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NOTICE BIBLIOGRAPHIQUE

Auteur(s)	**Beck, Richard**
Auteur(s) secondaire(s)	**Beck, Joseph**
Titre	**Beck phase contrast**
Adresse	**London : [s.n.], [1955]**
Collation	**1 vol. (112 p.-1 f.) : ill. ; 23 cm**
Nombre de vues	**15**
Cote	**CNAM-MUSEE IS0.4-BEC**
Sujet(s)	**Microscopes Appareils et instruments scientifiques -- Industrie et commerce Grande-Bretagne -- 20e siècle**
Thématique(s)	**Catalogues de constructeurs Machines & instrumentation scientifique**
Typologie	**Ouvrage**
Note	**Fonds Brieux ; Joint à "Beck microscopes"**
Langue	**Anglais**
Date de mise en ligne	**15/03/2013**
Date de génération du PDF	**05/01/2026**
Recherche plein texte	**Non disponible**
Notice complète	https://documentation.arts-et-metiers.net/cgi-bin/koha/opac-detail.pl?biblionumber=9288
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Note de présentation des catalogues de constructeurs du fonds Brieux

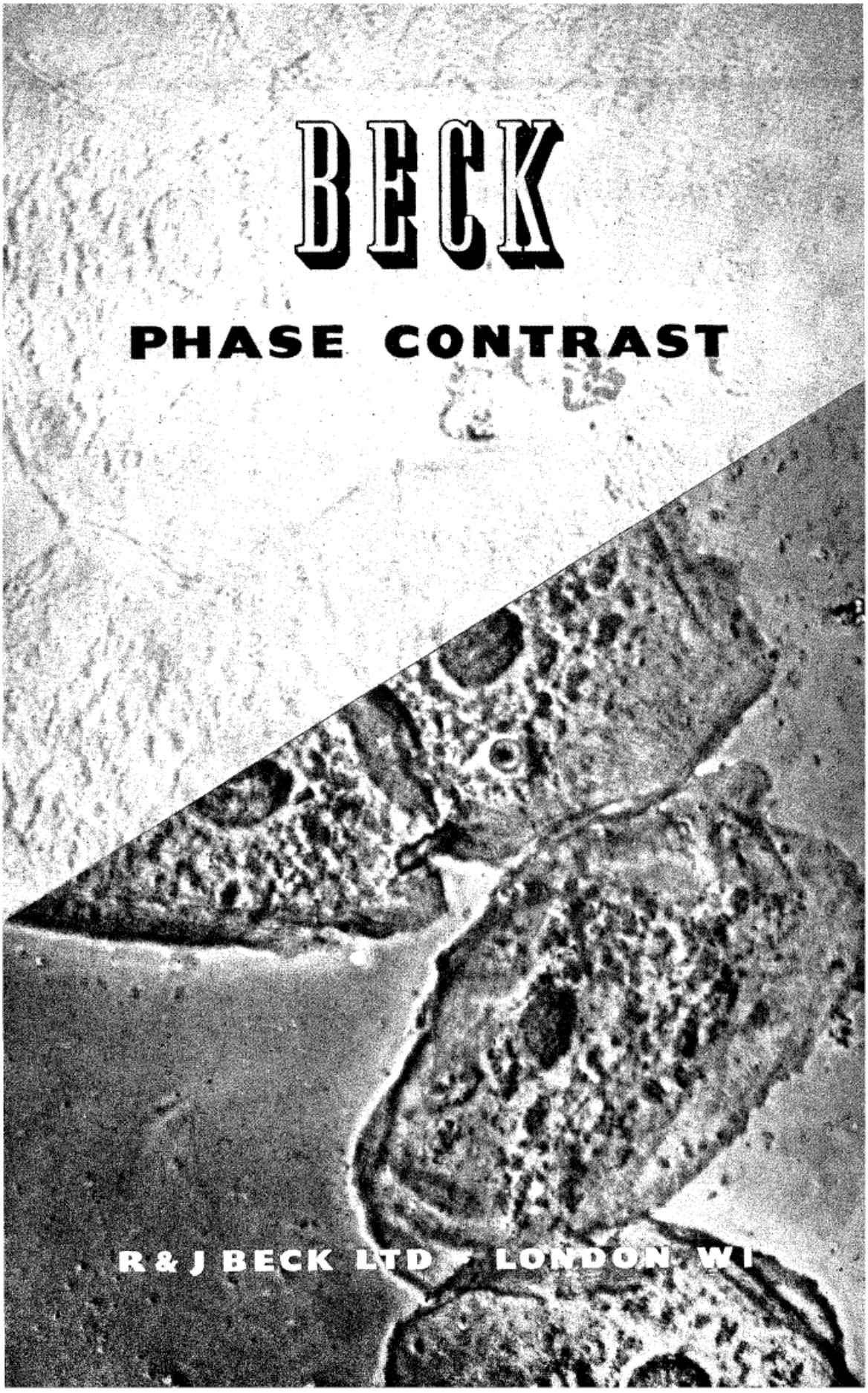
Le musée des arts et métiers a acquis en 2004 une partie de la bibliothèque personnelle d'Alain Brieux, libraire, expert, spécialiste des instruments scientifiques, dans le cadre de la vente publique : « Instruments de sciences et médecine de l'antiquité à nos jours : deux siècles de catalogues de fabricants français et étrangers (1739-1939) & Livres sur les instruments de collection de la fin du XIX^{e} au début du XXI^{e} siècle ».

Un ensemble de 186 catalogues de constructeurs a ainsi rejoint la collection du centre de documentation du musée . Le fonds Brieux, incontournable pour les historiens des techniques est aussi un outil précieux pour les chargés de collection du musée puisqu'il documente les objets concernant les domaines de la communication, de l'énergie, de l'instrumentation scientifique, de la mécanique. Hormis le catalogue de Van Musschenbrœk datant de 1739, l'ensemble couvre la période 1815-1970. Y figurent des constructeurs français (Adnet, Alvergniat, Brewer, Charrière, Chauvin, Deleuil, Lerebours, Nachet...), anglais (Amadio, Arnold & sons, Beck, Becker...) et allemands (Brückner, Geissler Nachfolger, Schlecher, Zeiss...). Ces documents se présentent sous forme de catalogues détaillés, notices techniques ou publicitaires. Riches en contenu, abondamment illustrés, ils sont le plus souvent accompagnés de tarifs, parfois de courriers.

Le choix de numériser ces catalogues s'est imposé de lui-même, de par l'homogénéité de ce lot et surtout devant l'intérêt historique qu'il représente : 182 volumes libres de droit sont désormais disponibles en ligne.

Notons que des catalogues de ce type, numérisés par d'autres institutions et accessibles sur Internet, sont recensés par The Scientific Instrument Commission.

Thierry Lalande
Musée des arts et métiers



FOREWORD.

Phase contrast illumination.

The method of illumination is recognized in all branches of microscopy as being of such importance that full advantage must be taken of all latest techniques, if the best possible results are to be obtained.

The phase contrast method supplements the more usual techniques of microscopical illumination and provides a means of studying certain detail not visible by any other method.

The method is particularly useful on living biological material which it would normally be necessary to fix and stain, since such specimens have little natural contrast arising from either colour of density variations. However, these specimens have inherent variations in thickness and refractive index which can, by the phase contrast method, be converted into variations of density. Thus, path differences through various portions of the specimen are rendered visible, the greater path lengths appearing darker in the observed image.

This booklet describes the method, the apparatus necessary for carrying it out and the way in which such apparatus is employed. It also gives particulars of a complete microscope for this type of work.

The most universal use of phase contrast illumination is in conjunction with transparent objects, with which the present booklet deals. The method has however been found of great advantage in the examination of polished metal specimens where the difference in refractive index in the various portions of the object does not apply, but where small inequalities of level can be amplified, thus rendering the detail visible. A special phase contrast vertical illuminator the " Vertiphase " has been developed for this work and a booklet fully describing the apparatus is available and will be gladly sent to anyone interested.

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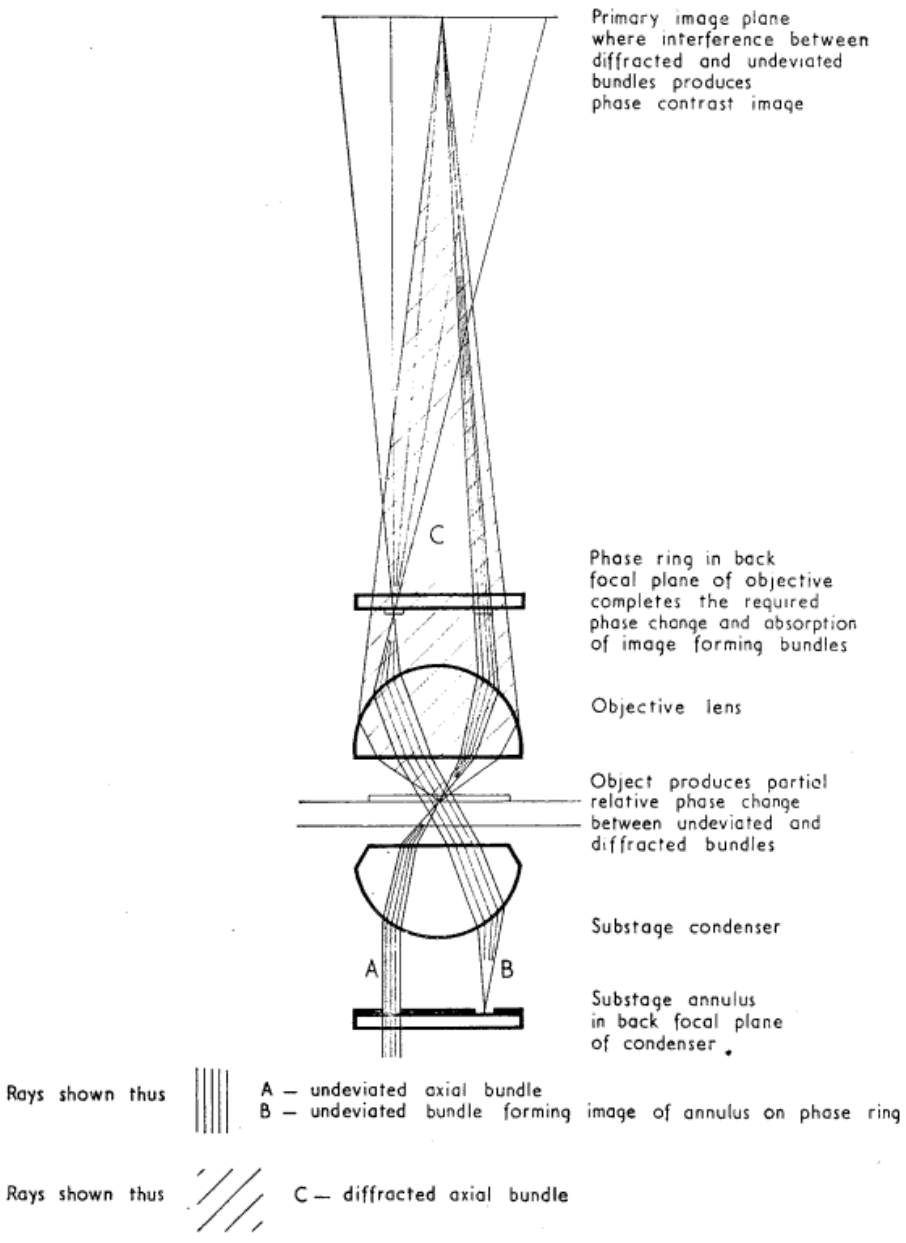
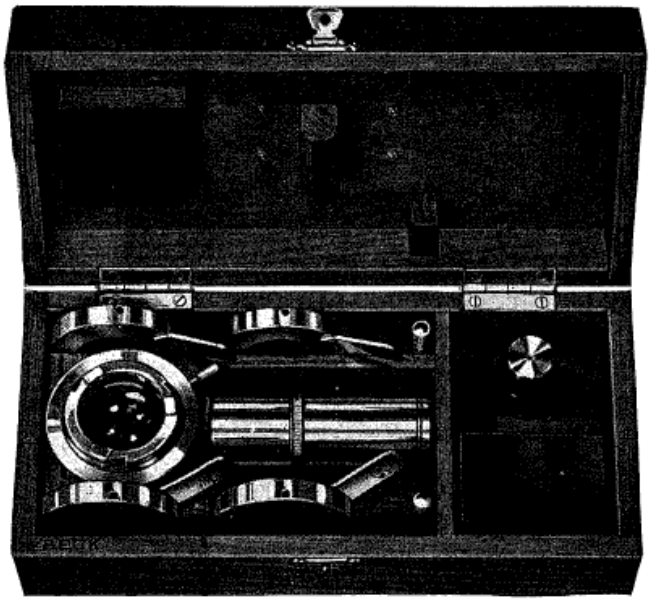


Fig. 1

System for phase contrast illumination of transparent objects

Phase Contrast Illumination

Reference to Fig. 1 will explain the method used and the apparatus employed for illumination by phase contrast. The essential requirements are a phase plate in the back focal plane of the objective and an annulus placed below the substage condenser. By means of the condenser with its annulus, which gives a bright ring of light, the object is illuminated by a hollow cone of rays. The object glass forms an image of the annulus in its back focal plane, as shown in the diagram by the bundle of rays (B). In this plane is fitted a phase plate consisting of a disc of glass with a depressed ring, matching the annulus below the condenser. The amount by which the phase ring is depressed changes the phase of the light passing through it by $\frac{1}{4}$ wave. By this means the light passing through the depression is rendered out of phase with the light scattered or diffracted by the object, shown in bundle (C) in the diagram and by interference with the light indicated by the undeviated bundle (A), is rendered visible to the eye.



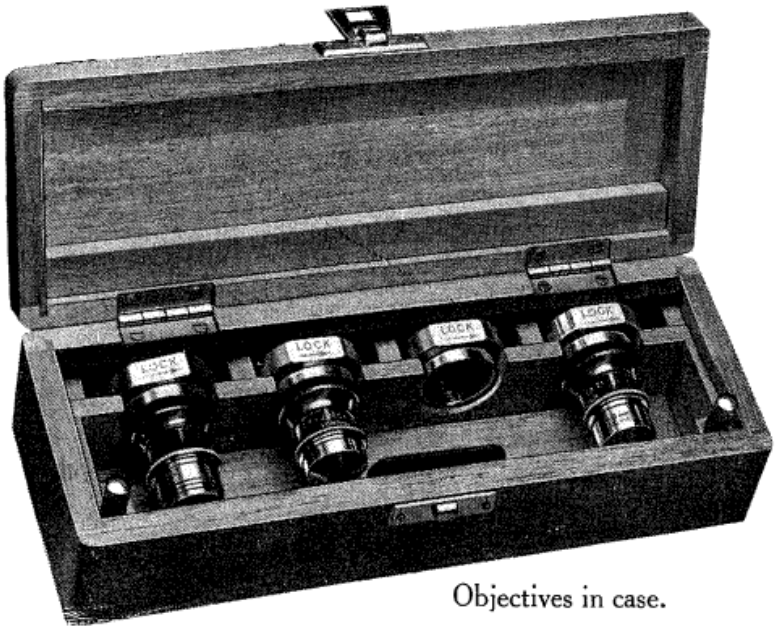
Phase contrast apparatus in case

The phase plate and the substage annulus are the essential requirements for this illumination and must be matched together. Each object glass must have its correct phase plate fitted in its exact position and a suitable substage annulus must be used in conjunction with it. The essence of the successful use of the method depends on the correct centration of the various apparatus and consequently the set of apparatus as supplied provides means of centring the annulus and the phase plate and for their correct alignment. In addition a special substage condenser is employed and an observing microscope is provided for the examination of the back focal plane of the objective to check the adjustment.

Phase Contrast Illumination

The apparatus is as follows :—

(a) Achromatic objectives 16 mm., 8 mm., 4 mm., and 2 mm., oil immersion, each in centring mount and fitted with its appropriate phase plate.



Objectives in case.

(b) Objective changer to fit nosepiece of the microscope, to accommodate above.

(c) Substage condenser, 14 mm. focus, standard R.M.S. diameter (1.52 in.) or with quick change ring to fit substages of No. 47 or No. 48 microscopes.

(d) Centring trays to fit below the condenser, one for each objective, each is fitted with the appropriate annulus. They are attachable to the condenser by a quick change method and each has engraved upon it the focal length of the objective with which it is to be employed.

(e) A filter to give green light from a white source or to filter out the " e " line from a mercury vapour lamp. This is used in front of the light source.

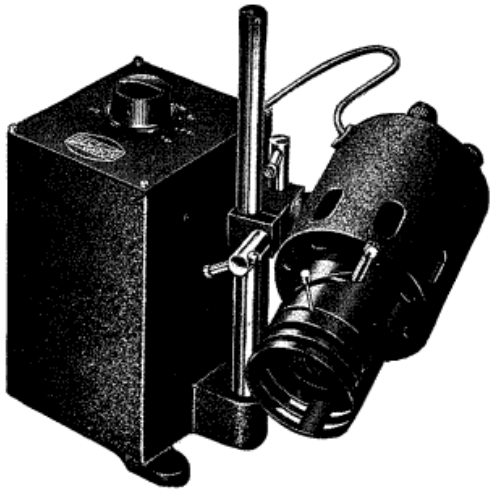
(f) Observing microscope to fit in place of the microscope eyepiece to view the back focal plane of the objective.

(g) A nosepiece pinhole diaphragm for centring.

(h) Cases to contain up to four objectives and four annuli.

The apparatus can be employed on most standard microscopes, preferably those fitted with centring substages.

As indicated on page 9 the illuminating source is of great importance. The Tenslite lamp fulfils all the requirements. This lamp is a powerful illuminant and is a complete unit with its transformer built in. It is provided with a dimming switch, so that the intensity of the light can be regulated to the amount required to suit the object under examination. The general design of the lamp may be seen from the illustration. It has full mechanical adjustments for raising and lowering and for setting at the correct angle. It is provided with a corrected condenser, which has a focussing adjustment, an iris diaphragm and slots for the accommodation of light filters or neutral screens. The bulb has an individual



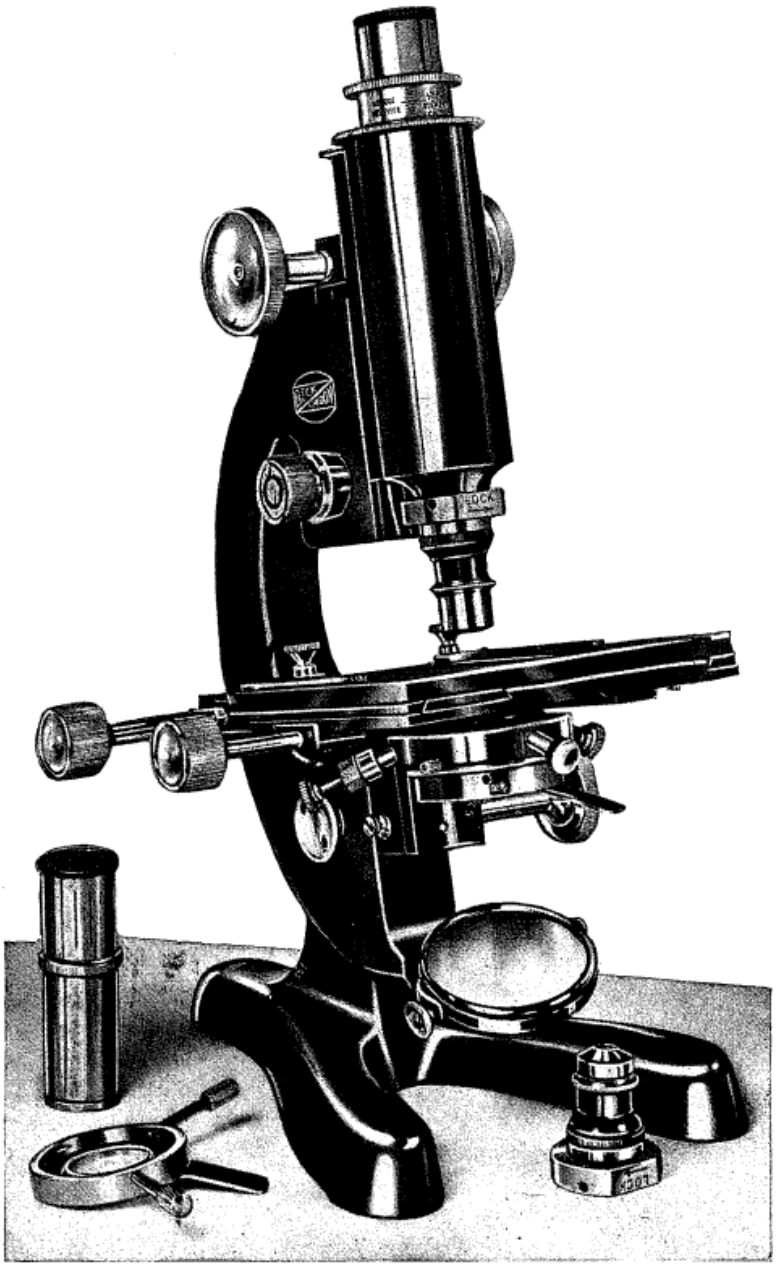
No. 3516

centring adjustment operated by two rotating milled knobs at the back of the lamphousing to centre the filament accurately in relation to the condenser and iris diaphragm. The illuminant is a 6 volt, 48 watt lamp with a closely coiled filament of the solid source type. The lamp can be run off any alternating current from 200 to 250 volts.

No. 1997. Phase contrast apparatus for transparent objects, consisting of condenser, nosepiece changer and keys, light filter, observing microscope and case to contain above with four annulus trays ... ...

Achromatic object glasses in centring fittings and appropriate annuli in centring trays :—

No. 3231P	$\frac{2}{3}$ in.	16 mm.	N.A. 0.28	
No. 3232P	$\frac{1}{3}$ in.	8 mm.	N.A. 0.54	
No. 3234P	$\frac{1}{6}$ in.	4 mm.	N.A. 0.85	
No. 3235P	$\frac{1}{12}$ in.	2 mm.	N.A. 1.3 oil immersion	
No. 1822	Case to contain four object glasses in centring fittings ...			
No. 3482	Nosepiece pinhole			
No. 3516	**Tenslite lamp** with ground and green glasses			
No. 3517	Spare bulbs for above			each



Phase contrast microscope

No. 2281

Phase Contrast Microscope

This microscope consists of the Model 47L with the special attachments for phase contrast illumination, for use with transparent objects. The microscope is illustrated on page 6 and the following is a brief specification of the instrument.

The base and limb are substantial, giving complete rigidity. The limb is hinged for inclining the instrument.

Focussing adjustments are two fold, coarse and fine, each with milled heads on both sides of the limb. One milled head of the fine adjustment is graduated, each division being equal to .005 mm.

The bodytube is of large size and is fitted with a graduated drawtube.

The stage is of large size and carries a built-in mechanical stage giving a vertical travel of 1 in. and a horizontal travel of 3 in. It is fitted with scales and verniers reading to .1 mm.

The mirror is double, plane and concave, with complete adjustments and clamp to prevent accidental movement after the instrument has been centred up.

The nosepiece is of standard R.M.S. gauge and carries the centring object glass fittings provided with the phase contrast set.

The substage has rack and pinion focussing and also centring adjustment which can be locked when the condenser is in correct centration. It carries the condenser by means of a quick changing device, so that when the microscope is used for work other than by phase contrast illumination, a rapid interchange with other condensers or dark ground illuminators can be made. The special substage condenser for phase contrast illumination is so made that an iris diaphragm may be attached to it for other work, and this fitment is provided with the microscope.

The case of the microscope is of hardwood, with carrying handle and lock and key. The objectives with their centring fittings and the phase contrast apparatus are contained in separate cases as illustrated on pages 3 and 4. This ensures their safety and protection from dust. All apparatus should be replaced in the cases when not in use.

The phase contrast apparatus is as described on page 4 under No. 1997 together with 4 achromatic object glasses, in centring fittings with their appropriate annuli. The object glasses are Nos. 3231P, 3232P, 3234P and 3235P A pinhole to fit the nosepiece for assistance in centring is also included.

Eyepieces are supplied in two powers x6 and x10.

No. 2281 Phase contrast microscope, with complete optical equipment, in cases ... ...

The use of the apparatus

The user would be well advised to accustom himself to the actions of removing and replacing both the annulus trays and the objectives with their centring fittings, before attempting to set up for phase contrast work. If the Beck phase contrast apparatus is correctly set up, there should be no need to re-adjust it over long periods of use and the observing microscope need only be employed for an occasional check on the adjustments.

The substage unit :

An inspection of the substage unit, in conjunction with the Fig. 2, will show the principal parts of the unit.

The condenser (A) is mounted into the substage fitting (B), into the lower end of which is fitted the steel ring (C). An " F " is engraved on the front of this ring, to denote its position with reference to the microscope. There are three cam faces on the edge of this ring and also three registration faces on the under-surface.

The annulus tray (D) locates on to the ring (C) by means of the two screws (G) and the sprung plunger (K).

In the centre of the tray (D) is fixed the annulus (I), which is a transparent ring on an opaque background, of a diameter suited to the objective, the focus of which is engraved on the handle (H) attached to the tray (D). The annulus is protected on both faces with glass and may be cleaned without damage. It is inadvisable to remove the annulus from its individual tray.

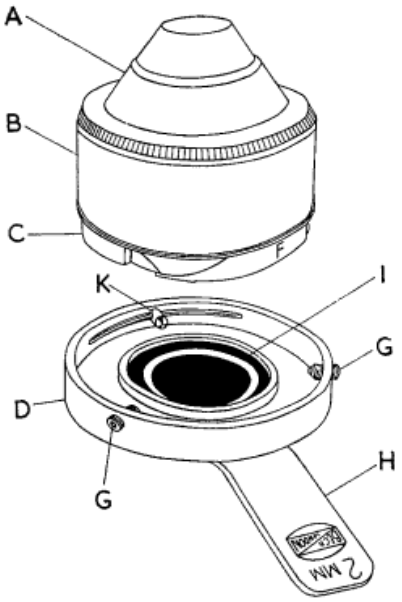


Fig. 2

When the condenser is in position on the microscope, the tray (D) is held below, and concentric with, the ring (C). The handle should be set at about 30 degrees clockwise past the " F " engraved on the steel plate. The tray is lifted towards the ring (C) locating the plunger (K) and the screws (G) into their cam slots. When the tray covers the ring (C) it should be rotated counter-clockwise until the handle (H) is brought to the front, in line with the letter " F."

Centring is brought about by adjusting the screws (G), which have hexagonal holes to fit the two keys contained in the apparatus box. When centred, the tray should be removed and replaced, to make certain that the location is correct.

To remove the tray, hold the handle (H) and rotate clockwise about 30 degrees, then lower the tray to clear the ring (C) and remove. Always place the tray into its slot in the apparatus box when not in use.

The quick-release centring objective changer.

Fig. 3 shows the adapter (L) which is secured on to the body of the microscope so that the engraved letter "F" is towards the front. The letter "F" should be erect. The clamp ring (M) passes through the adapter and is engaged in the R.M.S. thread of the nosepiece and clamped home with the key (R) provided. There are two slots in the lower surface of the clamp ring (M) to take the key.

Screw an objective into the female R.M.S. thread of the centring fitting (N) and hold it below and concentric with the adapter. The flat surface on the centring fitting (N) engraved with the word LOCK must be held about 30 degrees clockwise past the letter "F" on the adapter (L).

Raise the centring fitting up to the adapter until the latter is covered. Now rotate the centring fitting counter-clockwise until the flat surface marked LOCK is towards the front, over the letter "F."

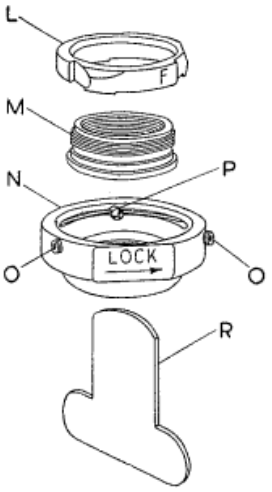


Fig. 3

Insert the two hexagonal-ended keys into the corresponding holes in the two screws (O) and adjust the objective for centre. Tension is maintained by the spring plunger (P) throughout the adjustment.

Remove the keys.

The centring fitting, complete with objective, is removed by rotating it clockwise 30 degrees. It will withdraw downwards from the adapter (L). The objective should be tightened home as hard as possible and the assembly of the centring fitting and objective should be kept in the apparatus box when not in use.

The microscope body should always be racked up at least half an inch before either removing or attaching a centring fitting.

Keep the contact faces of the changers free from dirt and immersion oil.

Lamp requirements.

The first requirement of the lamp unit is that its condenser shall have a minimum diameter of 1 in. This is necessary in order to fill the field of the 16 mm. objective using an x6 eyepiece when the lamp condenser is 14 in. from the annulus tray.

Light source size is also of importance, since it should be of such dimensions that the magnified image of the light source produced by the lamp condenser at the position of the annulus tray is 1 in. x 1 in. This is necessary to fill the annulus employed with the 2 mm. objective.

The Tenslite lamp as illustrated and described on page 5 fulfils all the requirements.

Setting up the microscope

(1) Adjust lamp and condenser so that the light is passing out along the axis of the condenser, and the image of the light source is focussed 14 in. from the condenser. Insert filter for green light in beam.

(2) Set up the microscope stand with the pinhole in the nosepiece, and a low power eyepiece. Remove the substage condenser and turn the flat face of the mirror towards the light.

(3) Place lamp and microscope in such positions that the distance between the lamp condenser and the annulus tray is 14 in. when the substage condenser is in position. Throw the beam of light from the lamp on to the centre of the mirror and so adjust the mirror that the lamp iris, when closed to a small diameter, is seen centred in the microscope eyepiece. Clamp the mirror in this position.

(4) In the case of a microscope having substage with a tubular fitting of the standard R.M.S. size, 1.52 in. insert the condenser direct into this, with the letter "F" facing the front of the microscope. In the No. 2281 microscope and also on our No. 47 and No. 48 microscopes, the centring substage is of the quick change type in which the condenser is held in a flanged ring and the attachment and removal is carried out as described in the "Handbook of the Beck Microscope." It should be secured in the flanged ring by means of the clamping screw in such a position that when fitted in the substage, the letter "F" engraved on the lower part of the condenser mounting, will face the front of the microscope.

When the condenser has been fitted to the substage, it should be focussed upward until the top surface of the condenser is level with the stage. The centring screws of the substage are now operated until the image of the lamp condenser is once more central in the eyepiece. In the quick change substage referred to above the clamping collar of the spring plunger should then be tightened to keep the condenser truly centred.

If a microscope without a centring adjustment to the substage is employed, this second centring will have to be made by moving the mirror, but we stress that if there is a large error in the centring of the substage condenser, there will be difficulty when attempts are made to set the annulus image on the phase plate of the objective lens.

(5) Where centring objective fittings are employed, the following procedure should be adopted in order to centre the objectives. Where such is not the case proceed to (6).

Remove the pinhole, and fit the adapter (L) Fig. 3 to the microscope body. It is advisable to remove the whole body of the microscope, as the adjustments may be upset if the stand is jolted during the clamping of the adapter.

Fit the 16 mm. objective to a centring mount and fit on to the adapter. Close the lamp iris and centre its image in the field of the eyepiece using only the adjusting screws of the centring fitting (N) Fig. 3, for this purpose. This will necessitate focussing the objective.

Place an object, that has some well defined mark such as a crossline, on the stage. Adjust the object upon the stage until the selected mark is central in the field of the eyepiece, being careful to move nothing but the object.

Remove the 16 mm. objective with its centring fitting. It is important to make sure that, after centration, the object glass is not unscrewed from its fitting. It is also of advantage to remove and replace the object glass with its fitting several times, as a check, to make sure that the location has been correct during centration.

Attach the other objectives in order of power and repeat the procedure until all are centred, using the mark on the object as the reference point. It is advisable to re-check the position of the reference point during the adjustment of the higher powers by occasionally examining its centration in the field of the 16 mm. objective. With this objective, the image of the lamp iris can be seen at the same time as the reference point and any change in the adjustment of the substage can be detected.

When all the objectives are satisfactorily set, then continue to adjust the annulus trays as from section (6).

(6) Open the lamp iris fully. Fit the lowest power objective and attach the annulus tray which corresponds to it. Rack down the objective to approximately its correct working distance, having first placed a 3 in. x 1 in. slide on the stage. Remove the eyepiece and replace with the observing microscope. Focus the phase ring on the objective by sliding the eyepiece of the observing microscope in or out, when a field will be seen as in Fig. 4.

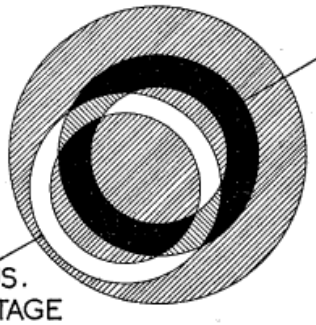


Fig. 4

Using the methods given earlier, centre the bright image of the substage annulus on to the dark ring of the phase plate, taking care not to change the setting of anything other than the centring screws of the substage annulus tray.

The image of the annulus may not be equally illuminated all round its circumference. This is due to the non-homeogenity of the light source. The filament centring screws of the Tenslite lamp should be operated until the dark shadows are no longer apparent.

When adjustment is complete, the dark ring should slightly overlap the bright annulus image on both the inside and outside diameters, as shown in Fig. 5.

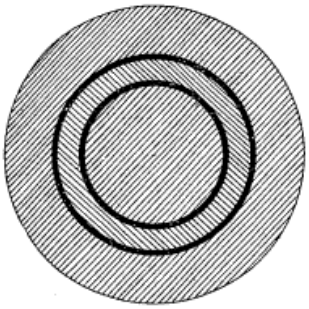


Fig. 5

(7) Two troubles may be encountered during this adjustment. They are :—

(a) The annulus image may not be bright. This can be rectified by slight adjustments of the objective working distance or by focussing the substage condenser slightly.

(b) The bright annulus image may be misshapen (as shown in Fig. 6) and will not fit the dark annulus. This is due to alignment errors between the substage condenser and the objective lens.

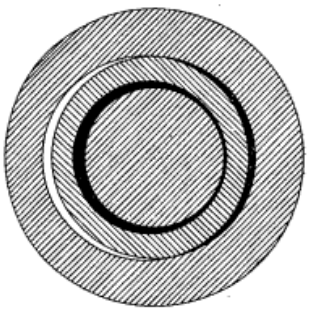


Fig. 6

If this latter condition is experienced with a microscope fitted with centring objective fittings, re-check the centring of the objective. If the fault occurs when centring objective fittings are not employed, it can be corrected only by off-setting the true centring of the substage condenser until it agrees with the objective. If the latter expedient is resorted to, one of the big advantages of the Beck system will be lost, namely, that when all units are centred, there is no need to remove the eyepiece and insert the observing microscope at every change of objective.

(8) Repeat the actions of Section (5) with the remainder of the objectives and annulus trays until all are centred. The 2 mm. lens must be oil-immersed during the adjustment.

(9) Remove the observing microscope and replace by eyepiece of suitable power.

The microscope is now ready for observation.

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PHASE CONTRAST APPARATUS.

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