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WILD M 20 MICROSCOPE

INSTRUCTIONS FOR USE

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WILD M 20 MICROSCOPE
INSTRUCTIONS FOR USE

To our customers,

Having acquired our M 20 microscope, you are now in possession of a first rate research instrument, incorporating the most recent theoretical and practical advances in the field of general microscopy. We have done our very best to provide you with an instrument of quite outstanding quality, both with respect to its optical and mechanical performance. In accordance with this we guarantee for:

> the quality of every instrument. This goes without restriction with regard to eventual breakdowns resulting from either faulty manufacture or material. It does not include however damages due to careless or faulty manipulation.

It is quite clear that a precision instrument of this kind must be handled with all proper care, if it is to give its owner satisfaction and unremitting reliability over many decades. We advise you therefore to read this manual carefully **before** using the microscope and to memorise every single operation. This will enable you to make the fullest use of the M 20's wide scope of possibilities without risking unsatisfactory results. Our representation and ourselves as well will gladly assist you in any problem which may arise in connection with microscopy.

Wild Heerbrugg Ltd.

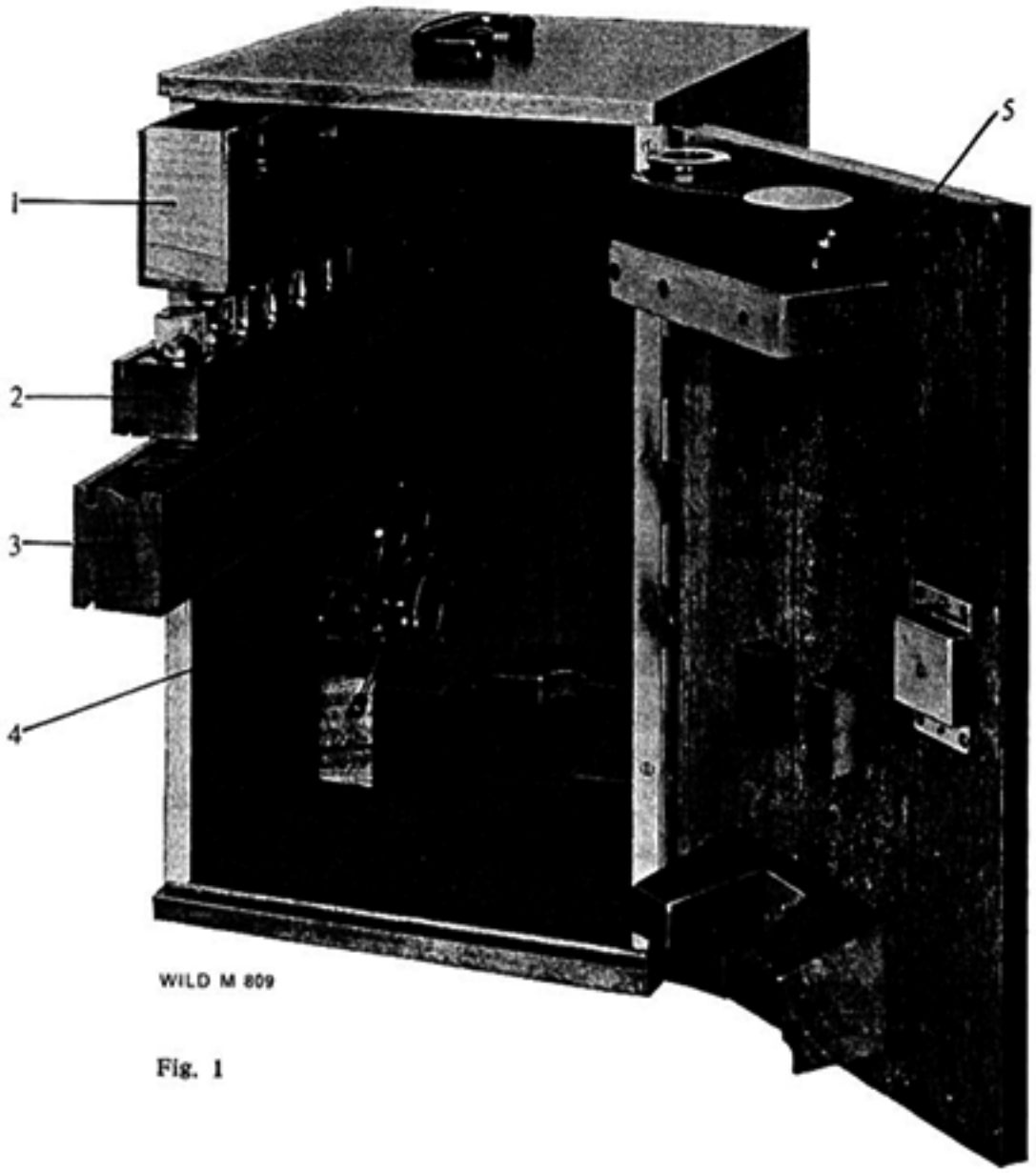


Fig. 1

M 20 Cabinet

1. Drawer for small accessories and filter exchanger
2. Drawer for objectives
3. Drawer for eyepieces
4. Fixing device for additional condenser
5. Fixing device for tubes (photo tube, monocular straight tube), ball-seat mirror or centring inset.

I. Setting up the instrument

For transport the M 20 is screwed to the base of its cabinet. It can be loosened easily from below and then be withdrawn from its guide rails. After having removed the wooden block (fig. 13) which takes the weight off the fine adjustment and also the paper pads, the mirror can be put into the corresponding socket on the base plate (always provided that the M 20 be equipped with such a mirror). For transport the socket lamp and also the built-in illumination (without its bulb) can be kept in their places on the base plate (fig. 2).



Fig. 2



Fig. 3

Instead of the mirror carrier, the set screw mirror, centring inset or socket lamp may be set up.

In order to increase the handiness of this brochure, page 28 with fig. 18 can be foldet out.

First the support (2) is raised by means of the coarse adjustment (7). Then the objectives, which are kept in their covers in the medium drawer are to be screwed carefully into the four- or six hole nosepiece (3) without touching the front lenses. This is best done by seeing to it that the objectives of growing magnification are placed clockwise. In order to do this the nosepiece may be withdrawn from its guide rails (2). Be careful to push it in completely after the objectives have been screwed in. (As to cleaning the optics, see pages 17 and 21.)

A medium powered eyepiece or pair of eyepieces (10×) which can be found in the lower drawer of the cabinet, is first inserted into the tube (1a). Now the fine adjustment (8) arranged on both sides of the stand like all other operating knobs, is actuated until the line marker, situated on the right side of the stand is being straddled by the double line which indicates the total range of movement of the fine adjustment.

The fine adjustment drum is divided into 2μ intervals. Since there is practically no back-lash, ½μ intervals can be read off with sufficient accuracy.

If the coarse adjustment (7) happens to be either too hard or too easy its run may be adjusted by means of a knurled ring situated on the right hand coaxial movement. Braking is done by turning it counter-clockwise. The condenser movement (5) also can be adjusted in run by turning both knobs in opposite senses.

Focusing

is best done with medium magnification (10× objective, 10× eyepiece). The support is lowered by means of the coarse adjustment until the objectives nearly touches the preparation. It is absolutely necessary to observe this operation from the side. Due to the convenient size of the objectives and the spring mount, the slides cannot be harmed as long as they are at normal height. Then the condenser (6a) with front lens swung in (6c) is raised into its highest position by means of the rack and pinion movement (5). The aperture- (condenser iris diaphragm) is now opened completely.

Now either chapters A, B or C must be consulted, according to whether the instrument is equipped with a mirror, the built-in illumination or the socket lamp.

A. Setting up the illumination by means of mirror

The mirror (fig. 2 or 7), a simple plane/concave rotatable mirror or a plane/concave set screw mirror with fixing device, is directed towards a window or other light source and adjusted in such a manner that the field of view appears bright when looking through the eyepiece (the concave face should never be used with a condenser).

The support is now raised by means of the coarse adjustment until the preparation is seen clearly. Final focusing is done with the fine adjustment knob. By further adjusting the mirror the field of view can be evenly illuminated. When using low magnifications it may happen that objects such as window frames, etc. appear in the image. If so the condenser is lowered slightly until these vexing images disappear.

When working with day-light be careful so as not to use direct sun rays. It is recommended to use a window facing North. Setting the aperture generally best suited for visual observation is done by following the rules given on page 14.

Day-light illumination has of necessity many draw-backs, such as lack of contrast because of the large light field, low intensity for high magnifications, variations of luminosity and changements of colour temperature, etc. In order to make full use of the optical qualities of such an outstanding research instrument the use of an artificial source of light is a must. Maximum effect of the light source is attained by observing the Kœhler lighting principle, easy to realise with the M 20.

B. Adjusting the built-in illumination

This illumination consists of:

a. transformer with special cable (11)
b. lamp housing with socket (10e) special bulb, collector and field diaphragm (10b)
c. clamping lever (10c)
d. centring inset (10a) with filter ring

First the transformer is set to the local mains tension by means of the voltage selector. It is then branched on the mains on one side and connected with the lamp housing on the other. In order to get maximum life expectancy the bulb should if possible be fed with sub-tension. The outer knurled ring of the lamp housing, already fixed to the stand, is loosened, whereupon the lamp socket can be withdrawn. The special bulb (6 V/20 W) is now screwed carefully into this socket. The bulb may be found in the uppermost drawer of the cabinet, packed separately. Now the lamp socket is again pushed into the housing. However it must not yet be clamped tight. Now the lamp may be lighted (switch on transformer housing). The light field iris diaphragm of the built-in illumination is then closed somewhat counterclockwise (marked by red arrow, 10b). The ground glass filter supplied is put into the filter ring of the centring inset. The lamp socket can now be moved in the sense of the longitudinal axis of the lamp housing until the image of the incandescent filament appears on the ground glass filter. (To be quite correct, the filament should appear in the lower focal plane of the condenser. This can be achieved by closing the condenser iris diaphragm and depicting the filament on its lamellae. (Do not forget to reopen the diaphragm!) The lamp socket can now be clamped tight by turning the outer knurled ring (10d) counterclockwise. In order to avoid direct contact of bulb and collector the built- in illumination is delivered with a stop ring. The ground glass filter is now removed from the centring inset. While observing through the eyepiece, the support is raised by means of the coarse adjustment until the preparation can be seen clearly. Final focusing is done with the fine adjustment knob. By slightly lowering the condenser the closed field diaphragm is brought to appear as clearly as possible in the plane of the preparation. The image of the field diaphragm can be brought exactly to the center of the field of view (fig. 4) by moving the centring inset (10a). The diaphragm is now opened until the field of view is fully illuminated. When changing the magnifications the diameter of this diaphragm must always be set accordingly. For further operations (setting illumination aperture) see page 14.

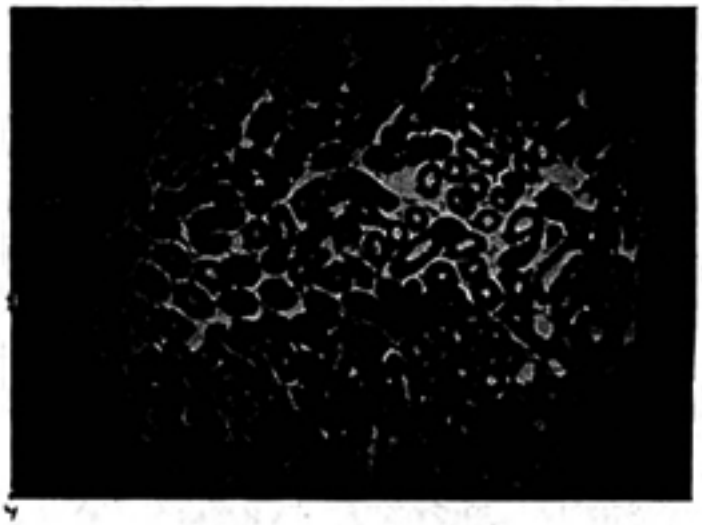


Fig. 4a

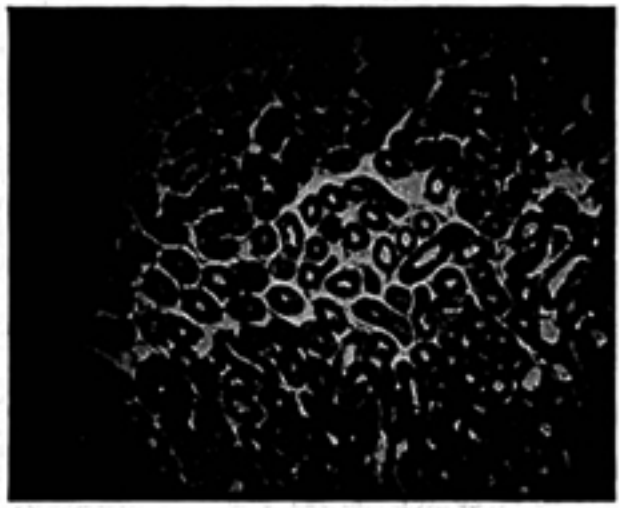


Fig. 4b

Should the clamping lever (10c) work loose by actuating it unvoluntarily, the adjustment of the built-in illumination must be checked according to chapter 7 on page 24. (Setting up and adjusting built-in illumination.)

The sliding head of the centring inset is connected with the cylinder by means of grease friction. In case the latter should get loose, for inst. when removing the centring inset cohesion may be achieved by pressing them slightly against each other. The mirrors, silvered on the surface, which are built into the centring inset and into the lamp housing, must not be touched with bare hands. Dust will be removed either with a fine hair brush or else with small rubber bellows.

The filter exchanger (fig. 5)

A novel type filter exchanger (9a) further adds to the usefulness of the built-in illumination. This device can be screwed into the instrument's base plate after having removed the cover screw (9b). Correct position is assured by a guide pin. This filter exchanger consists of an upper fixed part provided with four coloured reference marks and a lower mobile filter arm into which three filters may be placed. The middle opening of this arm is also marked with a reference line. Filters of 33 mm diameter may be used. Since they are placed into four different holes they are quickly and easily interchangeable and may be combined at will. This filter exchanger has a triple task:

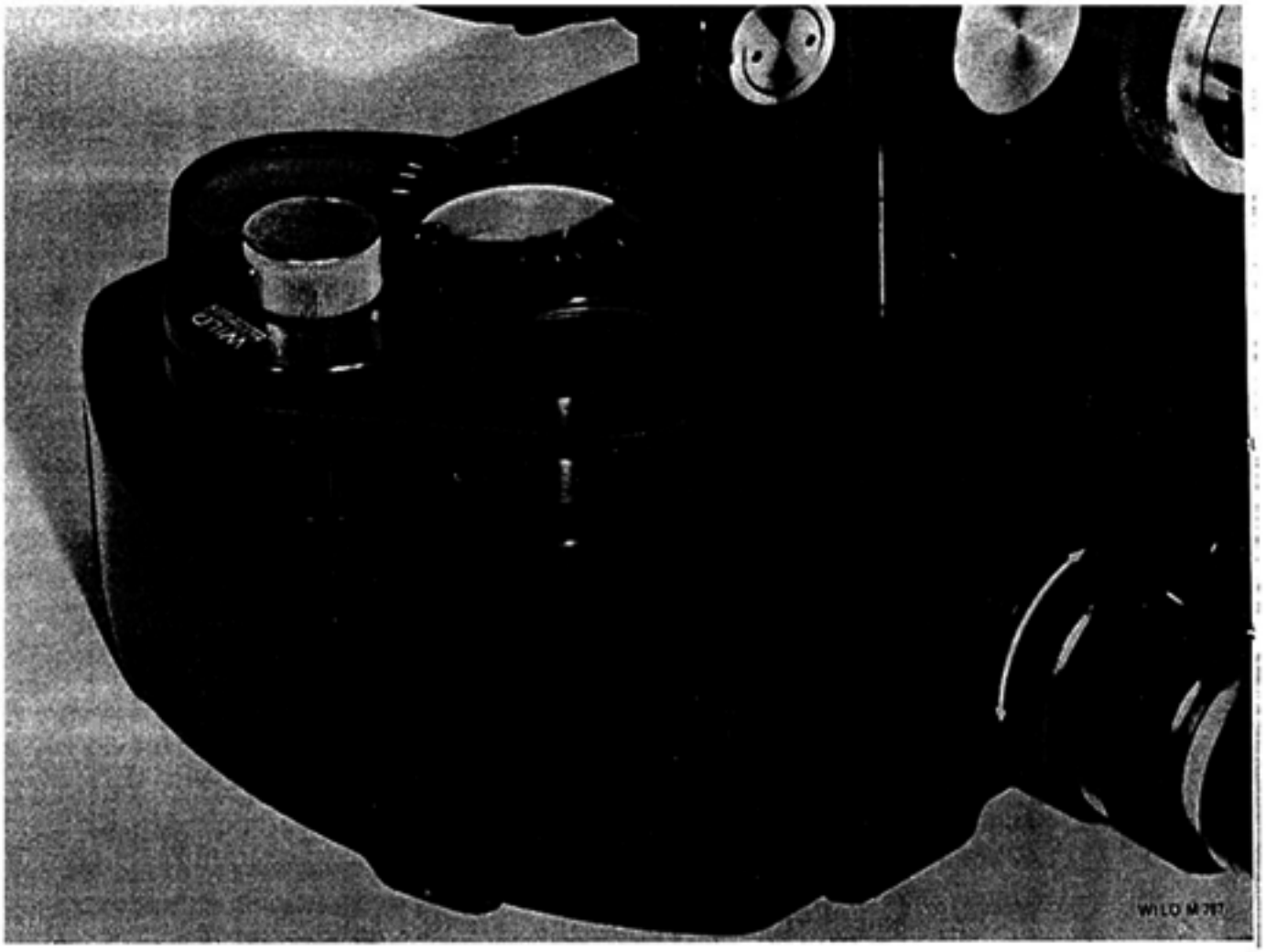


Fig. 5

1. Taking up contrast filters

These are placed into the lower arm and then easily swung into the path of rays. If needed, another filter is placed into the upper part. Thus every required combination is achieved without much ado.

2. Taking up the light regulator

This latter consists of two polarizing filters. One of these is placed into the lower part (middle hole) in such a manner that its engraved reference mark coincides exactly with the one in the filter arm. Light intensity is reduced by approx. $^1/_3$rd by this filter. If a second polarizing filter is set into the upper part and its reference marks coincide with the one of the carrier (head of the screw) light intensity is $^1/_5$th, on red $^1/_{10}$th, on yellow $^1/_{20}$th and on blue $^1/_{40}$th of the original value. Total darkness is obtained if set against the white line, which is perpendicular to the lower reference line. Any desired light intensity can be obtained between the various reference marks.

3. Taking up the polarizing equipment for M 20

in connection with the built-in illumination and filter exchanger, for binocular observation:

The polarizer is put into the lower, moving arm of the filter exchanger (middle hole) and orientated by means of the index mark. The compensator (Red I) is to be placed into the upper fixed bracket. A red index mark indicates its correct placement (45°). The analyser is now introduced into the opening provided for in the objective nose-piece (after having removed the latter from the tube carrier, fig. 6) so as to coincide its index mark exactly with that of the opening. The nose-piece is now again carefully slipped on its guide rails. Care must be taken to slide it in completely.

Apart from the above equipment another is available, the analyser of which is to be set onto the eyepiece (see special leaflet).

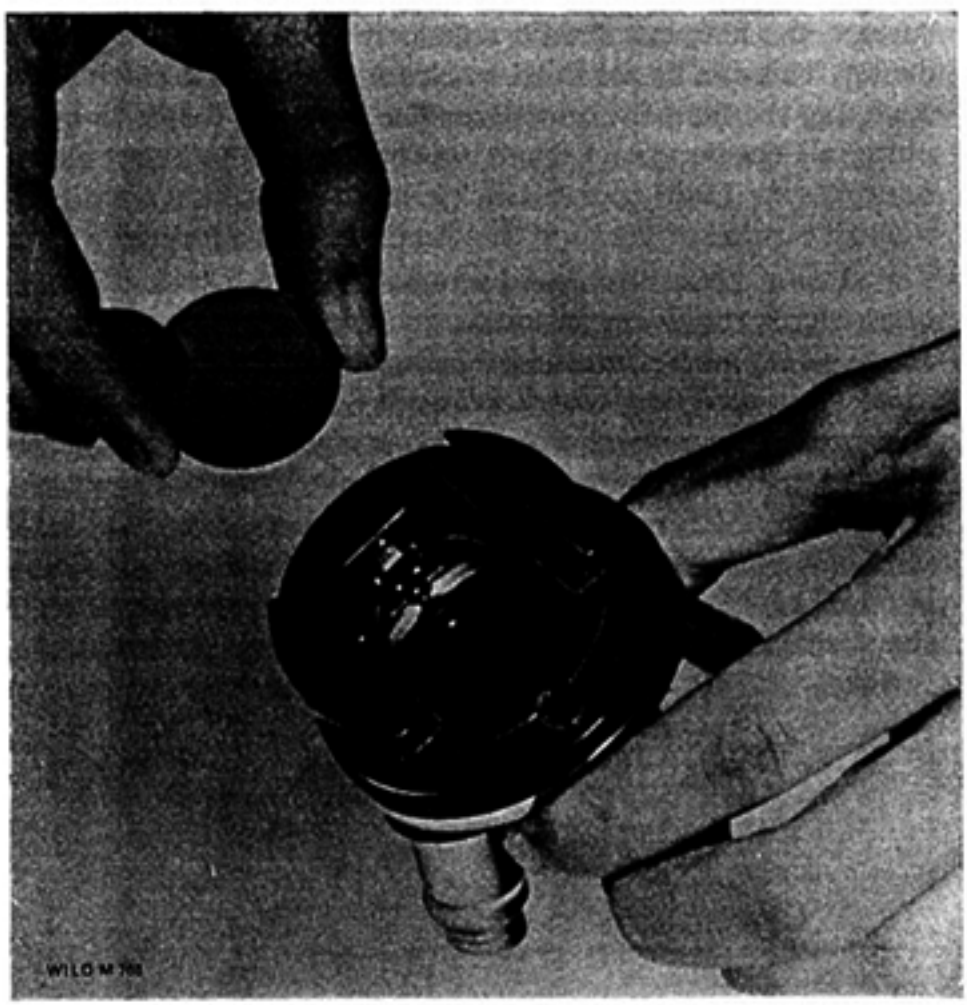


Fig. 6

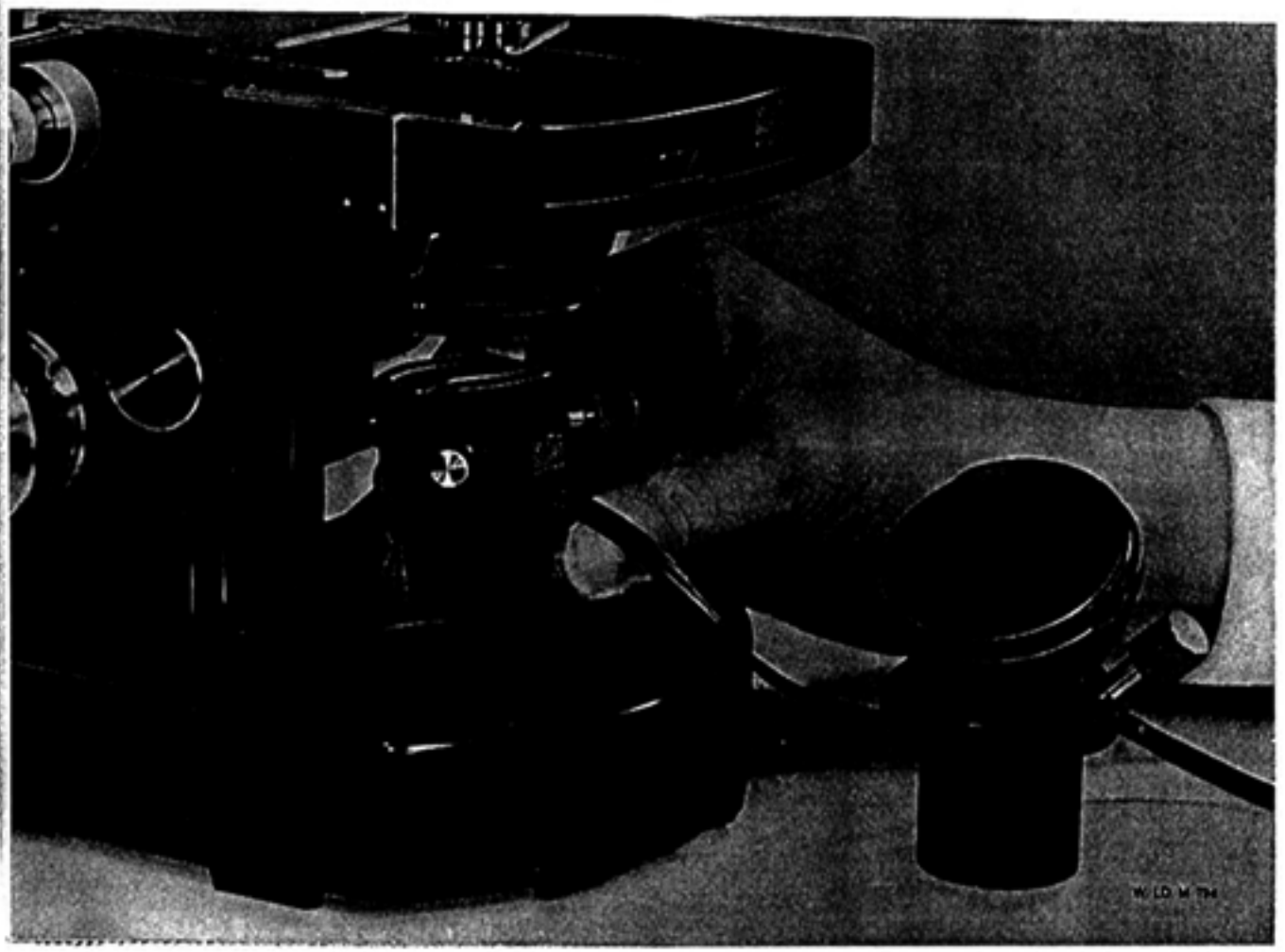
The interference filter carrier for built-in illumination

Here interference filters of 50/50 mm size are used which can be slipped into a spring frame. The interference filter carrier is to be put carefully onto the centring inset and clamped with the filter in horizontal position. By tilting the filter with the lateral operating knobs one obtains continuously changing colours. If need be the centring of the field diaphragm is corrected by moving the sliding inset.

C. Setting up illumination by means of socket lamp (fig. 7)

The socket lamp (6 V/5 W) is to be found already in the base plate. It is fed through a small transformer (plug-in transformer) in case of alternating current, or over a resistance when continuous current is used. In order to get maximum luminosity this lamp must be centred which is done as follows, using medium power lenses (10×):

Fig. 7



Remove eyepiece from the tube. Hold frosted blue filter which is part of the equipment over the eyepiece tube. In topmost position of the condenser (with front lens) there will appear the incandescent filament, when using a frosted bulb a light stain. Now actuate both centring screws of the lamp until the image of the filament or the light stain is perfectly in the center of the eyepiece opening.

To blot out the image of the filament introduce frosted blue filter into the filter ring of the socket lamp. Put eyepiece back into tube. In case of excess of light the brightness must not be reduced by means of the condenser diaphragm. Instead use an opalescent glass or grey filter. The support is now raised by means of the coarse adjustment until the preparation appears bright and sharp. Final adjustment is done with the fine adjustment knob. For further operations (choice of illumination aperture) see page 14.

Thumb rule for setting illumination- (condenser) aperture

Remove eyepiece from tube and close condenser iris diaphragm slowly, while observing through the tube. The best aperture for general observations is obtained when approx. ¼th of the bright objective aperture is shut off (see fig. 8). The eyepiece may now be put back intoplace.



Fig. 8

When observing visually the iris diaphragm should not be touched if possible. In order not to impair image quality the luminous intensity should never be controlled by means of this diaphragm nor must the condenser be lowered (see also brochure "The optical bases of Microscopy"). If need be the luminous intensity must either be reduced by changing the current input or by using the light regulator (described on page 10) or grey filters to be placed into the filter ring of the various illuminations. When changing the magnification the condenser aperture is to be set accordingly as described above.

As an exceptional measure the condenser iris diaphragm can be further closed in order to increase image contrast or depth of field. Be careful however not to impair the resolving power and therefore the performance of an objective.

Correct use of illumination in bright field

n. a. of objective	Double lens aplanatic condenser	Achromatic-aplanatic condenser
up to 0.1	concave mirror without condenser	
0.1 to 0.5	Plane mirror and condenser without front lens	
0.5 to 1.0	Plane mirror with complete condenser	Plane mirror and condenser with front lens n.a. 0.95
1.0 to 1.3	Plane mirror with complete condenser and condenser immersion	Plane mirror and condenser with front lens n.a. 1.30 and condenser immersion
Wide field condenser		
up to 0.1	Plane mirror and wide field condenser with fixed diaphragm	
0.1 to 0.2	Plane mirror and wide field condenser without fixed diaphragm	

For special purposes the set screw mirror can replace the normal mirror-carrier. It is fixed into the base by an eccentric clamp. The set crew mirror is centered with two screws, and once adjusted keeps its position under all circumstances.

Changing the objectives

All WILD objectives, except the achromat 3×, are parfocal. Beginning with WILD plane Fluotar 3× and Achromat 4× all objectives of higher magnifying power may be swung into the path of the rays without modifying the position of the stand. It suffices to correct slightly by means of the fine adjustment to get maximum sharpness. Furthermore the medium and high power objectives (beginning with Achromat 20 × and WILD Fluotar 20×) are spring mounted in order to protect both

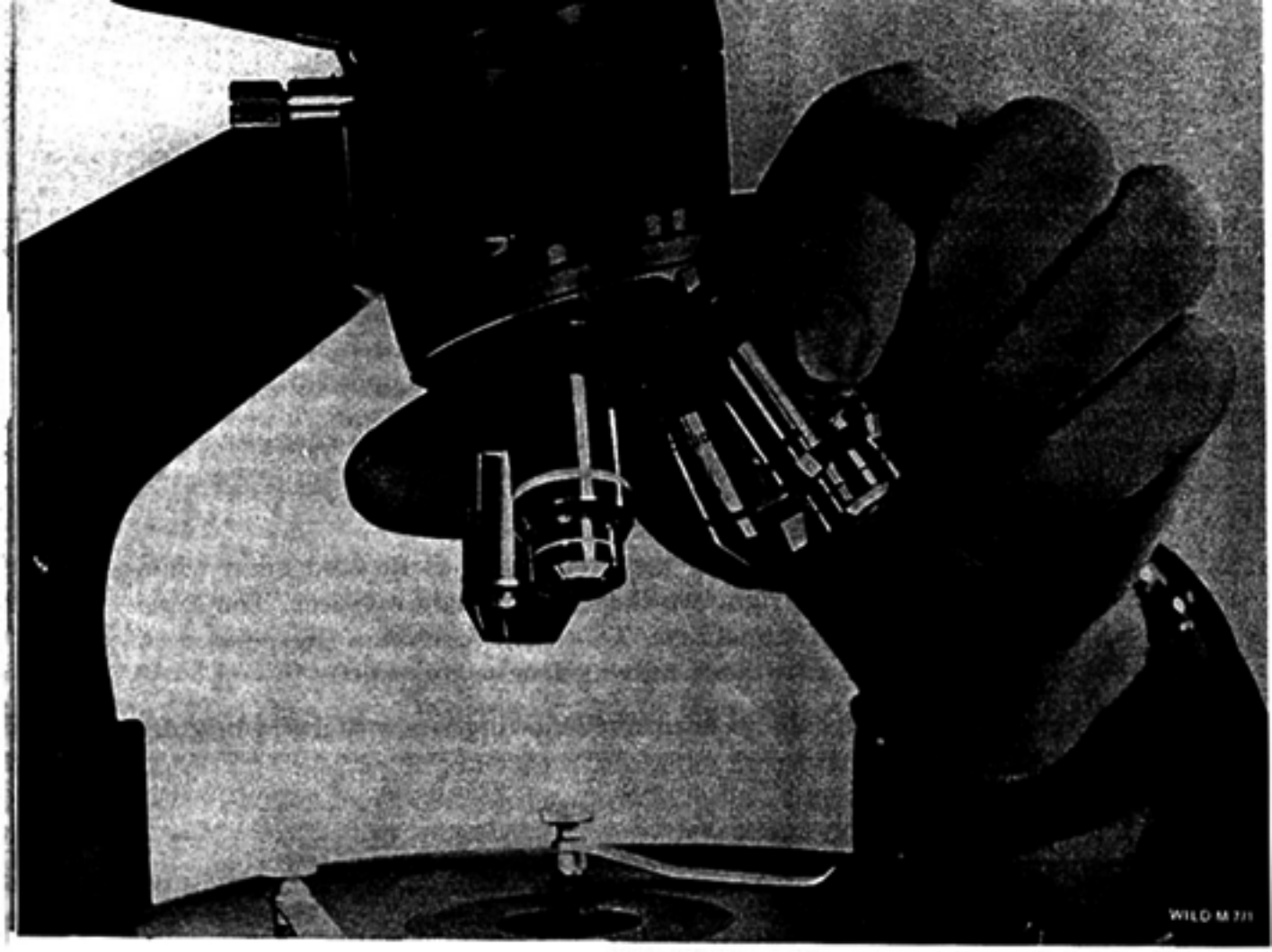


Fig. 9

preparation and objective front lens. When changing the magnification the objectives should be held near the nose-piece (fig. 9). This latter is then turned until it snaps into its stop. Do not touch the objective front lens (as to cleaning the optics, see pages 17 and 21).

The condenser aperture must be checked after having first removed the eyepiece in the manner described on page 14. When using objectives of higher numerical aperture than 0.65 it is necessary to swing in or slip on the condenser front lens.

Setting up oil immersion

In order to make full use of the high numerical aperture—and thus resolving power—of high power objectives (= immersion objectives)

it is necessary to apply a medium with higher refractive index than air (n = 1) between the preparation (cover glass) and the objective front lens.

WILD immersion objectives are calculated for use with immersion oil of 1.515 refractive index. They are marked HI (homogeneous immersion) In order to start observation with such an objective, the stand is raised. The immersion objective is then swung into place and 1 to 2 drops of immersion oil are applied to the preparation cover glass. Now the stand is lowered carefully until the front lens barely touches the oil. This operation is highly delicate and must be observed from the side. The stand is then lowered further while observing through the eyepiece, until the preparation appears sharply defined. The final correction is done by means of the fine adjustment knob. Be careful so as to avoid air bubbles in the immersion oil which might impair the picture quality.

The illumination (= condenser) aperture is set according to the rules given on page 14. If maximum aperture is required (n.a. 1.25 or 1.30) a drop of immersion oil must also be applied between the **object slide** and the **condenser front lens** (double immersion).

After observation the front lenses both of objective and condenser must be cleaned carefully. To this end the support is raised and the nose-piece removed from the carrier. (After cleaning it, **slide in completely!**) The condenser front lens is swung out, having first been lowered slightly. The other immersion condensers are best removed from the stand. (Lower condenser carrier, unscrew tightening screw.) A soft clean cloth should be used for cleaning after having it moistened first with Xylol. Now the objective and condenser front lens are rubbed dry carefully with soft linen. No cloth soiled with immersion oil, and be it only once, should be used for this, lest there will result an oil film. **Never** use alcohol for cleaning!

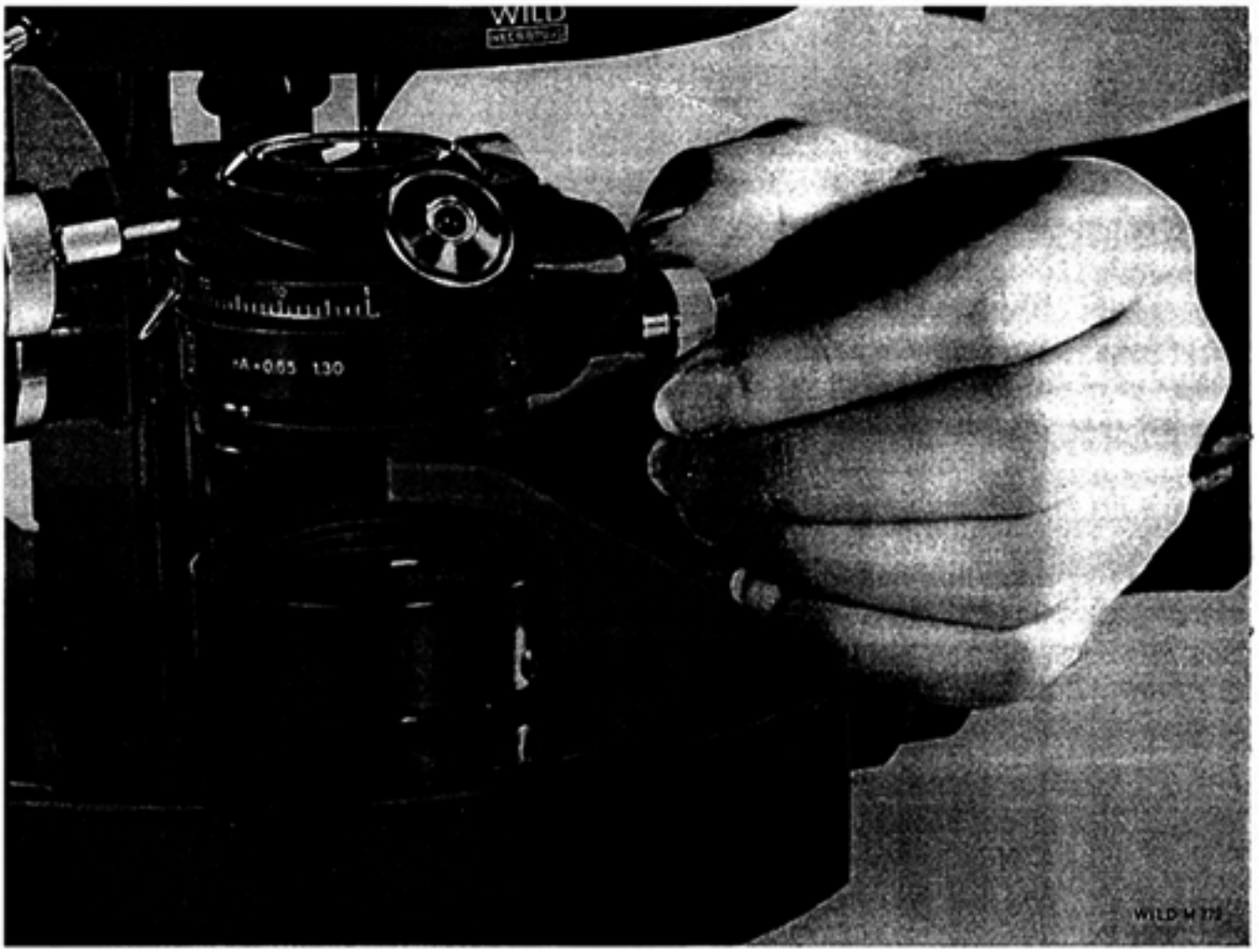


Fig. 10

Changing the condensers

(Exchange against aplanatic-achromatic, dark-field, phase contrast or universal condenser)

The condenser is lowered by means of the rack and pinion condenser movement. The front lens of the swing-out condenser (fig. 10) is then tilted out. After having loosened the tightening screw the condenser slides out of its mount. (Be careful not to damage centring inset, mirrors or lamp.) When refastening the condenser, this latter must be introduced **completely.** The operating knob of the front lens of the swing-out condenser must be on the same side as the built-in illumination, e.g. on the left.

The eyepiece tubes

After loosening the tightening screw (fig. 11) provided with an elastic guide pin, the eyepiece tubes are freely rotatable and can easily be removed from their bearing, if pressed against the guide pin. ▶

Beginning with Huygens type 6× and compensating eyepiece 6× all eyepieces can be used with the **binocular tube** (1a).

The lefthand eyepiece sleeve (1b) can be moved in order to set the exact interpupillary distance. Should the latter be unknown, the left part of the tube is moved during observation until one single circular field of view is obtained. The difference of magnification due to this displacement is automatically compensated for in the binocular tube.

The left, moving eyepiece sleeve (1b) is provided with a correcting ring which permits to compensate for anisometropia. Correction is achieved as follows:

> A fine structural detail of the preparation is focused upon while observing with the right eye through the right eyepiece. The same is done now with the left eye. To obtain maximum sharpness turn correction sleeve (without moving fine adjustment!).

Attachable eyecups help to keep out irritating lateral light in brightly lit rooms.

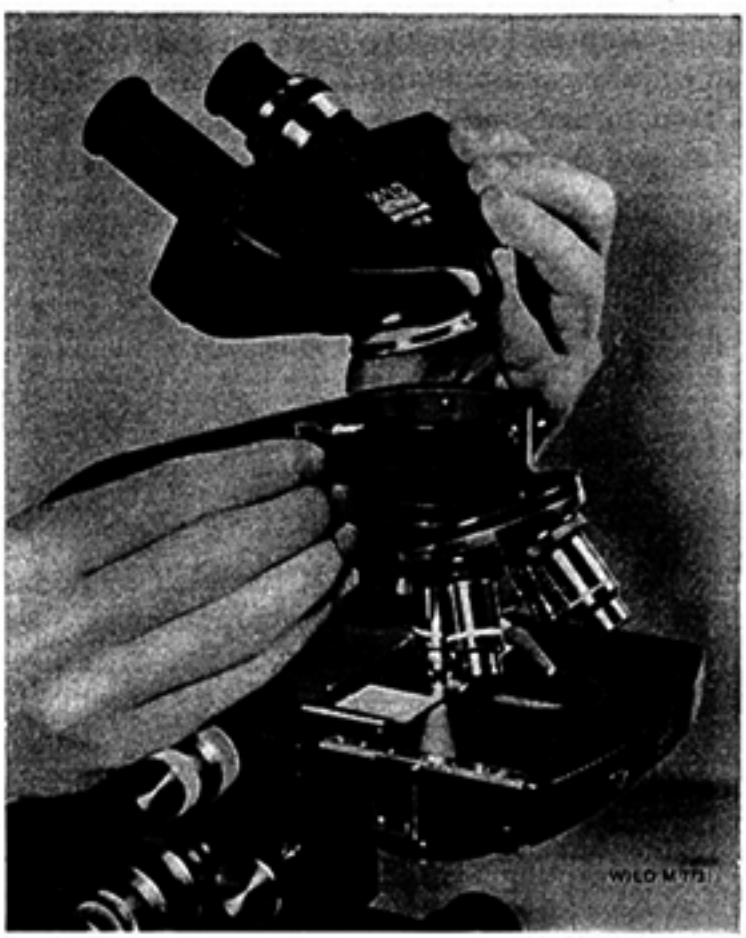


Fig. 11

For instructions regarding the Photo Tube see instruction for use «Photomicrographic Camera».

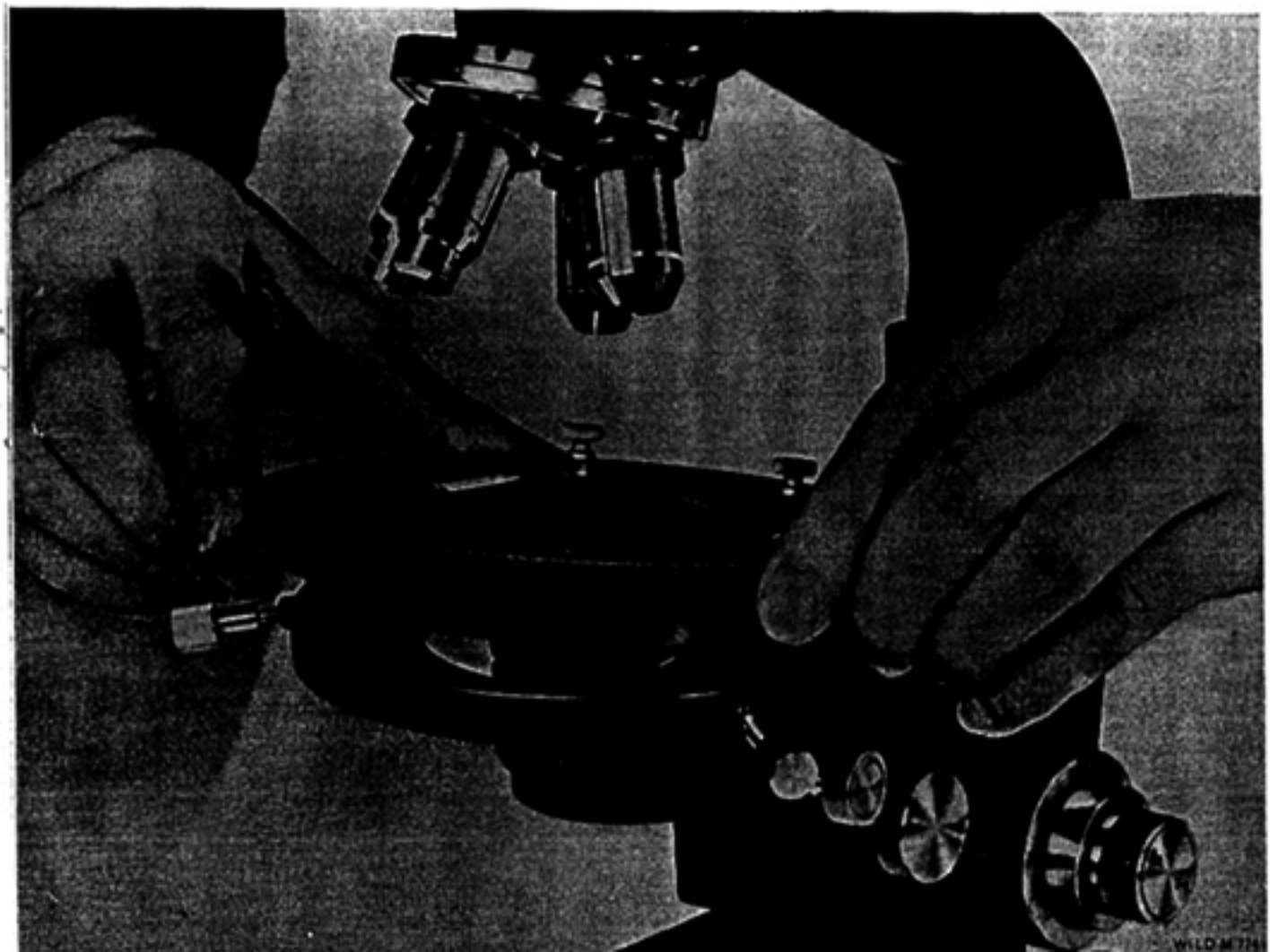
The Stages

The fixed mechanical stage K (4a) can be actuated by means of coaxial operating knobs (4d, e). These knobs are accessible from both sides. Should it become necessary to modify the run in the sense of the ordinate, the outer operating knobs are turned in opposite senses (do not loosen excessively!).

For special investigations, separate attachable stages can be used instead of the slide holder (4c) (hot an cold stage, attachable glass stage, etc.). They are to be screwed onto the mechanical stage in the same way as the slide holder and take part in the movements.

Apart from the fixed mechanical stage two centring and rotatable stages are available (Kd and Rd models) which are easily interchangeable among themselves in the centring mount (fig. 12).

Fig. 12



The Low Voltage Microscope Lamp

For detailed instructions as to the use of the low voltage lamp (6 V/30 W), to be used in connection with the M 20 microscope and above all for photomicrography and microcinematography, see special brochure.

A connecting rail, fitting into two holes on the lower side of the base plate, keeps the accurate distance between the lamp and the microscope. Another bolt, protruding under the lamp stand, fits into a hole in the connecting rail.

Used without connecting rail and with raised lamp housing the low voltage lamp serves as light source for observations in one-sided incident light and also for illuminating the surface of transmitted light preparations the external structure of which is required to appear clearly.

II. Maintainance of Instrument

Dust is the microscope's deadliest enemy. If not used, the instrument should either be stowed away in its cabinet or at least protected by the dust hood. If needed, the optical parts are to be cleaned **externally.** This is done preferably by means of the dust brush or with a clean soft linen rag which has previously been laundered several times. Hard, encrusted dirt may be removed by applying some drops of Xylol, all traces of which must however be rubbed off with a dry cloth. **Under no circumstances** must the objectives be screwed apart by a non-professional. Their optical performance might be seriously endangered.

From time to time the mechanical parts must be rubbed clean either with a deer-skin or a soft cloth. **Never** use oil for the sliding surfaces of both coarse and fine adjustment, of the mechanical stage or the object carrier. They might get stuck completely.

If the instrument fails to give satisfaction because of faulty manipulation it must be repaired by either a skilled mechanic or better by ourselves.

III. Packing the Instrument

If the instrument must be moved, the objectives are first screwed out and stowed in the middle drawer of the cabinet (in their protective

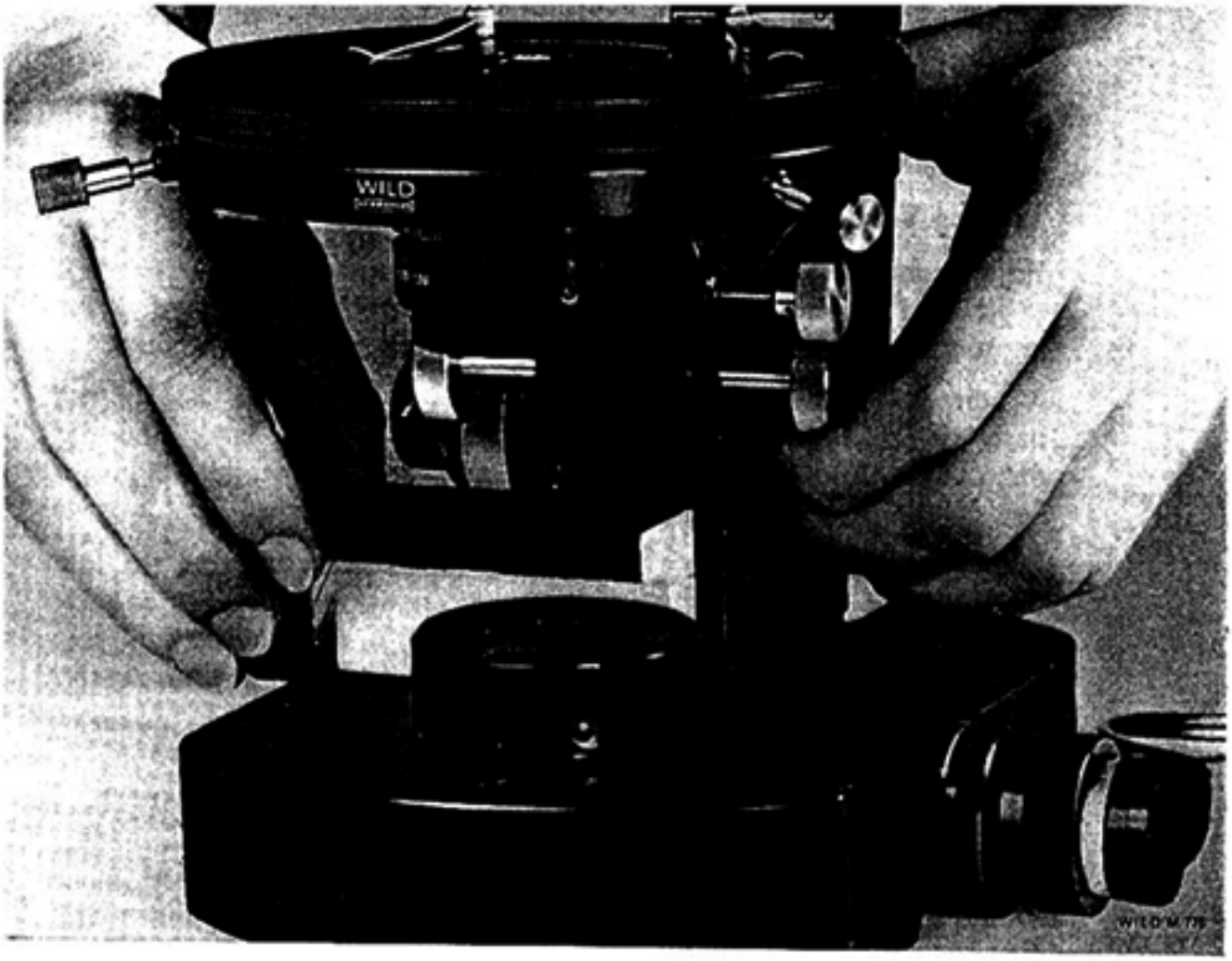


Fig. 13

covers). The eyepieces are then withdrawn from the tubes and stowed in the lower drawer. The simple plane/concave mirror and also the bulb of the built-in illumination are to be wrapped into soft paper and stowed in the topmost drawer. This also contains the filter exchanger, which latter is introduced in such a way as to fit with its foot into the semicircular hole provided at the lateral wall of the drawer.

The centring screws of the rotatable centring stages are to be tightened completely then loosened by ½ turn.

The wooden block which takes the weight off the fine adjustment is pushed under the rack and pinion housing, after having raised the stage slightly by hand (fig. 13).

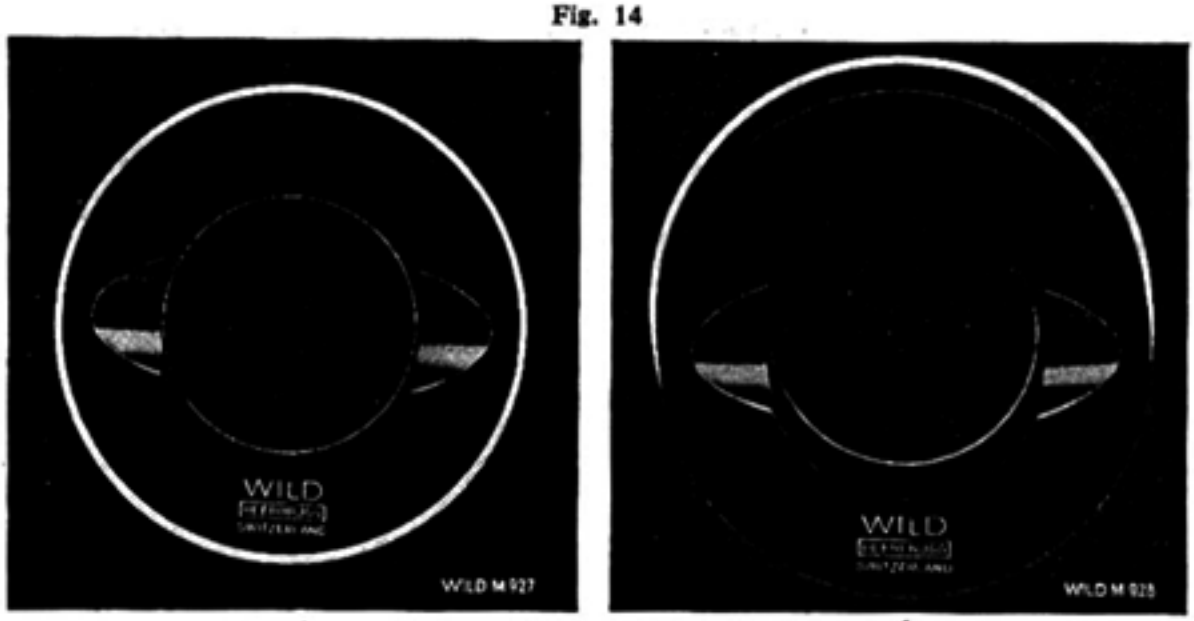
Now the instrument is slipped into the cabinet and fastened from below by the fixing screw. All free space between microscope and cabinet walls are preferably padded with soft paper. **Be sure to introduce such paper pads also between stage and objective nose-piece on the one hand and between condenser and illumination on the other.**

IV. Mounting and adjusting the built-in illumination

If the built-in illumination has to be mounted subsequently or if the adjustment is no longer correct because the clamping lever (10c) situated on the left side of the base plate has been loosened inadvertently, one proceeds as follows:

1. The centring inset (10a) is pushed into the corresponding opening of the base plate instead of the mirror or any other light source, whereby the cocking spring of the centring inset must gear together with the corresponding guide groove. The centring inset is freely movable by hand and serves for centring the field diaphragm. If one now looks through the inset, a brilliant ring will be visible is in the centre of the visible opening (fig. 14a). For the nonce the inset beneath the lens. The inset is now moved to and fro until this ring must not be touched any more.

Fig. 14



a b

2. After having first removed the cover screw (10c) on the left side of the base plate, the clamping lever is screwed in completely then reversed by at least one full turn and set so as to **point vertically upwards.** It serves for fixing the lamp housing.

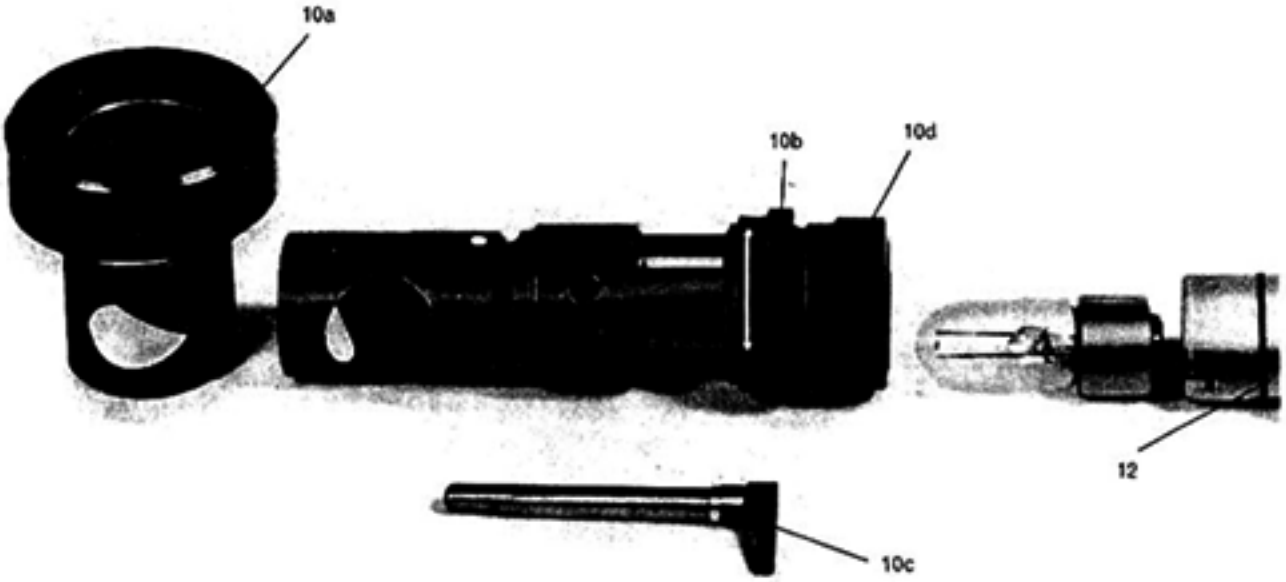
3. After having removed the cover plate (push from the inside) the lamp housing is to be introduced into the opening, taking care that the **white reference mark** is pointing upwards (fig. 16). The housing is then fixed by means of the clamping lever. The inner knurled ring (10b) field diaphragm is to be turned clockwise until it stops.

4. Loosen the outer knurled ring (10d) of the lamp housing, whereupon the lamp socket can be withdrawn. Now the special bulb (6 V/20 W) which is part of the delivery is cautiously put into the socket. This can then be slipped into the housing and fixed by means of the knurled ring.

5. The voltage selector of the transformer is set to the mains tension. Now the transformer is connected to the mains and, by means of the special cable, to the lamp housing. The lamp is now ready to be switched on (transformer switch). In order to assure maximum life expectancy this lamp should if possible be used with sub-tension.

6. If points 1 to 5 have been observed carefully the field of biew should now appear bright so as to permit to start focusing on a preparation with medium magnification (objective 10×, eyepiece 10×). (Raise condenser completely and open aperture diaphragm. Lower support by means of coarse adjustment until objective barely touches the preparation. Now actuate coarse adjustment screw until preparation is focused while observing through eyepiece.) The field diaphragm can be closed counterclockwise, the knurled ring of which (10b) is marked by a red arrow. Now lower the condenser until the image of the field diaphragm appears sharply defined in the plane of the preparation (fig. 17).

7. Should the image of the field diaphragm be out of center, loosen clamping lever of built-in illumination and turn lamp housing around longitudinal axis, respectively push inwards or pull outwards until the image appears centred. (Observe through eyepiece.) Then fasten clamping lever so as to lock lamp housing completely. Be careful not to move centring inset all the while. The built-in illumination is now centred once and for all.

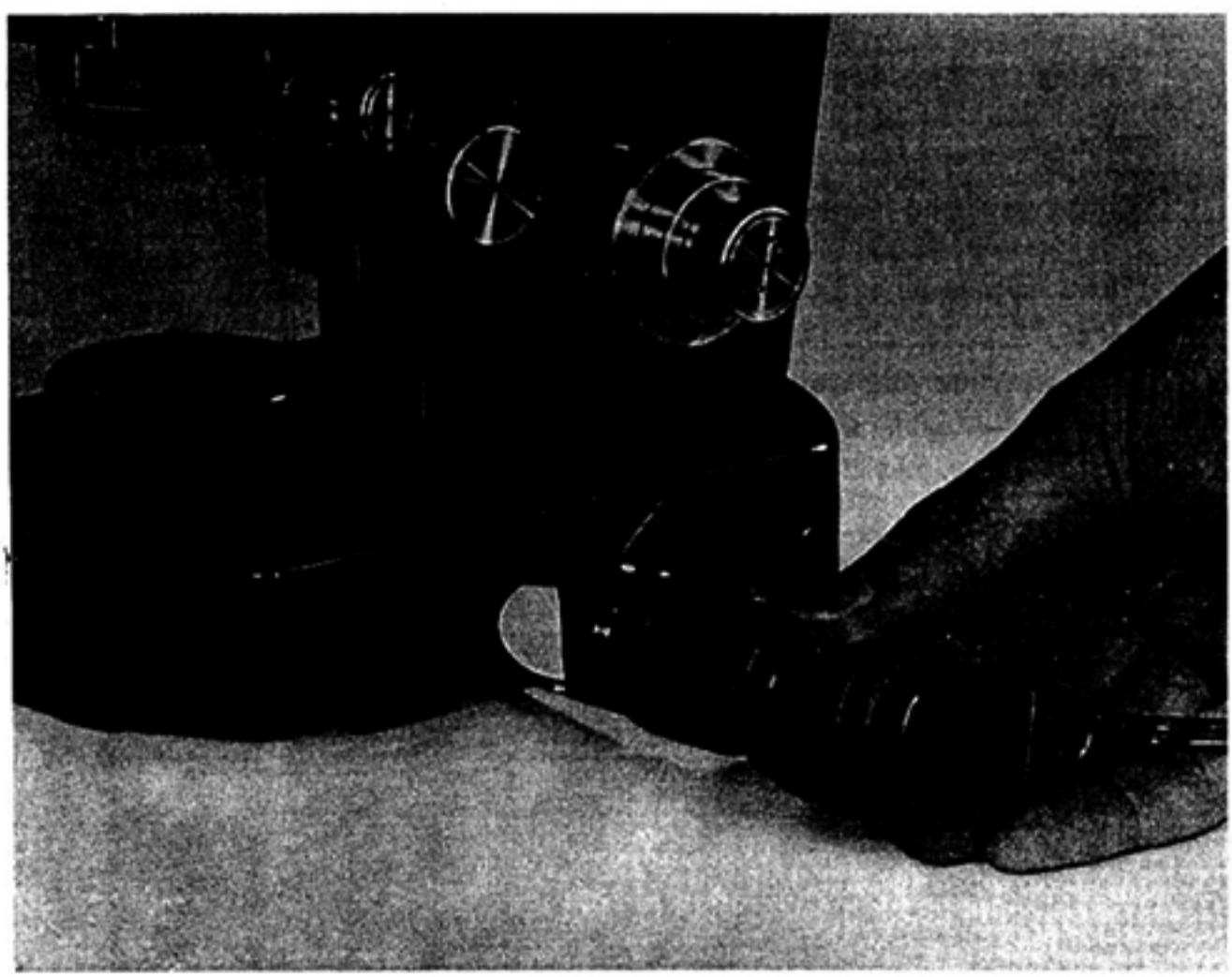


11

Fig. 15 **Built-in illumination**

10a Centring inset
10b Adjusting ring of light field diaphragm
10c Clamping lever for fixing lamp housing
10d Clamping lever for fixing lamp socket
10e Lamp socket
11 Connecting cable to transformer
12 Ring mark

Fig. 16



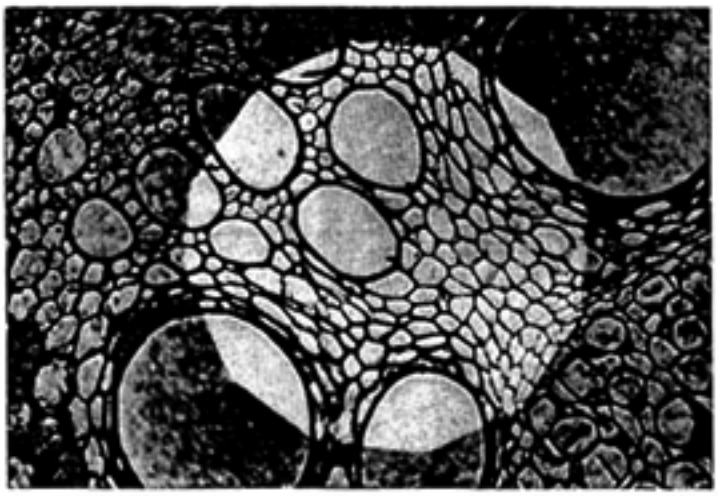


Fig. 17

Now the Koehler lighting principle is to be applied which is done as follows:

a. Put ground glass disk into the filter carrier of the centring inset, then open slightly field diaphragm. Move lamp socket along axis of the lamp housing until the incandescent filament appears on the ground glass. (To be quite correct, this filament should appear in the lower focal plane of the condenser. This may be achieved by closing the condenser iris diaphragm and projecting the image of the filament on its metal lamellae. Do not forget to reopen it!) Then clamp the lamp housing counterclockwise. By moving the centring inset (10a) the image of the field diaphragm can be brought exactly to the center of the field of view (fig. 4 and 17).

b. Open now field diaphragm until the field of view is just completely illuminated. When changing the magnification the diameter of the field diaphragm must be set accordingly (see also final paragraph page 9).

   The aperture diaphragm of the condenser is set according to the thumb rule given on page 14.

Recommended Accessories

WILD Fluotar high performance objectives, Phase contrast equipment, Photomicrographic camera, Powerful low voltage lamp, Dark field immersion condenser, Drawing and Projection equipment, Special phase condenser with long focal distance, Polarizing equipment, WILD Varicolor equipment, Equipment for fluorescence.

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4a Mechanical stage K
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4c Slide holder with elastic clamping arm
4d Operating knob for movements in the sense of the abscissa
4e Operating knob for movements in the sense of the ordinate
} coaxial
5 Condenser drive
6a Swing-out condenser
6b Filter carrier
6c Knurled knob for swinging out front lens
7 Coarse adjustment
8 Fine adjustment
} coaxial
9a Filter exchanger
9b Fixing screw of filter exchanger
10a Centring inset
10b Adjusting ring of light field diaphragm
10c Clamping lever for fixing lamp housing
10d Clamping lever for fixing lamp socket
10e Lamp socket
} built-in illumination
11 Connecting cable to transformer
12 Base plate
13 Centering ring

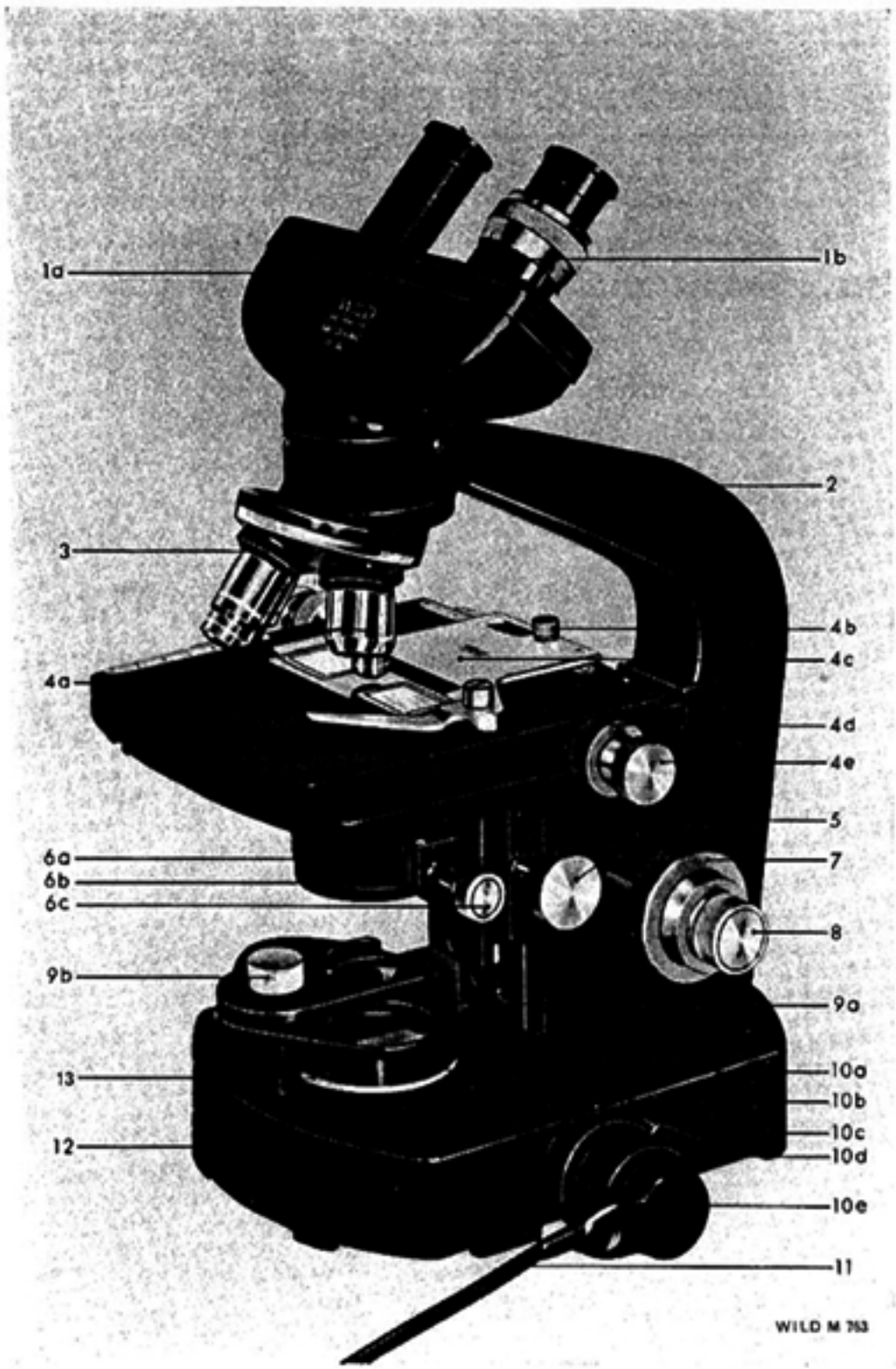

1a
1b
2
3
4a
4b
4c
4d
4e
5
6a
6b
6c
7
8
9a
9b
10a
10b
10c
10d
10e
11
12
13
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Fig. 18

Mi 605 e – XI.62

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