeing and Printing. By G. Auerbach; translated and edited by William Crookes, F.R.S., etc. London: Longmans, Green, & Co.

scientific discovery has given to previously obscure or nearly unknown substances. Although anthracen was discovered so long ago as 1832, by Dumas and Laurent, it was only by the extended researches of a British chemist, Andersen, in 1862, that its properties and composition were first well defined. Seven years later artificial alizarin was being made from it. This work is for the most part occupied with a purely chemical treatment of the subject, and as such can only be interesting to a trained chemist, wishing to have in one volume an account of all the researches which have been made upon anthracene; but it contains besides a complete account of the various researches which have been made upon madder and its derivatives, garancine, garanceux, flowers of madder, madder extract, etc., with many interesting practical and historical data. Its special value is to those who are engaged in the manufacture of artificial colouring matters and the study of anthracene products. In an appendix receipts are given for the application in printing and dyeing of the artificial alizarine and pupurine. There is a valuable bibliography of the subject attached, in which reference is given to several hundred papers scattered in home and foreign journals relating to subjects treated of in the work. The author's revised and extended manuscript of the original edition has been ably and successfully translated and edited by Mr. Crookes.

II. *Abridgments of Complete Specifications of Patents Recently Published.*

A.D. 1876, September 12th.—No. 357.

LISTER, HENRY. "Improvements in Cooling Woven or Felted Fabrics after the Process of Steaming or Blowing."

"This Invention relates principally to goods which are

intended to have fancy finishes imparted to them, the setting of which is effected by winding the fabrics upon hollow perforated cylinders, and steaming or blowing them, after which the fabrics are allowed to cool. It is necessary that the fabrics should be thoroughly cooled before being taken off the cylinder, otherwise the 'setting' is imperfect. This process of cooling frequently occupies several hours, occasioning a great waste of time, and requiring a great number of 'cans,' rollers, or hollow cylinders.

"The object of my invention is to cool the fabrics more rapidly, and this I effect by placing the 'cans' or rollers after steaming, boiling in water, or 'blowing' upon 'pegs' or nozzles in connection with an exhaust air pump, by working which a continuous current of cold dry air is drawn through the fabric, which is thereby rapidly cooled and dried.

"A force pump may be used instead of an exhaust, and air forced through the fabric after steaming."

A.D. 1876, September 14th.—No. 3603.

WIGZELL, EUSTACE, and POLLIT, JOSEPH. "Improvements in Machinery or Apparatus for Drying Skeins or Hanks of Wool or other Fibrous Material." *(Provisional protection only).*

"This invention relates to machinery or apparatus whereby the hanks or skeins may be supported separately from each other, so as to be exposed as much as possible to the atmosphere; such machinery rotating upon a central axis so as to agitate the surrounding air and cause a current or currents thereof to impinge upon the hanks of fibrous material, whereby the drying of the same is accomplished.

"The machine or apparatus may consist of an upright shaft from which radiate horizontal arms carrying tin or other metal cylinders having divisions around the circumference, so as to contain the hanks or skeins, and keep them separate. The radial arms are caused to revolve round the central shaft, and at the same time have a rotary motion of themselves, so that the position of the hanks upon the cylinders is constantly changing, and no settlement of moisture can take place. The

distance apart vertically of the radial arms may be varied to suit the length of the hanks under operation. The lower arms are made to raise and lower, so as to facilitate the putting on and taking off of the skeins or hanks.

"The whole apparatus may be placed upon a delicately balanced scale, pan, or weighing machine, so that the exact amount of moisture lost during the process of drying may be readily ascertained. Or, we may place the hanks upon cylinders or rollers in an enclosed chamber, through which a current of air may be passed by means of a fan, the cylinders or rollers supporting the hanks having a rotary motion imparted to them upon their own axes."

A.D. 1876, September 13th.—No. 3591.

KILBURN, RICHARD. "Improvements in Washing and Scouring Machines." (See plate.)

"This invention consists in the employment of three rollers working together, that is to say, one roller supporting other two rollers at different parts of its circumference; or the two rollers may occupy the lower position and support a single top roller. Cloth or other material passing between such rollers is subjected to twice the amount of pressure and squeezing that it would do if passed through a pair of rollers only, and it is found also that rollers arranged as above described do not tear or drag the material, which frequently occurs when two pairs of rollers are used.

"In order that my invention may be fully understood I herein give reference to the accompanying sheet of drawings illustrative thereof.

"Fig. 1 shews the bottom roller A supporting the two top ones B, B, which are mounted in guides in the framework, and the pressure regulated by springs C, C. The shaft of the roller A carries the driving pulley, the upper rollers being caused to revolve by frictional contact.

"Fig. 2 shews the reverse of the above arrangement, by which I can dispense with one set of springs.

"Having thus described the nature of my invention, and shewn by drawings how the same is performed or carried into

practice, I would have it understood that I claim the arrangement of rollers herein described, with or without the use of springs, and irrespective of the manner of driving the same."

A.D. 1876, November 28th.—No. 4601.

CLARK, ALEXANDER MELVILLE. "An Improved Process of Softening, Cleansing, and Decolourizing Fibres and Fabrics." *(A communication from William Maynard.)*

"This invention relates to the use of detergents previous to bleaching, by which cotton, silk, wood, and grasses, such as hemp, flax, &c., may be softened, decolorized, and cleansed without boiling either in the raw state or woven into fabric.

"The process consists in the use of sulphurous acid hydrated (*i.e.*, dissolved in water) in connection with various proportions of an alkali, but principally sal soda.

"In referring to the processes having a resemblance to the present invention I would state that it is not new to deterge or cleanse the fibre by first steeping it in a weak acid, and afterwards in an alkaline solution preparatory to bleaching the same by chlorine, and that it is also old in bleaching operations to employ the hyposulphite of soda or other alkali, together with a subsequent treatment by an acid to decompose the salt and liberate the sulphurous acid in the fibres of the cloth to be bleached. I therefore lay no broad claim to these reagents, nor to the process referred to.

"The invention consists, for softening, deterging and decolorizing the fibre, in using the hydrated sulphurous acid, mixed and neutralized with a solution of an alkali in its crude state, instead of using the crystallized sulphite salt, and thereby utilizing certain qualities of the said newly formed or incipient neutral compound of sulphurous acid and the alkali, discovered empirically by the inventor of the herein described process, which do not belong to a solution of the crystallized sulphite salt, and an application of which discovery is found to be the only method of thoroughly cleansing, deoxidising and decolorizing the fibre without boiling.

"In carrying out the invention, the sulphurous acid being prepared by means of the apparatus forming the subject of

Letters Patent granted to me, and bearing date August 2nd, 1876, No. 3094, is placed in a receptacle large enough for the purposes required, and means provided for stirring it. The potash or other alkali is then poured in gently and carefully (in strong solution) until the moment that sulphurous acid ceases to be evolved. The goods are then placed in the liquor, and the temperature raised to 100° or 150° Fah., and allowed to remain there for from 3 to 6 hours, when they may be washed in pure water. The theory of the action is that the reducing agent deprives the organized material of its oxygen; the organic matter being thus decomposed nascent hydrogen seeks an affinity with the nitrogen of the organic matter, and doubtless amidogen (NH^2) or imdogen (NH) is formed, which, uniting with one atom of the base, say, for example, potassium, forms potassamine, and thus the organized material is deterged from its organic matter without any destruction of its vital constituents."

A.D. 1876, September 25th.—No. 3732.

SHAW, JAMES. "Improvements in Rollers for Expressing Liquid from Textile Materials, Yarns, and Fabrics." (See plate.)

"My said invention relates to rollers for expressing liquids and used in connection with apparatus for scouring, bleaching, washing, dyeing, and otherwise treating textile materials, yarns, and fabrics with liquids.

"My invention consists in applying covers of vulcanised rubber to the rollers, but in a better manner than has heretofore attempted to be done, the essential feature of my improved mode of application consisting in the rubber cover not being cemented to the roller or in any way made to adhere to it, but being loose and free to creep round whilst accommodating itself to the pressing or squeezing action. This looseness renders the rollers much more efficient and durable, and so that they can be worked with less force.

"In cases in which the feed or progress of the goods between the rollers is apt to become irregular or unequal the rubber covers may be applied in rings or sections which can

move independently of each other, and thereby avoid the twisting that would occur with a long cover in one piece. Also, if any ring should get damaged it could be replaced without renewing the entire cover.

"And in order that my said invention and the manner of performing the same may be properly understood I hereunto append a sheet of explanatory drawings, to be herein-after referred to, and representing my improved arrangements. In these drawings the same reference letters are used to mark the same or like parts wherever they are repeated.

"Fig. 1 is a side elevation of one modification of my improved squeezing roller and Fig. 2 is a cross section of the roller. The outer cover C of vulcanised rubber may be placed immediately upon the iron body B of the roller, such body B being rough-turned on its outer surface; but I prefer and find it advantageous in practice to interpose between the iron body B and the rubber cover C a coating of vulcanite or hard-cured rubber, which is shewn in Fig. 2 by a thick black circle between the body B and cover C. This vulcanite coating is cured upon the roller body B, or otherwise made adherent to it, but it is essential to my invention to have the outer cover C loose upon the surface which it covers, and such outer cover C is cured in the ordinary way of vulcanising rubber upon a metal cylinder of a suitable size. The arrangement works satisfactorily with a rubber cover C about one inch thick upon a vulcanite coating three-eighths or one quarter of an inch thick, but these thicknesses may be varied. The surface of the iron body B of the roller may be grooved or fluted, as shewn in cross section in Figs. 3 and 4. Instead of the vulcanite coating there may be interposed between the rubber cover C and the iron body B a compressible or elastic packing of yarn or felt, or a shell of wood or other suitable material or composition; and when such packing or shell is used it should be about as thick as, or thicker than what is in Figs. 2 and 4 shewn for the vulcanite and iron body B together, the body being made so much smaller for the same external diameter or the complete roller. When the rubber cover C is made in sections, as herein-before mentioned, such sections may con-

veniently be of the sizes indicated by the vertical dotted lines in Fig. 1. The iron body B is by preference made with projecting ends E (Fig. 1) which keep in place the rubber cover C, whether it be in one piece or in several sections; and these ends E work beyond and slightly overlap the ends of the lower or other roller, which latter roller may be a plain iron one or one covered like that shewn in Figs. 1 and 2, and herein-before described.

"Having thus particularly described my said invention, and the manner of performing the same, I have to state that I do not restrict myself to the precise details herein described or delineated, but that what I believe to be novel and original, and claim as the invention secured to me by the herein-before in part recited Letters Patent is,—

"1. The fitting of rollers for expressing liquids from textile materials, yarns, and fabrics, with loose covers of vulcanised rubber, as herein-before described.

"2. The fitting of rollers for expressing liquids from textile materials, yarns, and fabrics, with vulcanised-rubber covers which are in separate loose sections, as herein-before described."

A.D. 1876, October 9th.—No. 3896.

WIRTH, FRANK. "Improvements in Bleaching Animal Fibre." *(A communication from Ferdinand Victor Kallab.)*

"This invention has for its objects improvements in the method of bleaching animal fibre, such as wool, woollen thread, woollen fabrics, waste wool, silk thread, silk fabrics, waste silk, in a more economical and effective manner than by the methods heretofore ordinarily used and practised.

"The invention consists in the use for the said purpose of hydrosulphurous acid in the form of an acid salt, namely, bihydrosulphite 'of sodium (bihydrosulphurous sodium) in combination with the addition of very small quantities of indigo blue permanently fixed for the purpose (which I shall call "azurage") described in the following specification.

"In order to bleach animal fibres sulphurous acid has heretofore been commonly used, either in the form of gas or as a solution of the said sulphurous acid gas in water; and in the

latter case sulphurous or bisulphurous natrium (soda) has often been employed, to a solution of which in water muriatic acid or sulphuric acid is added in order to set free the sulphurous acid.

"As by the bleaching process described the animal fibres are rendered colourless, and in consequence of their transparency have even a somewhat yellow appearance, I add and incorporate with the fibre a violet colour (the complementary colour to yellow) in order to obtain a wholly white appearance of the fibre. This incorporation of the complementary colour I term "azurage," as already described, and it may be imparted to the fibre either before the bleaching (in the case of sulphuration) or after the bleaching, by means of blue or violet dyeing matters or by means of mechanically fixed dyes (such, for instance, as ultramarine); but this dyeing process is not an absolutely permanent one, as it is unable to resist the action of the atmosphere or alkaline washing baths.

"Before proceeding to a more complete description of the invention and of the manner in which it is to be performed, I will point out the differences which exist between it and other methods hitherto used and practised.

"Hydrosulphurous acid is distinguished from sulphurous acid principally by the fact that the former cannot exist in a free state, since if it is set free from its compounds by the addition of a strong mineral oxide (such as muriatic or sulphuric acid) it is decomposed into sulphurous acid and sulphur, in the same manner as is the case with hyposulphites; moreover hydrosulphurous acid is distinctly different from hyposulphurous acid (which gives only neutral salts), as only the former reduces indigo blue to indigo white.

"In order to put this invention in operation, the bihydrosulphurous sodium to be employed for the bleaching process is preferably made as short a time as possible before it is required to be used. It is made by adding to a concentrated solution of bisulphite of sodium metallic zinc. These two substances are allowed to act upon one another for about an hour in a closed vessel, the liquid being occasionally agitated. The mixture is then allowed to settle and the clear liquid is

drawn off, the latter containing as well as acid hydrosulphite of sodium a small quantity of dissolved zinc.

"The bleaching process is as follows:—The fibre to be bleached is first cleaned from fatty, starchy, and gummy matters and other impurities by boiling or other suitable means, as ordinarily used, and it is then placed whilst thoroughly wet in a bath of clear cold water, to which has previously been added a small quantity of finely ground indigo, preferably of a kind which gives a lustrous red-blue. The fibre is quickly drawn through this bath in order that it may become regularly coated with indigo, and it is then removed to the bleaching bath. The bleaching bath is prepared by placing a sufficient quantity of clear water at ordinary temperature in a wooden vessel which can readily be tightly closed. To the water is added sufficient bihydrosulphite of sodium to give the solution a strength of 1—4° Beaumé. From 5 to 20 cubic centimetres (305 to 1·22 cubic inches) (according to the quantity of the hydrosulphite to be used) of acetic acid of 50 per cent. thoroughly free from strong mineral acids are to be added, and the whole is then well stirred and the fibre immersed. During the bleaching process which now takes place the vessel must be closed in order to exclude atmospheric air. The effect of the bleaching bath begins to appear at once, but the time required to complete it varies with the fibre treated, so that in many cases it may be advisable to leave the fibre immersed for twelve to twenty-four hours or more.

"In order to ascertain whether the bleaching process is completed, a small quantity of the fibre is taken out, rinsed in water, and exposed to the air, when it should shew a colour wholly white. The fibre is then removed from the vessel, drained, and exposed to the air (and if concentrated bleaching baths have been employed it should be treated with a solution of ½ to 1 per cent. of crystallized soda). It is then well rinsed in flowing water, and finally dried in a centrifugal drying machine, or in the open air, or in a hot-air chamber at 30° to 35° C.

"If the fibre treated in the method described has not a sufficiently white colour, it is again treated in the bleaching

bath, the preliminary blueing process, however, being dispensed with.

"The quantity of indigo to be used in the process above described is ½ to 1 gramme (·0175 oz. to ·035 oz.) to 100 litres of water (176 pints); the exact proportion should be found by trial, a cup of white porcelain being filled with the blueing bath which should then shew a weak blue colour.

"During the bleaching process the indigo, which at first is fixed only mechanically, is reduced to indigo-white, which being dissolved is instantly permanently fixed. By subsequent exposure to the air this indigo-white is again changed to indigo-blue, and the blueing or "azurage" of the fibre is consequently most permanent.

"The strength of the bleaching baths must be less for bleaching silk than for bleaching wool, and is made dependent upon the more or less yellow colour of the fibre to be bleached, its strength never however exceeding the above-named limits. Should the resulting white have a greenish appearance, which may be the case if the fibre has been very yellow, the latter should be passed through cold water, to which sufficient muriatic or sulphuric acid has been added to give an acid taste.

"The bleaching bath used as above described may be used for a second bleaching process in the following way:—It is first tested to ascertain whether hydrosulphite of sodium is still contained in it; this can be done by adding muriatic acid to a small quantity of the solution, which after some minutes becomes milky if it still contains hydrosulphite. If no hydrosulphite of sodium is still contained in it, about one-tenth part of the previously used acid hydrosulphite is added, and a fresh quantity of fibre (which has previously been blued in the way already described) is placed in the bath and is allowed to remain there until the hydrosulphite is proved to have been converted into sulphite (in which case muriatic acid added to a small quantity of the liquid disengages only sulphurous acid without eliminating sulphur). The fibre is then removed and muriatic acid is added to the bath until the penetrating smell of sulphurous acid is perceptible, when the half bleached fibre

is returned to the bath and allowed to remain until the bleaching process is complete, when the fibre is treated and finished in the way already described.

"In some cases the bath may be used still more concentrated than that first described, that is to say, of a strength of 5—6° Beaumé, when the acetic acid need not be added. The acid bath containing only sulphite may be converted again into one containing hydrosulphite by adding to it muriatic acid until the smell of sulphurous acid is perceptible, when zinc (three-fourths of the quantity previously employed) is added. The resulting hydrosulphite is employed in the way first described by adding acetic acid.

"A bath used in the way described for the second time may also be used in a similar manner for a third time, and so on.

"If a wool fibre of a very yellow colour is to be bleached, the process may be modified by using instead of the acid hydrosulphite the neutral one, which is obtained by adding to the solution of the acid salt milk of lime in such quantity that the clear liquid (removed from the resulting sediment) bleaches blue litmus paper and turns turmeric paper a weak brown. By this neutral hydrosulphite a corresponding strong blueing bath (1—4° Beaumé) is made without any addition, and the fibre to be bleached is placed in it without previous treatment with indigo. The bleaching process being complete the fibre is rinsed in cold water and is then treated with a very weak solution of acetic acid and again washed. The bleaching bath must be as neutral as possible.

"Although the novel process of bleaching by means of hydrosulphite, as herein described, is applicable to all animal fibres, it is especially applicable to bleaching wool.

"Having now described my invention, and the manner in which it is to be performed, I claim,—

"1st.—The use of hydrosulphurous acid in the form of a salt in the place of sulphurous acid, substantially as and for the purpose set forth.

"2nd.—The method of blueing or "azurage" by means of indigo-blue, substantially as and for the purpose set forth.

"3rd.—The method of employing the used bleaching bath

for a second or third bleaching process or more, substantially as set forth.

"The principal feature of this discovery is, not the use of sulphurous acid hydrated, or the use of an alkali, or the combination of any oxy acid with a basic acid, denominated by the termination of "ite" or "ate," but the use of sulphurous acid (hydrated by means of the apparatus before referred to) combined with a solution of potash or other alkali in incipient combination, as described.

"In neutralizing the sulphurous acid I employ magnesia for silk, sal soda for cotton, and potash or soda for hemp, jute, and flax, as these reagents are best adapted to the special requirements of the several fibres.

"I am aware of the fact that claims have been set forth and secured by Letters Patent for decolorizing vegetable fibres by the use of weak acids followed by treatment with alkalies, but these were not described nor neutralized so as to make them perform the object of this invention, or to enable persons unacquainted with the process to use them. This process of deterging and decolorizing is effected without the mechanical effect of boiling, thereby saving the expense of steam, and in less than one-fourth part of the time now employed, and with less than half the labour.

"The neutralization of the sulphurous acid by the alkali, it will be seen, is also effected, not by combining them in crystalline compounds of hyposulphite of soda, but by combining the crude alkali with the liquid hydrated acid cheaply manufactured by the above-mentioned apparatus, thus saving the expense of crystallization, which is ordinarily effected by boiling the alkali with sulphur and evaporating. This neutralization of the two reagents also, according to the present process, not only prevents the injurious caustic action of the stronger or weak alkalies, but it effects the cleansing and decolorizing of the fibre under the most favourable condition, for the compound which is formed by the sulphurous acid and alkali is in a peculiar condition, which is rather that of a mechanical mixture than a defined sulphite salt, which the presence of the alkali with the sulphurous acid causes the

latter to exercise a more active chemical affinity for the oxygen of the colouring matter in the fibre, and thus more completely cleanses and decolorizes the same."

A.D. 1876, September 25th.—No. 3731.

ORR, JOHN BRYSON, of Glasgow, in the County of Lanark, North Britain. "Improvements in the Treatment of Textile Fabrics Printed or Dyed with Aniline Black in order to Prevent what is known as 'Greening.'" *(Void by reason of the Patentee having neglected to file a specification in pursuance of the conditions of the Letters Patent.)*

"This invention consists as hereinafter set forth.

"When the goods have been printed and aged from twenty-four to forty-eight hours as is the custom in printworks, they are treated as follows:—

"1st. They are passed through a boiling bath of bichromate of potash (strength 4 oz. of the potash salt per gallon of water). A little acid added to this bath is an advantage by assisting in liberating the chromic acid. The pieces may be passed through the bath on rollers, the passage occupying at least one minute.

"2nd. They are washed with boiling soap and water.

"3rd. They are dried.

"The goods are subjected to a cold bath of chlorate of aluminum or other chlorate, such as chlorate of ammonium (containing 1 part of the salt in 60 parts of water).

"5th. They are again dried.

"6th. They are steamed for half an hour or thereabouts, or the steaming may be dispensed with if the pieces are worked from half an hour to one hour in boiling chlorate of aluminum containing 1 part of the salt to 100 parts of water.

"7th. The bichromate bath is preserved and may be used over and over again.

"8th. It is preferable to steam the goods as soon as possible after drying from the chlorate bath.

"9th. Care is also to be taken that the chlorate bath is not too strong, 1 in 60 (or even 1 in 100 for lighter stuffs) will be found sufficient.

"10th. By the foregoing treatment not only will the goods

be preserved against 'greening,' but the black is rendered prettier and the whites purer. The same process is used for dyed goods, but in this case the chlorate baths are to be still weaker."

12. British and Foreign Patents, from the Commissioners of Patents Journal, April 24th to May 18th, 1877, inclusive.

Engraving, Bleaching, Squeezing, Extracting, etc.

4435. HENRY DEWHURST, of Huddersfield, in the county of York, Woollen Printer, for an invention of "Improved means or methods of embossing, indenting, or engraving shapes and designs on woven or felted fabrics."—Dated 16th November, 1876.—This patent has passed the great seal.

4466. WILLIAM ELI SUDLOW, of Oldham, in the county of Lancaster, Engineer, for an invention of "Improvements in machinery or apparatus for steaming and setting textile fabrics."—Dated 18th November, 1876.—This patent has passed the great seal.

4552. EDWARD GRIFFITH BREWER, of Chancery Lane, in the county of Middlesex, for an invention of "Improvements in centrifugal drying machines or extractors."—A communication to him from abroad by Messrs. Boulieu, Brothers, and Charlon, of Lyons, France.—Dated 23rd November, 1876.—This patent has passed the great seal.

1356. WILLIAM BIRCH, of Salford, in the county of Lancaster, Machinist, for the invention of "Improvements in squeezing machines."—Provisional protection has been granted.

1900. ADOLPHE ALEXANDRE PLANTROU, jeune, of Boulevard de Strasbourg, 23, Paris, (France), Director of Manufacture, for an invention of "An improved process of scouring and purifying vegetable and animal fibres and fabrics."—Dated 15th May, 1877.

1297. ROBERT LEAKE, of the Strangeways Engraving Works, Manchester, in the county of Lancaster, for an invention of "Improvements in machinery for etching or engraving rollers for calico printers."—Dated 6th May, 1870.—The £100 stamp duty has been paid.

1690. HAROLD POTTER, of Manchester, in the county of Lancaster, Bleacher, for an invention of "A new system of bleaching, and in the apparatus employed therein."—Dated 12th May, 1874.—This patent has become void.

74. F. V. KALLAB, of Wiese, for "A process for bleaching animal fibres."—5 years.—(Secret.)—Dated 23rd December, 1876.—Austrian patent.

4763. F. V. KALLAB, of Wiese, near Frauenthal, for "Bleaching animal textile fibres."—5 years.—Dated 10th January, 1877.—Saxon patent.

41,967. F. V. KALLAB, a Patent of Improvement for "Bleaching animal textile fibres."—Dated 12th April, 1877.—(French patent, 2nd October, 1876.)—Belgian patent.

Colouring Matters and Colours.

4839. CHARLES GIRARD, EDMOND WILLM, and GUSTAVE BONCHARDAT, all of Paris, in the republic of France, have given notice to proceed in respect of the invention of "Improved processes for obtaining colouring matters or of processes for obtaining novel colouring matters."—American patent.

182,234. RICHARD SIMPSON, ARTHUR BROOKE, and THOMAS ROYLE, of Harrow, England, for "Preparation of alizarine, &c., made from anthracene."—Application filed 16th June, 1876.

Claim.—"1. Alizarine and other analogous colouring matter made from anthracene, in the form of dry powder, substantially as set forth. 2. The hereinbefore-described method of preparing alizarine and other analogous colouring matter from anthracene, which consists in mixing hydrate of lime and water, adding thereto the colouring matter, mixing the whole together, drying the mixture, and finally passing it through a sieve, substantially as set forth."

41,993. WATTINNE-DELESPIERRE and C. RAVE, of Schaerbeek, for "A dye called 'alizarine,' applicable chiefly for wool."—Dated 17th April, 1877.—Belgian patent.

In the matter of Letters Patent granted to JOHN LIGHTFOOT, of Lowerhouse, near Burnley, in the county of Lancaster, Chemist, for the invention of "Improvements in printing and dyeing textile fabrics and yarns," bearing date the 12th October, 1870, No. 2692.—Notice has been given by WILLIAM MORGAN-BROWN, the assignee and owner of the said Letters Patent, that he has applied for leave to file a Disclaimer and Memorandum of Alteration of parts of the Specification. The time for giving

notice to oppose such application expired on the 25th May, 1877.

Apparatus and Processes of Printing and Dyeing.

4625. JOHN ROGERS ASHWELL, of New Basford, in the county of Nottingham, Bleacher, for an invention of "An improvement in the process of dyeing hosiery goods."—Dated 29th November, 1876.—This patent has passed the great seal.

1056. WILLIAM JACKSON, of Urmston, near Manchester, in the county of Lancaster, Print Buyer, has given notice to proceed in respect of the invention of "Improvements in treating fabrics printed with aniline colours."

1648. GEORGE CANTREL GIBBS, of Brentford, in the county of Middlesex, for an invention of "Improvements in machinery or apparatus for dyeing and colouring felt, silk, and other textile or porous fabrics."—Dated 27th April, 1877.—Provisional protection has been granted.

1761. JOSEPH WILSON SWAN, of Newcastle-on-Tyne, in the county of the same town, Chemist, and ISAAC FREEMAN, of the same place, Accountant, for an invention of "Improvements in the means of printing from punctured stencils."—Dated 5th May, 1877.

1517. PETER MARTIN SHANKS, of 31, Red Lion Square, in the county of Middlesex, for an invention of "Improvements in the production of raised surfaces or blocks for printing, and in the preparation of materials and construction of apparatus employed therein."—The result partly of a communication to him from abroad by John Robert Johnson, at present residing in Algeria.—Dated 30th April, 1874.—The £50 stamp duty has been paid.

1596. JOHN THORNTON and WILLIAM DANIEL THORNTON, Dyers, of Marsh Field Dye Works, Bradford, in the county of York, for an invention of "Improvements in apparatus for dyeing in sections fibrous materials or striped goods."—Dated 6th May, 1874.—The patent has become void.

166. I. ZUCKER, of Vienna, for "Dyeing Turkish caps (fez) with various designs."—1 year.—(Public.)—Dated 7th December, 1876.—Austrian patent.

183,360. DANL. ALLEN, of Philadelphia, Pa., for "Dyeing apparatus."—Application filed 29th March, 1876.—American patent.

Brief.—"A frame supporting the hank-rollers is raised and lowered by

the ordinary elevator mechanism. The shafts of a series of cog-wheels have bearings in a vertically-adjustable table, and have at each end a coupling-plate, corresponding to a similar one on the end of each shaft-roller."

Claim.—"The combination of the vertically-adjustable frame D, and its shafts *a*, with the bench J, carrying the driving mechanism separate from the frames and tubs, and adjustable to different heights, as and for the purpose set forth."

Silk and Wool Treatments.

1905. ADRIEN ENOULT, of Elbeuf-sur-Seine, in the republic of France, for an invention of "Improvements in machinery or apparatus for removing knots from woollen and other textile fabrics and for dressing and finishing the same."—Dated 16th May, 1877.

4756. J. S. BUTLER, of London, for "Dyeing silk-lustred fabrics."—5 years.—Dated 8th January, 1877.—Saxon patent.

41,820. H. DUQUAIRE, for an imported invention for "Utilizing the ammoniacal vapours produced by washing woollen rags and rendering the operation more salubrious."—Dated 26th March, 1877.—(French Patent, 15th March, 1877.)—Belgian patent.

Finishing Processes; Shrinking, Stiffening, Enlarging, Plaiting, Rolling, etc., Fabrics.

1015. EDWARD JAMIESON and HENRY COLLINS, both of Salford, in the county of Lancaster, for an invention of "Improvement in and apparatus for shrinking textile fabrics."—Dated 14th March, 1877.—This patent has passed the great seal.

4577. WILLIAM ROBERT LAKE, of the firm of Haseltine, Lake, and Co., Patent Agents, Southampton Buildings, London, for an invention of "Improvements in the application of certain salts and soaps for the preparation of threads and fabrics to give them stiffness, render them impermeable, and improve their appearance."—A communication to him from abroad by Claude Garnier, of Lyons, France, Cloth Dresser.—Dated 25th November, 1876.—This patent has passed the great seal

4756. ROBERT WILSON, of the Bridgewater Foundry, Patricroft, in the county of Lancaster, Engineer, for an invention of "An improved mode of finishing cotton fabrics."—Dated 8th December, 1876.—This patent has passed the great seal.

84. WILLIAM BIRCH, of Salford, in the county of Lancaster, Machinist, has given notice to proceed in respect of the

invention of "Improved self-acting machinery for opening, smoothing, spreading, and guiding fabrics for the use of bleachers, dyers, calico printers, and others."

712. GEORGE JOHN BOLINGBROKE and JOHN LING, both of Chelmsford, in the county of Essex, Drapers, for an invention of "A new machine or apparatus for facilitating the tight rolling of woven fabrics."—Dated 21st February, 1877.—This patent has passed the great seal.

1340. CHARLES JAMES COX and JOHN PEARSON COX, trading as Charles Cox and Sons, of the Queen's Road Works, in the town and county of the town of Nottingham, Bleachers, and Lace Finishers, for the invention of "Improvements in and connected with machines or mechanism for surface glazing or glossing lace, calico, and other like fabrics."—Provisional protection has been granted.

1386. FERNAND DEHAITRE, of the firm Pierron et Dehaitre, of Boulevard Saint Denis, 1, at Paris, Mechanician, for the invention of "An improved machinery or apparatus for enlarging fabrics of all kinds."—Provisional protection has been granted.

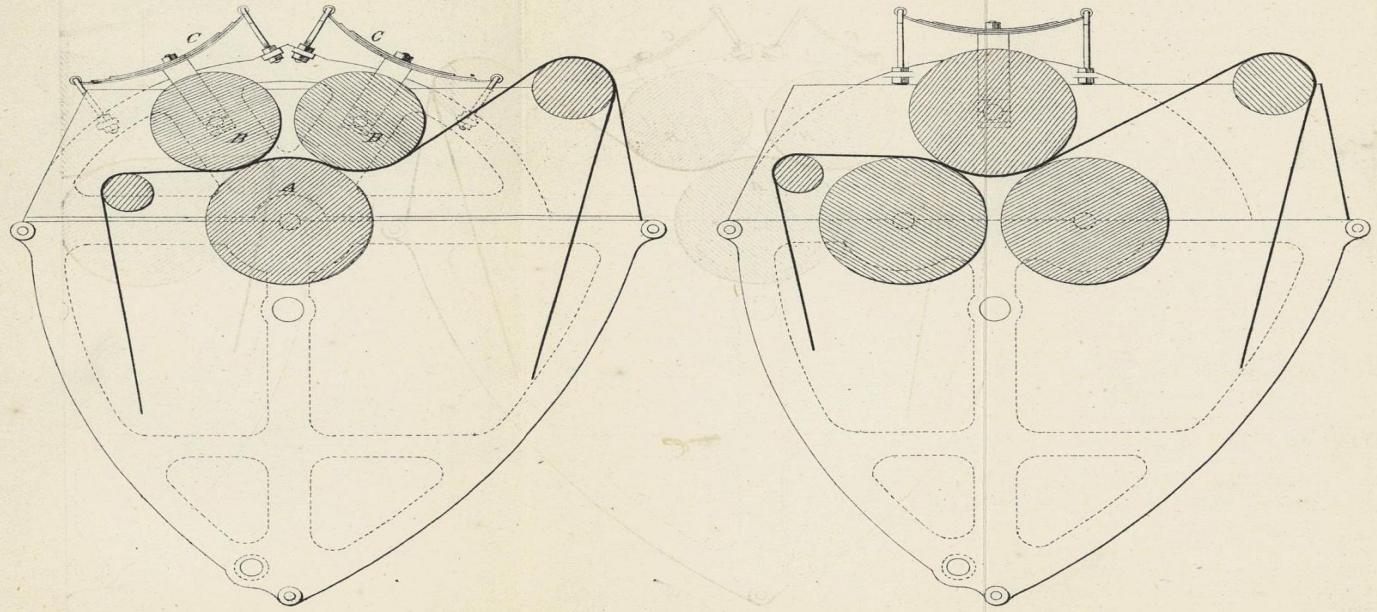
1476. NEWTON WILSON, of High Holborn, in the county of Middlesex, Sewing Machine Manufacturer, has given notice to proceed in respect of the invention of "Improvements in machinery or apparatus for plaiting fabrics."

1567. WILLIAM BROOKES, of 62, Chancery Lane, in the county of Middlesex, Patent and Registration Agent, for an invention of "New or improved machinery or apparatus for simultaneously measuring and winding or rolling up lengths of cloth or other fabrics."—A communication to him from abroad by Eloi Herlin, of Lobbes, in the kingdom of Belgium, Merchant.—Dated 21st April, 1877.

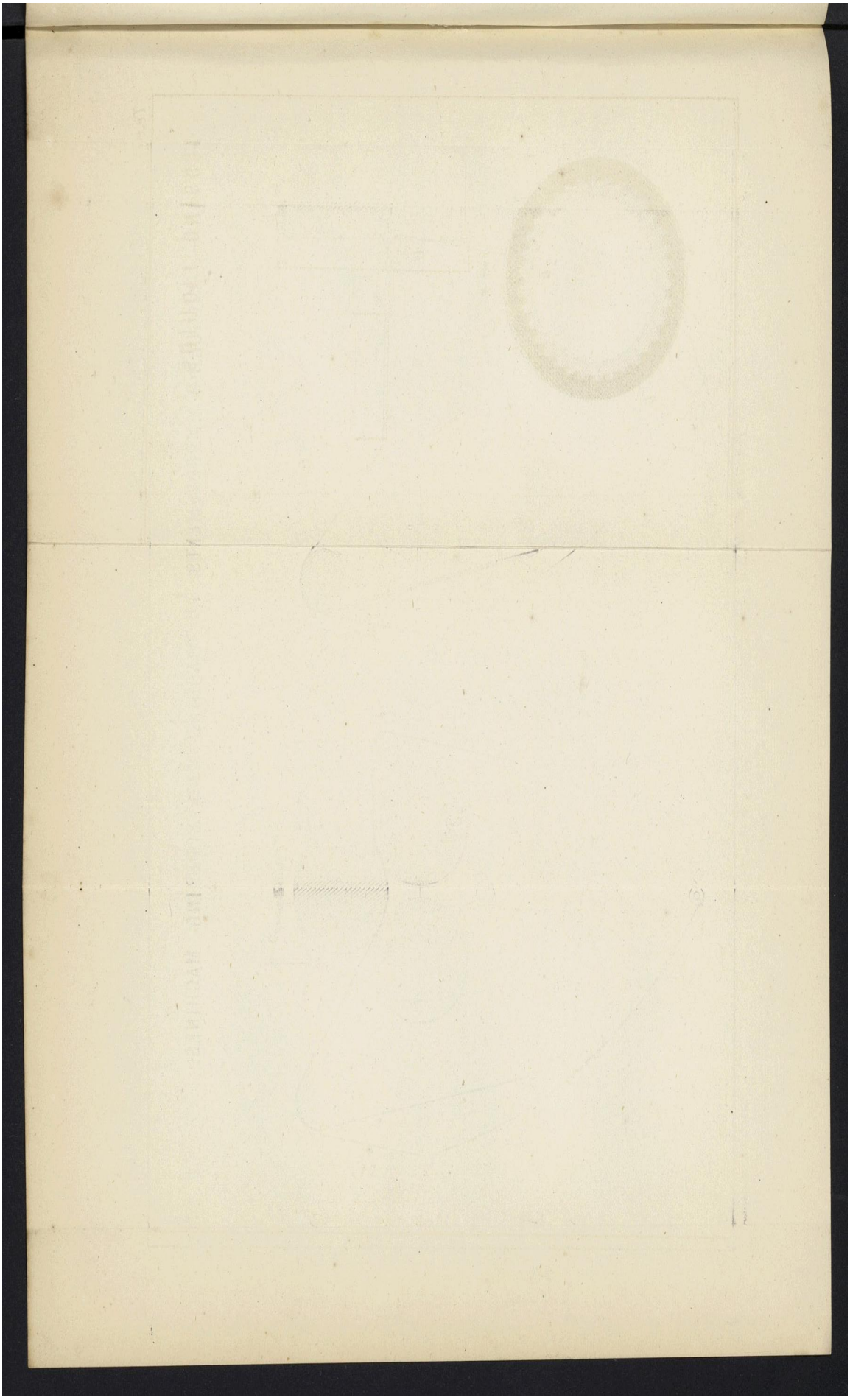
1569. WILLIAM LANCASTER, of Accrington, in the county of Lancaster, and EUGENE DOLLANDER, of Wilderstein, Alsace, in the empire of Germany, for an invention of "Improvements in the construction of apparatus for sizing and dressing yarns, part of which improvements is also applicable for starching and drying woven goods."—Dated 4th May, 1874.—This patent has become void.

Palmer and Howe, Printers, Bond Street, Manchester.

KILBURN'S IMPROVEMENTS IN WASHING AND SCOURING MACHINES.



Palmer & Howe, Manchester.



SHAW'S PATENT FOR ROLLERS FOR EXPRESSING LIQUIDS.

FIG. 1.

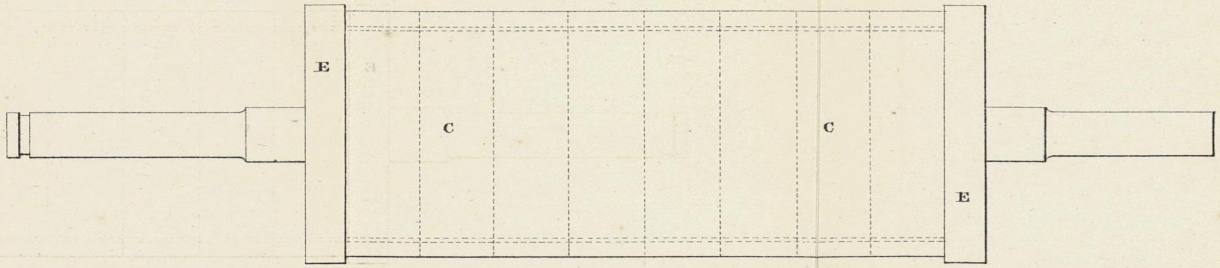


FIG. 2.

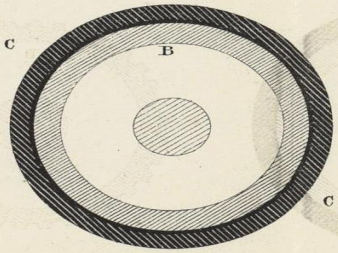


FIG. 3.

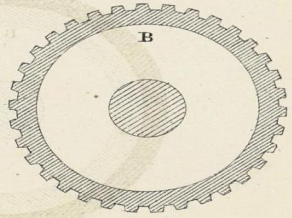
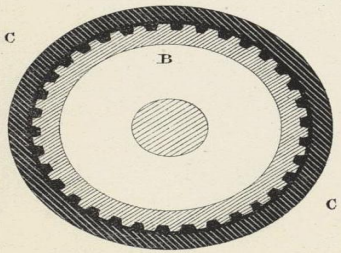


FIG. 4.



Palmer & Howe, Manchester.