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MILITARY PHOTOGRAPHY.

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MILITARY PHOTOGRAPHY

BY

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PREFACE.

The Chapters constituting this little book originally appeared in the form of a series of articles in *The Broad Arrow and Naval and Military Gazette*. It is by the special permission of the proprietors of that journal that I have been enabled to issue the series, somewhat modified and enlarged, in book form.

OWEN E. WHEELER.

CONTENTS.

CHAPTER	PAGE
I. INTRODUCTION	9
II. PHOTOGRAPHY IN RECONNAISSANCE ...	17
III. ,,, <i>(continued)</i>	23
IV. GENERAL UTILITY FOR MILITARY PUR- POSES	33
V. HINTS ON EQUIPMENT	38

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MILITARY PHOTOGRAPHY.

CHAPTER I.

INTRODUCTION.

The study of Photography as a science applicable to the purposes of the art of war has hitherto received surprisingly small attention. Until about twelve years back, when rapid dry-plate processes were just beginning to assert themselves as not only practicable, but easy of manipulation and productive of excellent results, it was natural that military men should not look upon the camera and lens as likely to prove of serious use, at any rate in the field. Moreover, until a still more recent date, the existing processes of printing from the negative were neither easily nor rapidly manipulated under anything like adverse circumstances. But, of late years, the progress of the science has been so extremely rapid, and withal, every step gained has rested on so sure a basis, that it seems time some action were taken in the direction of

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bringing it more fully before the notice of military men and others who take an interest in such developments. For the present uses to which Photography is put by the Scientific Corps, and, under special circumstances, by the Intelligence Department,* are really small compared with its actual military value, on the assumption, of course, that it duly fulfils certain well-defined military requirements. As these requirements are by no means light, it may be well, by way of preliminary, to note what they are, and to what extent they have been anticipated by modern improvements in the art-science under discussion.

In the first place, Photography can nowadays be of little use on active service if the paraphernalia connected with it are not portable. It is related that a knight of the camera who accompanied our troops to the Crimea for the purpose of illustrating

* It must not for a moment be supposed that in making this remark I wish to depreciate in any way the excellent work done by the Photographic Section of the School of Military Engineering at Chatham, which in its way has about as efficient and zealous an establishment as it could possibly have. Nor am I unaware of the special uses to which Photography is put at Shoeburyness and elsewhere. But, as will be seen from succeeding chapters, my contention is that these are but exclusive and isolated developments of a branch of knowledge which might well be made much more general.

the campaign, took with him no less than thirty-six large cases, and a hybrid conveyance, which is described as having been "something between an ambulance van and a bathing-machine." There are few circumstances under which such a preposterous plethora of baggage for such a purpose would now be permissible, even if possible, nor would anything like it be necessary, as can readily be ascertained by a glance at the shop-window of any modern dealer in photographic wares. Cameras and all their appurtenances are now constructed of such beautiful and skilful design that a truly marvellous degree of lightness, coupled with rigidity and, above all, simplicity, has been attained. Indeed, it is not by any means too much to say that a complete small camera and lens, with tripod and dark slides fully charged for a number of exposures, can be readily carried by an individual, in addition to a revolver and a light sword. Again, the various processes of procuring a negative, and of printing from it, have been so much simplified that the chemicals required take up a quite insignificant space. Lastly, by the employment of the perfected negative tissue in lieu of glass plates, not only is the extreme of lightness reached, but the risk of breakage happily avoided, when circumstances render it necessary to consider every ounce

of baggage, or when a campaign is of a specially "rough and tumble" order.*

A second important condition is that the process of securing the negative should, while giving adequate results, be as rapid as possible. In this respect modern Photography very readily fulfils every requirement. In anything like a good light photographs of moving objects can be secured by a quite inexperienced amateur, and under the most unfavourable circumstances in the open air the exposure need not as a rule occupy more than a few seconds. Moreover, by modifying the subsequent operation of development, considerable latitude in exposure is obtainable, an advantage of enormous value, and one that did not accrue to the old wet collodion process in which a few seconds too many or too few often produced an utter failure.

Thirdly, the entire system of working must be simple, and not liable to derangement. That Photography as an *art*-science will ever be simple is hardly to be expected, but as an adjunct to military observations or operations it can easily

* I am not one of those who recommend the use of tissue in preference to glass plates when it can possibly be avoided. But the quality of sensitised negative tissue has of late years been so very greatly improved that many operators habitually use it, and with excellent results.

be rendered very simple indeed, so much so that a course of four or five lessons should make a man of average intelligence, if he be so minded, a useful military photographer. At the same time, these lessons, especially if they be conveyed orally, should not seek to teach too much. If Photography is to be of service from a military point of view, the first object to be gained is not artistic composition, nor the production of *tours de force*, but the avoidance of failures. And Photography can nowadays be made so simple that the risk of entire failure is not worth mentioning. A properly-instructed operator, with a carefully-selected kit, will find it positively difficult to go wrong, unless the circumstances are outrageously adverse. His sensitive plates or films can be procured ready prepared, of standard and uniform quality, and can be duly tested before setting out. The development is neither complicated nor hazardous, and when once the negative has been secured prints can be struck off and multiplied with the greatest possible ease.

This brings me to the last really important condition necessary to the utilisation of Photography in military operations, namely, that the printing from the negative should also be expeditious, simple, and in every way satisfactory

as regards results. Two processes, one of recent introduction, seem almost to have been invented for the express purpose of meeting this requirement. One, the Pizzighelli Platina print-out process, is so delightfully simple that, when daylight is available and there is no great hurry, a child can work it with success. The other, of which there are several forms, is a process of printing by development, enabling copies to be produced at almost any rate of speed, even by night, by exposing a piece of the prepared paper under the negative for a few seconds to any illuminant, and then developing as with an ordinary dry plate.

Without further discussion of details I may now, perhaps, be allowed to take it as a postulate that modern improvements *have* made it possible for Photography to be utilised even in the occasional *sturm und drang* of a campaign. Let me go a step further and attempt by the introduction of a very simple example to indicate one of the least of the potentialities of Photography so employed. We will suppose that two armies are beginning to *feel* one another in real earnest, and that a collision is imminent. The position likely to be occupied by the one is to some extent known to the Intelligence Department of the other, by

means of Reconnaissances, published maps of the country, or by those other "by-paths and indirect crook'd means" by which Intelligence work is necessarily, and generally speaking has been of late years very ably done. The information, it is understood, includes several sketches, very rough maybe, but very graphic, and of extreme importance, especially as tending to lessen confusion during an attack. With ordinary appliances the reproduction of these sketches would be a work of much time and labour, even if it did not follow the example of a certain important sketch made during the Afghan campaign, which was sent down hurriedly to Calcutta to be copied, and did not return to headquarters for one calendar month. But with a simple system such as I shall presently describe, the sketches would be handed over by the Intelligence Department to the photographic staff of the Brigade, Division or Army Corps, and in a few hours, whether by night or day, there should be copies enough available to furnish one to every Staff and Commanding Officer concerned throughout the whole force likely to be engaged. Is not such a potentiality as this alone worth considering, and setting against what I shall hereafter show to be the very insignificant cost and fuss of having an army as properly equipped with

photographers as it is with signallers and other useful accompaniments? But this, as I said above, is but one development, and by no means so striking and comprehensive as that which I now propose to discuss at greater length and separately, under the heading of Photography as applied to that most essential element of success in modern war, Reconnaissance.

CHAPTER II.

PHOTOGRAPHY IN RECONNAISSANCE.

The application of Photography to purposes of Reconnaissance is a subject which must be approached in a spirit of some antagonism to old and respected theories. There are hundreds of otherwise well-informed and generally sensible persons who are convinced that all the sketching that is required in ordinary Reconnaissances is best done with the pencil, and that to carry a photographic apparatus on such excursions would be impracticable, or at any rate productive of very feeble results. The idea of a man having to set up a camera on a tripod stand and shroud his head in a dark cloth in order to secure a picture, let us say, of an unimportant bridge, seems to many, perhaps, well-nigh ridiculous. But those who think this are not aware with what rapidity and ease a modern photographic apparatus can be made ready, and, when done with, packed up again. They forget, too, that the actual process of securing the picture is almost instantaneous. It would, indeed, be scarcely too much to say that,

in nine cases out of ten, when it is desirable in the course of a Reconnaissance to give, in addition to the written or verbal report, some pictorial representation of an object or feature of importance, a smart photographer would have exposed his plate, packed up his traps, and resumed his forward march before the pencil draughtsman could have accomplished more than the barest of outlines. This, too, supposing that he used, as we should recommend him to use, an ordinary camera and tripod stand. With an apparatus of the "Detective" or "Kodak" type still greater ease and readiness of manipulation would, of course, be attainable, although it is only on very special occasions that it would be worth while to sacrifice definition and general correctness of idea to such exalted portability as is possessed by some of these ingenious contrivances. The fact, however, remains, that they *can* be used, and used, too, with great effect, especially by a mounted man, who can by their aid secure a small picture without dismounting.

It will be said, perhaps, that it is one thing to expose a plate or piece of tissue, and another thing to develop the latent image. To which it may be replied that, as a general rule, the pictures made, whether by pencil or camera, in the course

of a Reconnaissance are not wanted until an hour or two after the picture-maker's return into camp. This would allow ample time for a military photographer to develop his exposed plates and take off a few rough prints (if necessary, by one of the processes of printing by development), or to hand over his double or roller backs to the Brigade or Divisional Photographic Section, as to which I shall have something more particular to say later on.

In any case—and upon this I would lay great stress—one of the great advantages of Photography in Reconnaissance is that it can be so easily combined with pencil draughtsmanship. Where there is literally not a minute to spare, and the report, sketches and all, have to be in the General's hands by a certain time which leaves no margin for work to be done in camp, a rough sketch can be taken with the pencil, and the plate exposed in the camera on the chance of its proving useful even if a little “lang o' comin'.” Again, there are many instances in which a few lines express all that is needed, and it would be a work of supererogation to make a photograph. Thirdly, it often happens that a most effective combination can be made of a photograph giving a general view, say, of a fort or position, and

pencil sketches showing details. In this connection it may be mentioned that the rough surface of photographic prints, produced either by the Pizzighelli platina process or on bromide paper, renders them easily marked by pencil figures corresponding to the numbers given to accompanying sketches. In the above instance I have supposed that the photographer possesses an elementary idea of sketching; but unquestionably the best combination of all is to be found in the co-operation of a military photographer with a friend who can sketch, both individuals being assumed to be capable of writing a decent report. Two men working well together in this fashion ought to produce topographical work of all sorts and sizes calculated to throw the most exacting of General officers into professional ecstasies.

It must not be thought that because the above few paragraphs are somewhat enthusiastic and "cock-sure" in strain that the writer is ignorant of, or underrates, the value of good military draughtsmanship. Far from it. I have had peculiar opportunities of seeing specimens of such draughtsmanship produced under the most trying circumstances, and yet of almost superlative merit. But my contention is that there are so few really good and rapid military draughtsmen available,

while it would be very easy to train any quantity of military photographers. And, apart from the extreme rapidity with which a scene embracing all manner of intricate details can be reproduced by photography, the unquestioned accuracy of the sun picture—except in cases where, through faulty apparatus or want of skill, the operator introduces distortion or false perspective—is a matter of very great moment indeed. With the photographer this accuracy is a matter more or less of compulsion, while at the same time it involves no extra exertion. With the military draughtsman, especially if he be an artist, it sometimes requires a distinct effort to be accurate, for the temptation to “make a picture” is often so strong as to be all but irresistible. And, as I have said before, and “in another place,” in reference to this very subject, there is probably not any soldier living, however enamoured of chiaroscuro and atmosphere, who would prefer a fancy picture of an enemy’s position to a photograph, even if the foreground in the latter were not enlivened by imaginary cows, and the middle distances were not quite what the laws of perspective would demand.

The actual scope of Photography as an adjunct to Reconnaissance can scarcely be dealt with here.

The objects and features which it is desirable to render pictorially for the information of the officer for whom the report is intended are necessarily different in different countries. In many cases, too, the officer conducting a Reconnaissance has in this particular to be guided by special instructions which enable him to concentrate his faculties upon certain particular items of paramount importance. As a general rule the photographer engaged in military Reconnaissance may surely be left to choose his own subjects, carefully keeping in view the fact that he has but a limited number of plates or pieces of sensitised tissue at his disposal ; and also, of course, that on a Reconnaissance it is seldom desirable to be leisurely in one's movements. An exposure or two should be reserved for the homeward journey, which in nine cases out of ten, in the presence of the enemy or in an unfriendly neighbourhood, will, in accordance with the recognised rule, be by a different route to avoid falling into a trap.

CHAPTER III.

PHOTOGRAPHY IN RECONNAISSANCE (*Continued*).

Having thus briefly discussed the general application of Photography to purposes of Reconnaissance, it becomes necessary that I should say something as to the special rules which I think should govern the employment of photographers in the field. Speaking generally, I may say at once that I do not believe either in the miscellaneous employment of individual officers and non-commissioned officers, who may happen to have apparatus and be able to use it, or in handing the work over completely to the Royal Engineers with practically *carte blanche* to make their own arrangements. The Scientific Corps are far too valuable in this country to be used to the extent that I believe military photographers could with advantage be used ; and individuals more or less irresponsible, and with exalted notions as to the amount of transport they should be allowed, are very apt to become a nuisance in a moving column. Surely if Photography is worth applying to military purposes at all, it should be applied

systematically, just as, for instance, heliography is. And the system I would propose is as follows.

In the first place, I would have attached to every Brigade and to the headquarters of every Division and Army Corps a small Photographic Section consisting of, say, two specially-trained non-commissioned officers or men, with a mule or pony-load of apparatus between them. This may sound a very meagre allowance of transport, but if readers will carefully dispossess their minds of the wealth of superfluous equipment which naturally suggests itself as being "useful in case of accidents," and think only of actual requirements, they will, we are sure, find it possible to include all the necessary kit, as to the details of which I shall have something to say hereafter (with the exception perhaps of the dark tent), in a total weight of, say, 160 to 200 lbs.*

The Army Corps and Divisional Photographic Sections would be under the orders of the Chief of the Staff and Divisional Intelligence Officers respectively; the Brigade Section under the control of the D.A.A. and Q.M.G. The work of these sections would chiefly lie—(1) In reproducing such

* The mule or pony would, of course, be a selected animal, and the kit could be conveniently carried in panniers with cane bodies, as recommended by Lord Wolseley.

maps, plans, and sketches as were required for distribution to general officers, officers commanding regiments, and Staff Officers; (2) in photographing special objects of interest, such as forts, bridges, &c., lying directly *en route*; (3) in developing, where necessary, plates exposed by the individual photographers mentioned in the succeeding paragraphs, and in taking prints from their negatives.

For purposes of Reconnaissance by individuals, or to accompany parties, I would propose that one officer and one non-commissioned officer, both of whom have received special instruction, should be furnished by each regiment of cavalry and battalion of infantry. Infantry officers to be mounted so as to accompany cavalry Reconnaissances when necessary. These individuals would be detailed for duty in Brigade and Divisional Orders as required, but for messing and other purposes might remain with their respective corps.

Let me now try to give an example of the working of these military photographers in the field. We will suppose that the exposures in the course of a Reconnaissance have been made either on glass plates or sensitised tissue—preferably, to my mind, of half-plate ($6\frac{1}{2} \times 4\frac{3}{4}$) size, and car-

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ried in the ordinary double backs. In some instances the subjects may be of such importance that, if a messenger is available, it is well to send the backs containing the exposed plates into camp, at once to be developed and printed from by the Divisional or Brigade Photographic Section. A pencil note giving the subject, quality of light, and time of exposure, will be sufficient guidance for the latter, the messenger, of course, being cautioned not to tamper with the backs *en route*. Under ordinary circumstances, the photographer will himself bring his exposed plates into camp, and either take them to the D. or B. Photo Section, or, if he is working with a force with which there is no such section, make shift to do what is needful with his own hands and in his own tent. As soon as night falls, a camp lantern can be shaded with ruby cloth or paper, and development carried on without any difficulty. If time presses, the negatives can be dried quickly with the assistance of a little methylated spirit, and a few proofs pulled with the aid of argentic-bromide or similar paper. Where the light is good, and the prints are not wanted immediately, the Pizzighelli platina printing-out process can be used with delightful ease and certainty of producing, at any rate, as good

results as are required for military purposes. The chemicals in either instance are few and easily carried, while the apparatus is of the most elementary description. Two or three ebonite dishes and a printing-frame are all that are required, and all that the individual photographer should be allowed to carry.

The above may seem so transparently simple that some readers may wonder why I have been at the pains to write it down. But it is just this simplicity which is absolutely essential if Photography is ever going to be successfully employed on active service. Even the Divisional or Brigade Photographic Section should only carry what is absolutely needful to enable it to do its work satisfactorily and systematically. Anything in the nature of a cumbrous dark room on wheels, for instance, is quite unnecessary, however desirable it may be from the point of view of the operators concerned. If any provision be made for the development of plates, &c., in the day-time, a portable dark tent will amply suffice for the largest plates or pieces of tissue that would ever be required on service. Similarly, the individual regimental photographer should carry besides his kit for exposing plates or tissue only just as much in the way of printing

materials as will render him independent of the D. or B. Section on an emergency. For the rest *the Section and the individual photographer should work together*, the latter relying on the former to complete what he has begun, the former being always in readiness either to afford the regimental photographer facilities for developing his own exposed plates or tissue, or to take in the latter and, if required, develop and strike off the requisite number of prints with all possible despatch.

In cases where a Reconnaissance of an extended tract of country, or of a particular route, is carried out by an officer in time of peace, and in the interests of the Intelligence Department, the arrangements must, of course, be modified to suit the circumstances. But here, again, I would urge that the utmost simplicity should be studied, and that nothing should be carried which is not really necessary. In some cases it even might not be considered absolutely needful to take any printing materials at all, but a small supply of these will, as a rule, be included among the *sine quibus non*. It often facilitates matters, and disarms suspicion, if a few photographs of landscapes of no military interest, and of groups of villages, etc., are taken, and rough prints dis-

tributed. In certain cases one of the detective cameras, of which there are several patterns now being made of a high standard of excellence, may occasionally be used with great effect by a skilful and self-possessed operator.

In all cases where a military photographer works as an individual, I would recommend him to confine himself to the half-plate size. Under ordinary circumstances a picture, especially a photograph $6\frac{1}{2}$ by $4\frac{3}{4}$ inches, is large enough for all practical purposes, and, where necessary, it can be easily enlarged, if taken on a campaign by the D. or B. Photo Section; if on a Reconnaissance in time of peace, by the School of Military Engineering at Chatham, or by the Topographical Branch of the Q.M.G.'s Department in India, as the case may be.

As germane to the discussion of what may be termed the field operations of the military photographer, I may perhaps be allowed to obtrude a little suggestion which I believe has at least the merit of being original. Occasionally it happens, especially in the case of some of the countries across the Indian frontier, that the photographer is viewed with distinct suspicion, if not with active hostility, even though it should be apparent that his ends and objects are not in the least

connected with military potentialities. But, on the other hand, there are circumstances in which it is permissible to take photographs freely, provided that, so far as may be gauged by a jealous scrutiny, no attempt is made to obtain negatives of fortifications or other objects of military interest, however remote. If the photographer be detected pointing his camera in the direction of the latter he is at once hustled off, but it may sometimes be possible for him to take a pretty little bit of landscape or a group in another direction, even though he be standing in the immediate vicinity of a fort bristling with alert sentries, active police agents, or suspicious natives. "What is the use of this?" will naturally be asked by those to whom the idea of taking a photograph, as it were round the corner, is preposterous. But it must be remembered that there are large possibilities attached to the use of a very simple piece of apparatus, to wit, the prism, and it may interest some readers to know that an attachment to a lens can be constructed, which, while the lens is pointed in one direction, will enable a photograph to be taken of an object in a line at right angles to that direction. Of course, the circumstances in which a little fraud of this description is desirable are not often present, but

still, to the Intelligence officer engaged on the delicate mission of obtaining information where such information is on all sides most jealousy guarded, the idea may not seem unworthy of being noted. In which connection it may be instructive to recall a little story which was going the round of the papers some months ago in reference to a certain German lady who used to wheel her child about a certain French town in a perambulator, the said child being a carefully contrived dummy fitted with an ingenious apparatus for taking photographs at the will of the officer in petticoats by whom the perambulator was propelled. Such and so various are the little dodges by which the smart military man can sensibly increase the value of Photography as applied to the purposes of his own profession.

Before dismissing this subject of photography as applied to Reconnaissance, I must not omit to say a word as to the use of the camera and lens in connection with war balloons. The time is not far distant when this development will prove one of the greatest possible importance. Indeed, results have already been secured which are distinctly promising, and which, I earnestly trust, will stimulate progress in this direction. The idea is, of course, no new one, having, at

any rate as regards captive balloons, been put into practice as far back as the siege of Paris. It is recorded that during the siege a captive balloon was sent up some 1,600 feet, and was provided with a series of reflectors and other scientific appliances which enabled the famous aeronaut, Nadar, on particular occasions, to take a glass negative every quarter of an hour. These he would send down in a little box gliding along a rope, and, with the aid of an optical chamber, they gave some idea of the military movements going on in the adjacent plain. It is true that neither Nadar nor his assistants succeeded in obtaining results of any importance, but photography during the last twenty years has made such strides, particularly in the direction of instantaneous processes, that what was impossible then could be accomplished now with little trouble. And if useful pictures could be secured from a captive balloon, how much more valuable will the camera prove in connection with the navigable balloons, which are fast coming within the region of practical politics ?

CHAPTER IV.

GENERAL UTILITY FOR MILITARY PURPOSES.

The chapters of this little book being designedly confined to the more popular and practical developments of photography as applied to military purposes, it is not my intention to discuss the uses of photography in the production of military surveys. I am well aware that some success has already been achieved in this direction by careful experimentalists, but the results attained do not strike me as foreshadowing any very solid advantage, especially in the all-important direction of rapidity of execution. For some years to come the pencil, prismatic compass, protractor, and stump will probably hold their own in this department, although unquestionably it is often possible to materially supplement a field sketch, especially in a hilly country, with a photograph, above all if an attempt be made to produce with the aid of several plates, however roughly, a panoramic effect.

Passing from the work which can be done by the military photographer in the field, we come to

a number of what may be termed the home-uses of the art-science, such as are fitly seen in practical working at institutions like the School of Military Engineering, the Ordnance Survey, and the Office of the Intelligence Division of the Adjutant General's Department. At Chatham we see the Sapper photographer producing accurate records of noteworthy military works; at Shoeburyness we have Artillery experiments conducted under the eye of the lens which transmits even the course of the flying shell to the instantaneous plate. But these minor applications are dwarfed by the enormous value of photography in the mechanical reproduction of military maps, plans and sketches, with absolute fidelity and with combined rapidity and economy into the bargain. For years past photolithography and photo-zincography have been employed in this manner for subjects in line, and—especially in India in the photographic branch of the Surveyor-General's Department—certain photo-engraving processes have been somewhat sparingly used for the reproduction of pictures in half-tone. But, of late, the great drawback attaching to all these processes, namely, that the plates or stones could not be printed with type, has been in a great measure removed by the introduction of photo-typographic processes of great excellence as

regards results and comparative simplicity as regards manipulations. These processes, as most readers must be aware, are very freely employed in the production of book, magazine, and newspaper illustrations, and we should like to see them much more often resorted to than they are in connection with military reports and text-books. They are cheaper than wood-engraving, and the results are incomparably finer. Indeed, where very exceptional rapidity in taking impressions is not required, a type block can be made from an original negative, the resulting print giving every gradation of tone with clearness—a fact which, in dealing with many military photographs, notably of positions, of damaged masonry fortifications, and so forth, is naturally of great importance.

should also like to see an effort made at the commencement of every campaign to supply all officers, at any rate, with a miniature map of the seat of war produced by one of the photo-engraving processes in vogue. We all know from Lord Wolseley's pocket book, if our good sense has not previously impressed the fact upon our minds, that a map of the country in which a campaign is taking place should form part of the field kit of every officer. But how many kits might be searched without finding the aforesaid map?

And how many of these mapless kits would no longer be mapless if a really good miniature map, the details of which could, if necessary, be read with the object-glass of one's binocular, were available.

I should not be doing justice to this portion of the subject if I forgot to allude to another important "home" development of military photography. I allude to the reproduction of despatches intended to be sent by carrier pigeons. As in this branch no sensible progress has been made since the siege of Paris, during which the French employed photography to this end with surprising ingenuity and completeness, I cannot perhaps do better than quote what was written on the subject by the French *savant*, Gaston Tissandier:—

"No one can have forgotten the service rendered by balloons during the siege of Paris, nor the wonderful part played by carrier pigeons, which brought to the besieged city news from the outer world. But these birds, however strong they might be, could only carry with them very light burdens through the air. A thin sheet of paper two or three inches square was all the load that could be entrusted to these winged messengers. But how write orders, send despatches, give precise instructions in such a minute letter? The most able calligrapher could hardly make it contain the letters in a single page of a printed volume. Microscopic photography came to the assistance of the besieged; it solved the difficulty as no other art could have done; it reproduced on a film of collodion weighing less than a grain more than

three thousand despatches, that is to say, the amount of sixteen pages of folio printed matter..... Several of these films, representing a considerable number of despatches, were rolled and enclosed in a quill about the size of a toothpick. This light and novel letter-box was attached to the tail of a pigeon.... Each pigeon could carry twenty films in a quill, the whole not weighing more than fifteen grains. Thirty or forty copies of the microscopic despatches were usually printed and sent by as many pigeons. More than 100,000 of them were thus sent to Paris during the siege. As soon as the small tube was received at the telegraph office, MM. Corun and Mercadier proceeded to open it with a knife. The photograph films were carefully placed in a small basin of water, in which were put a few drops of ammonia. In this liquid the despatches unrolled themselves. They were then dried and placed between two plates of glass. It then only remained to lay them on the stage plate of a photo-electric microscope."

In England we do not seem to devote much attention to the employment of carrier pigeons for military purposes, but a time may come when we shall find it expedient to do so, and to bear in mind the clever methods adopted by our French neighbours.

CHAPTER V.

HINTS ON EQUIPMENT.

Attention may now be drawn to the details of equipment, more especially that of the individual photographer engaged on active service. I have no idea of giving any minute list of articles required, of recommending any particular dealers, or of suggesting any sealed pattern of camera or special type of lens. I shall simply follow out the principle enunciated at the outset of this series, namely, that, to be of any real practical use in a campaign, individual military photographers must be as lightly equipped as possible, and must rely for their printing, at any rate, if not for the development of their negatives, on the Brigade or Divisional Photographic Section. A half-plate camera has already been recommended, and in the majority of cases this size would be sufficient. Where it is not, there should be no difficulty in having the negative enlarged by the Divisional or Brigade Photographic Section aforesaid. And the extreme portability of half-plate apparatus is an advantage so serious that even if the pictures

obtained by it have to be scrutinised with a magnifying glass, it may well be preferred to a larger size, necessitating a heavier camera and backs, a heavier tripod, and heavier plates. There may exist some difference on this point, but, at any rate, no one will controvert the desirability—nay, the necessity—of having all the apparatus in use by the individual photographers in a force *made to a uniform gauge*. As to the pattern of apparatus, that, as noted before, can well be left to the taste and fancy of the individual operator. Most photographers have some pet pattern which, if not so light as some, is more rigid, or more easily managed, or possesses some other, to the individual's mind, paramount advantage. It is, perhaps, needless to remark that for hot climates apparatus constructed of specially seasoned wood, and preferably with Russia leather camera bellows, to resist the attack of white ants, is desirable. Three double dark slides would be sufficient, but an extra three are very convenient, as enabling an entire dozen of plates to be transferred at once, and lessening the frequency of the changes. In the matter of plates, the brand must, of course, depend upon the operator, and the quantity upon the nature of the campaign. Six dozen should be the maximum taken to start with, a second supply

being left at the base with proper instructions for forwarding. Or the D. or B. Photo Section could be assigned an extra mule or pony for plates, to be issued as required to individual photographers. Some photographers would, no doubt, prefer prepared negative tissue to plates; these could be allowed to make their own arrangements. A good lens, with an instantaneous shutter, a light folding tripod, and a waterproof focussing cloth, together with the camera and three of the slides in a sling case, would complete the kit carried on the photographer's person. Surely not a very terrific load for an able-bodied man, in addition to at least a revolver and the other minor paraphernalia of active service.

Dishes, of course, would be nested, and of such unbreakable material as may be preferred, and equally, of course, if the bottles can also be, as suggested by a correspondent, of celluloid, an additional advantage would be secured. The chemical chest need be a very small one, for a very limited quantity of concentrated solutions will develop a large number of plates, and the D. or B. Photo Section can always be fallen back on for more if required. A bottle of methylated spirit should be carried for quickly drying developed negatives, and a small bottle of hydro-

chloric acid for use with the Pizzighelli printing paper. No special dark lamp is required, as a little ruby fabric folded round the camp-lantern is quite enough for all practical purposes. In the matter of printing, one printing frame and a few dozen sheets, ready cut to size, of bromide and of Pizzighelli platina paper, form an ample equipment. And these, with any particular odds and ends which may be fancied, constitute about all that need be carried by an individual military photographer in the field unless, indeed, he is accompanying a very small force, or is otherwise separated from the D. or B. Photo Section.

Turning to the Divisional or Brigade Photographic Section, I find myself again at a loss to lay down any hard and fast rules as to details of equipment. A camera for plates 12 in. by 12 in. would be required, with two or three double backs, and an extending front for copying and enlarging purposes. A folding easel or copying frame would be a useful adjunct, and in most cases it might be advisable to carry one of the many excellent portable dark tents which are in the market, and which are almost all constructed substantially on the same plan. In the matter of developing and printing materials, the equipment of the Divisional or Brigade Photographic Section

would necessarily be somewhat liberal, but there is no reason whatever why it should be extravagant. Provided the utmost simplicity is studied, and the utmost care taken not to make failures, it will be found that sufficient material for scores of negatives and hundreds of prints can be packed into an incredibly small space. And it should be clearly understood in this connection that when photography comes to be systematically applied, as it soon will be, to military purposes, it will be the business of military photographers to husband their materials as much as possible, and not to fire off plates on every possible opportunity in order to secure "mementoes" of the campaign, or groups of friends, or any nonsense of that sort.

Some may think the above rather a meagre outline of meagre suggestions. But it must be remembered that the whole idea of Divisional or Brigade Photographic Sections, with individual photographers working in concert with them, is at present but an idea, and, therefore, to carefully formulate kits down to pounds of this and ounces of the other would be premature. But it is not premature to do, as I have done—namely, endeavour to show that Photography could be employed even on active service with very little trouble, at small expense, and, above all, without

taking up an appreciable amount of transport. My old chief in the Q.M.G.'s Department in India, the late Sir Charles MacGregor, used always to contend that, if Photography was ever to be used successfully in the field, the photographer must be well to the front; and this he cannot be if he is to be accompanied by lumbering vans or huge packing cases. Above all else, he must be mobile, and perhaps I may be permitted to add, by way of conclusion, that, if he can be both mobile and useful, the sooner he springs into existence as an integral and recognised factor in our army, the better.

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