OPERATING INSTRUCTIONS

for the

"Me F2" UNIVERSAL CAMERA MICROSCOPE

LIST OF CONTENTS

Setting up the instrument

Table and optical bench 6
Installing the optical bench 7
Setting up the microscope stand 7
Fitting the round centring, rotating mechanical stage . . . 8

The microscope stand

Base . . . . . .
Housing and stage carrier . . . . . .
Optical system 8
Observation body 9
Adjustments 10
Round centring, rotating mechanical stage . . . .
Square mechanical stage 2
Stage insert rings . . . . . .
Specimen holder . . . . . .

Mains units in the optical bench

Electrical connection . . . . . .

Lamp housing "Lux US"

Application 14
Lamp housing "Lux US" for incident-light illumination 14
Lamp housing "Lux US" for transmitted-light illumination . . 15
Fitting the low-voltage quartz iodine lamp 15
Electrical connection of the low-voltage quartz iodine lamp. . 16
Adjusting the low-voltage quartz iodine lamp 16

Low-voltage lamps "Lux FN" and "Lux FNI"

Application . . . . . .
Low-voltage lamp "Lux FN" for incident-light illumination 17
Low-voltage lamp "Lux FNI" for transmitted-light illumination . . 17
Inserting the bulb 17
Regulating transformer 18
Bulb adjustment 18

Filter equipment

Filter attachment 19
Frosted screen in "Lux US" lamp housing and diffusion screen in push-on mount . . 19

Incident-light illumination equipment

Fitting the universal opaque illuminator 20
Setting the incident-light bright ground illumination (internal illumination) 20
Setting the steep-oblique incident-light bright ground illumination (pseudo-relief) . 21
Setting the incident-light dark ground illumination (external illumination) 22
Setting for one-sided incident-light dark ground illumination 22

Transmitted-light illumination equipment

Fitting the transmitted-light illumination equipment 23
Transmitted-light slide carrier and transmitted-light objectives 23
Two-lens condenser with swing-out front lens 23
Setting the transmitted-light bright ground illumination 24

Additional equipment for observations in polarized light

Rotating filter analyser 25
Incident-light filter polarizer 25
Transmitted-light polarizing condenser 25
Monocular body and crossline eyepiece 26
Compensators 26
Conoscopic investigations 26
Eyepiece for axial images 27
Czapski eyepiece and Klein magnifier 27

Photomicrographic bellows camera

Camera shutter 28
Photographic eyepiece holder and photographic eyepieces 28
Camera diverting mirror 28
International camera back 29
Cassette frame for metal cassettes 30
Focusing magnifier 30
Determining the exposure time 31
Photomicrographic magnification 32

Low-power photomicrography equipment

Removing the photographic eyepiece holder 34
Removing the universal opaque illuminator, the transmitted-light slide carrier and the optical system 34
Incident-light work with the lenses Dallmeyer f = 25.4 mm and Neu-Polar f = 50 mm 34
Transmitted-light work with the lenses Dallmeyer f = 25.4 mm and Neu-Polar f = 50 mm 36
Incident-light work with the lens Neu-Polar f = 100 mm 37
Transmitted-light work with the lens Neu-Polar f = 100 mm 39

Photomicrography and micro projection

Inserting the swing-out deviating prism 40
Fitting the photomicrographic camera "Kam VBX" or "REMICA III" 40
Photo-Automatic 40
Projection prism 40

Microscope accessories

Magnetic specimen holder 41
Mounting press . . . . . .

Spares

Spares and ordering numbers 42

Literature references 42

Fig

SETTING UP THE INSTRUMENT

Table and optical bench

A) Table with optical bench and two pedestals.

a) Lift off the split table top and the two intermediate side sections from the table frame (1) This is done against a spring force since the ball pegs of the table top are clipped into the frame.

b) Set up the two pedestals (2), supporting them by placing the cardboard blocks of the packing underneath them. Place the table frame on the pedestals observing the markings for assembling (viz. the right hand pedestal is marked with one line, the left hand one with two lines) and line up the holes for the fixing screws.

c) Slightly open the top drawers and secure each of the pedestals to the table frame with four countersunk screws 2 in (50 mm) long which are inserted from underneath. The two inner pairs of screws fit into the nuts secured is placed over each of the outer screws and the nuts are then fitted on. All into the nuts secured in the table frame. A rectangular plate is placed over each of the outer screws and the nuts are then fitted on. All screws must be left loose initially.

d) Remove the cardboard blocks and fit the foot rest (4) between the cross pieces of the tubular steel feet (3); secure it from the side with the two 1½ in (35 mm) long screws.

e) Line up all parts to each other and tighten up all screws.

f) The bolts for the stops of the drawers are inserted into the drawers.

B) Table with optical bench and one pedestal.

The assembly takes place as described above for two pedestals except that in place of the right pedestal the long square tubular feet are first screwed to the table frame with two ¾ in (18 mm) long screws each and the corresponding nuts. The wider one of the two feet mounting plates which carries the holes for the screws should be to the front.

Fig. 3

Fig. 3

C) Optical bench for an existing table.

Place the table frame (1) of the optical bench with the four rubber buffers on a low rigid table.

Lift the split table top and the two intermediate sections off the table frame on the optical bench. This is done against a spring force since the ball pegs of the table top are clipped into the frame.

Installing the optical bench

a) The rotary switch (6) for the regulating transformer (7) is pulled out of the hub of the control and out of the table frame after loosening the clamping screw.
b) The support bars of the table frame carry four anti-vibration spring supports. The optical bench (5) is carefully placed on these supports and secured with 4 screws 2.3/8 in (60 mm) long.
c) The switch (6) for the regulating transformer is placed back in the hub of the control and secured with the screw.
d) PLEASE NOTE! The free end of the yellow/green earth line is clamped with the screw (8) to the left side of the optical bench.

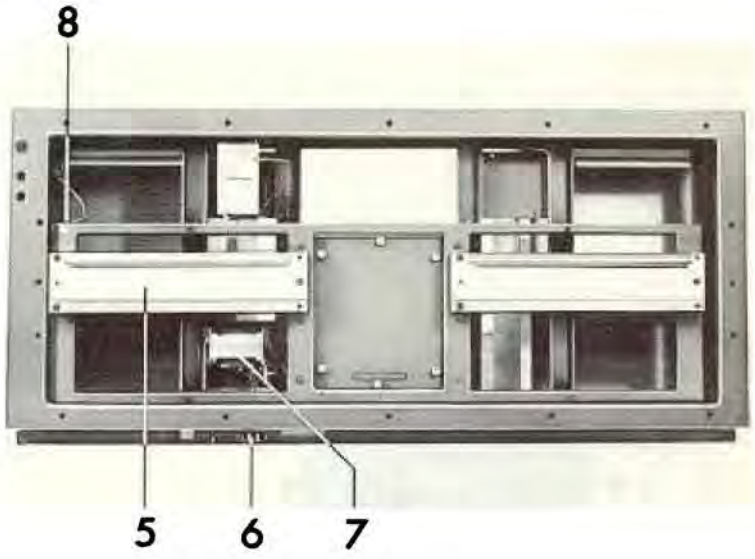


Fig. 4

Setting up the microscope stand

a) On the optical bench

The microscope stand (9) is placed on the centre section of the optical bench between the six stops. The four parts of the table top are then placed on the table frame and secured by pressing them down.

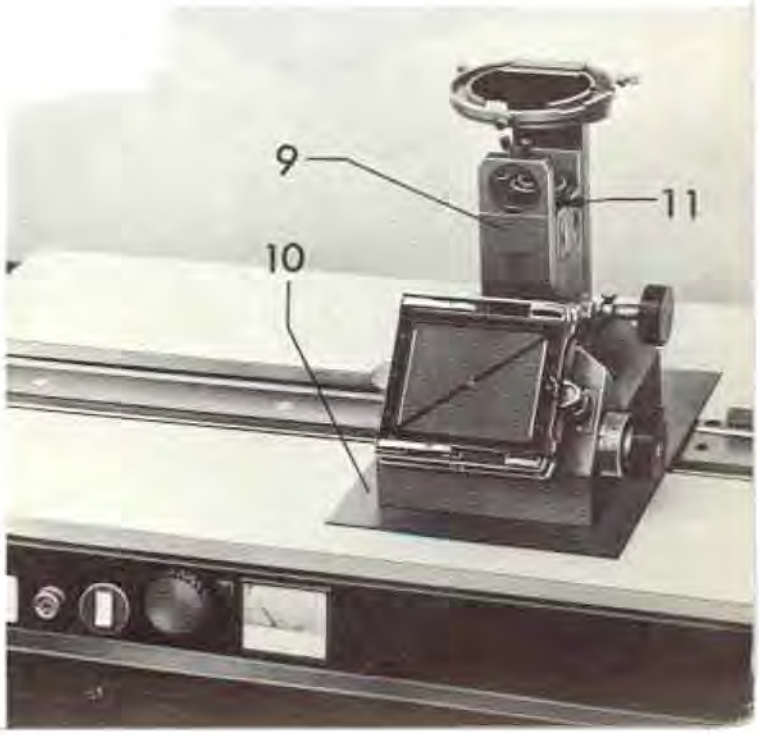
The two cover plates (10) are finally placed on the table top.

b) On an existing table

The table should be as rigid as possible.
The table top should be sufficiently large to provide space for the accessories.
The accessory boxes, see Fig. 2, are hooked from both sides into the locating holes underneath the microscope base; They serve as arm rests during observation.

PLEASE NOTE! The red screw at (11) relieves the load on the fine motion during transport and protects it against damage. It is unscrewed completely and stored for future use.

Fig. 5



Fitting the round centring rotating mechanical stage

a) Move the stage carrier (3) by means of the coarse control (see page 10) to its highest position. Remove the caps over the two centring screws (6) and unscrew the centring screws and the spring bolt (2) so that they are out of action.

b) Fit the stage (1) into the stage carrier in the correct orientation so that the notch in the rotating lower part of the stage plate is exactly opposite the spring bolt in the stage carrier.

c) Fully screw in the spring bolt (2) again. Also screw in the two centring screws (6) so that they engage. The centring of the stage is described on page 11. Replace the two caps in position.

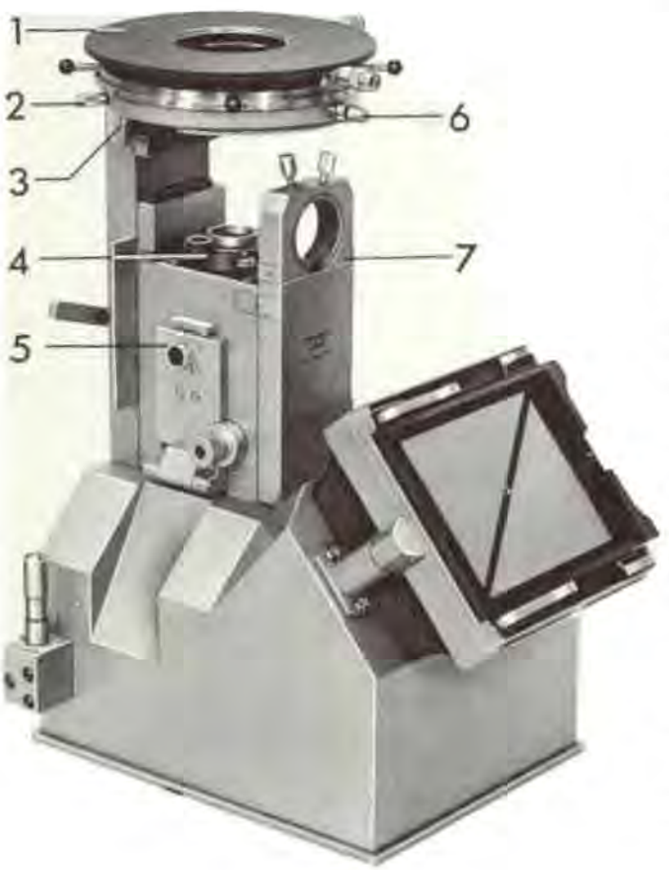


Fig. 6

THE MICROSCOPE STAND

Base

The base contains the photomicrography camera; it consists of the camera diverting mirror and the bellow camera.

Housing and stage carrier

The housing contains the coarse and fine focusing motions. On the left is the pivoted cover plate (5) with the carrier for the photographic eyepiece. On the right is an opening to take the swing-out deviating prism or the phase contrast attachment; it is covered by a plate. The top of the housing carries the segment shutter (4) for the bellows camera.

The slider plate (7) for the fine motion carries annular grooves for the optical system and the observation body.

The stage carrier is mounted on the slider plate for the coarse motion.

Optical system

After loosening the screw (8) the optical system (10) is inserted into the rear annular groove so that its locating pin engages in the locating pieces of the groove. Clamp the optical system in position with the screw (8).

The small swing-out deviating prism diverts the beam into the observation tube for visual work or allows it to pass into the photomicrography camera; it is operated by the lever (13).

Position for visual observation:
move lever forward.

Position for photomicrography:
move lever back towards the observer.

Observation body

Slightly unscrew the screw (9), insert the body into the annular groove after first pushing upwards the spring-loaded safety peg of the screw (9) by means of the body. Let the locating pin engage in the locating pieces and clamp the body with the screw.

The spring-loaded safety peg of the screw (9) prevents the body from falling down if the screw is loosened unintentionally.

When changing the body, first unscrew the screw a few turns and then push the body upwards against the spring-loaded peg until it can be taken out of the annular groove.

a) Binocular body (12)

The inter-pupillary distance is set by pivoting the two eyepiece tubes; its size can be read in mm against the scale at the centre of the body.

Any difference in the strength of the two eyes is allowed for during microscopy as follows: close the left eye, look into the right eyepiece with the right eye, focus the microscope on a specimen with the coarse and fine motions. Close the right eye and focus on the specimen for the left eye by rotating only the ring (11) of the diopter adjustment.

b) Monocular body (14)

It shows the same field and therefore the same magnification as the binocular body. The fitted slot serves for lining up the crossline eyepiece during observation in polarized light.

Both bodies have a tube factor of X.

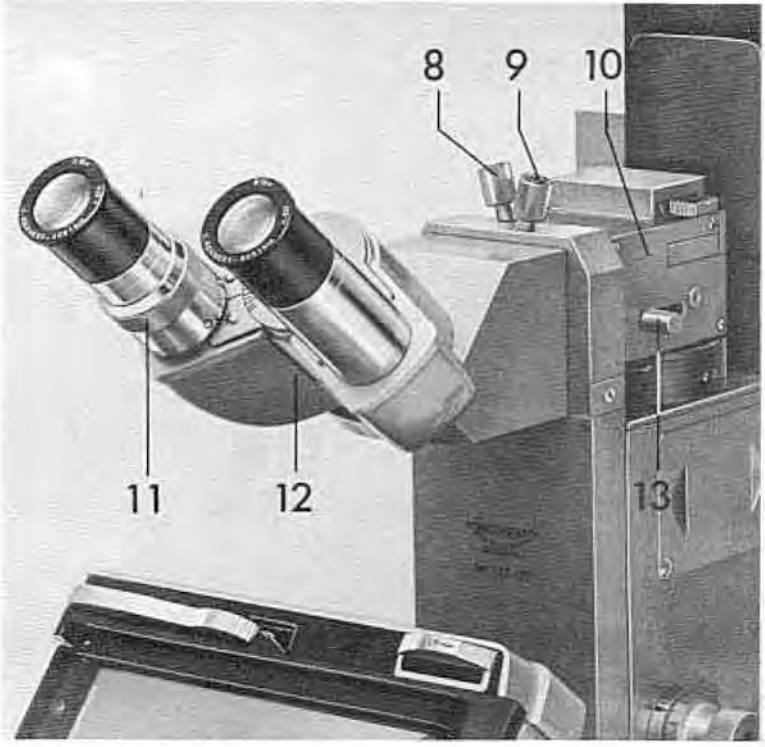


Fig. 7

Fig. 8

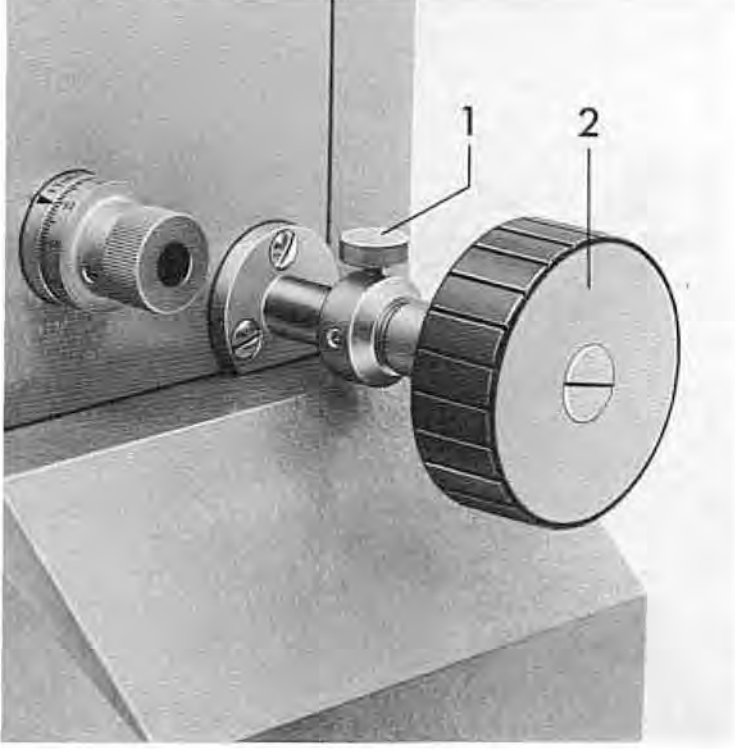


Fig. 9

Adjustments

a) Coarse motion

The coarse motion is operated by the control (2) and acts on the stage. The index point (3) is set against the appropriate mark on the setting scale (4) in accordance with the optics used.

The marks are as follows:

A ✦ D	Incident and transmitted light objectives
25	Photographic objectives for
50	Low-power photomicrography
100	
MHP	Micro hardness tester
IK	Interference contrast equipment after NOMARSKI.

The tightness of the coarse motion is regulated by the brake screw (1).

b) Fine motion

The fine motion is operated by the controls (7) and operates on the optical system. The right-hand fine motion control carries a graduation for depth measurement; 1 division = 0.001 mm. The fine motion has a travel of about 2 mm. Before starting work the fine motion should be set so that the reference lines (6) are opposite each other. The two shorter marks indicate the limits of the travel.

c) Fixfocus stop

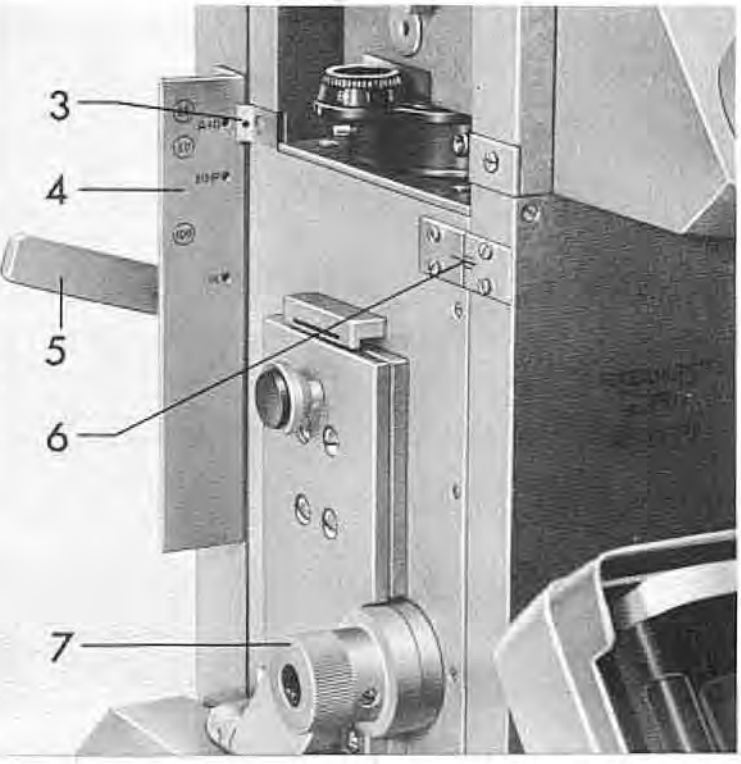
When working with parfocalised incident or transmitted light objectives a Fixfocus stop is used to give rapid coarse adjustment. After changing the objective the microscopic image is visible again and need only be corrected with the fine motion.

For special methods (e.g. micro hardness tester) the Fixfocus stop can be clamped at any other stage height.

When the lever (5) is moved upwards the Fixfocus stop is locked; when the lever is moved down the stop is released.

The Fixfocus stop also prevents the stage from dropping when working with heavy specimens.

Fig. 10



Round rotating centring, and mechanical stage

The stage (8) combines the rectangular coordinate movement of a mechanical stage with the rotary movement of a rotating stage.

Two mutually perpendicular coordinate movements (10) and (15) with a travel of 15 mm are provided for the systematic scanning of a specimen. When the circular graduation (12) of the stage is set to 0.0° the micrometer screw at the front operates the forward-backward movement while the right-hand one operates the left-right movement.

The settings of the forward-backward and left-right movements can be read on the graduations of the micrometer screws to 0.01 mm.

Four ball knobs (9) are used to rotate the stage through 360°.

The stage position can be read to 0.1° on the vernier (13).

The rotary movement can be locked with the screw (14).

The mechanical stage is centred with the two centring screws (11):

a) Coarse centring

Remove the two caps of the centring screws. Set the aperture of the stage insert ring concentrically to the objective by means of the centring screws and set the axis of rotation of the stage centrally to the optical axis of the microscope by visual observation. If fine centring is not required the caps can then be placed back on the centring screws

b) Fine centring

This is performed for observation in polarized light, using the monocular body and the crossline eyepiece.

Place a specimen on the stage and focus the image with a low-power objective and the crossline eyepiece.

The approximate area of the centre of rotation on the specimen is noted by rotating the stage; it is brought into the field and towards its centre by operating the two centring screws.

The specimen is then moved over the stage with the two coordinate movements until a clearly defined point lies at the centre of the crosslines. Now rotate the stage through 180°.

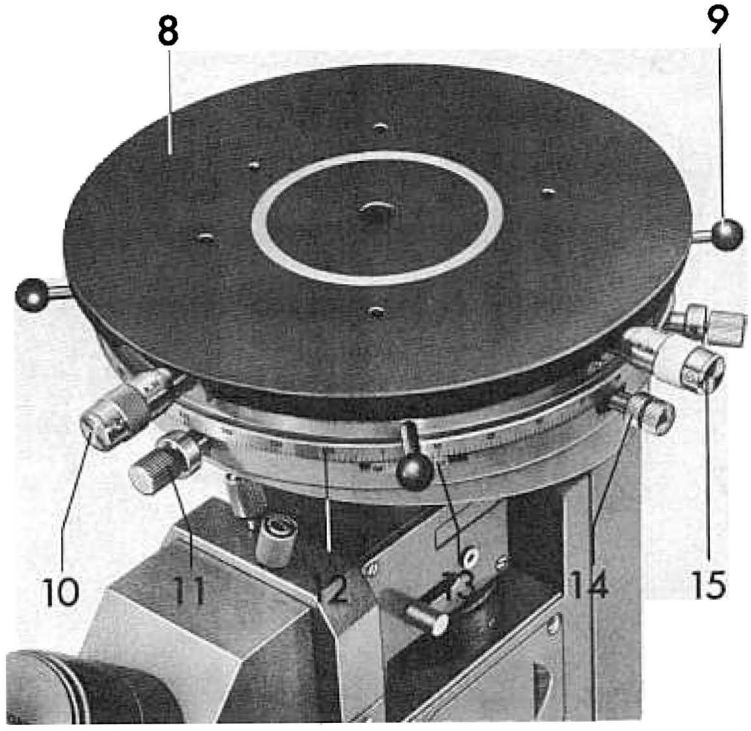
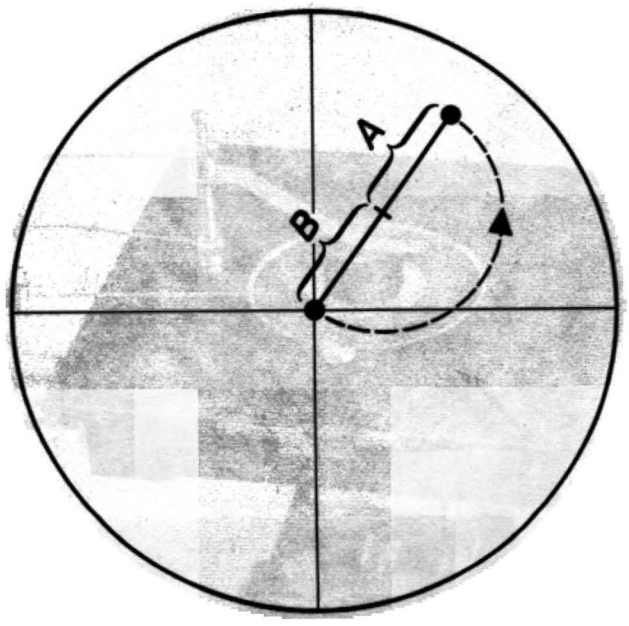


Fig.

Fig. 12



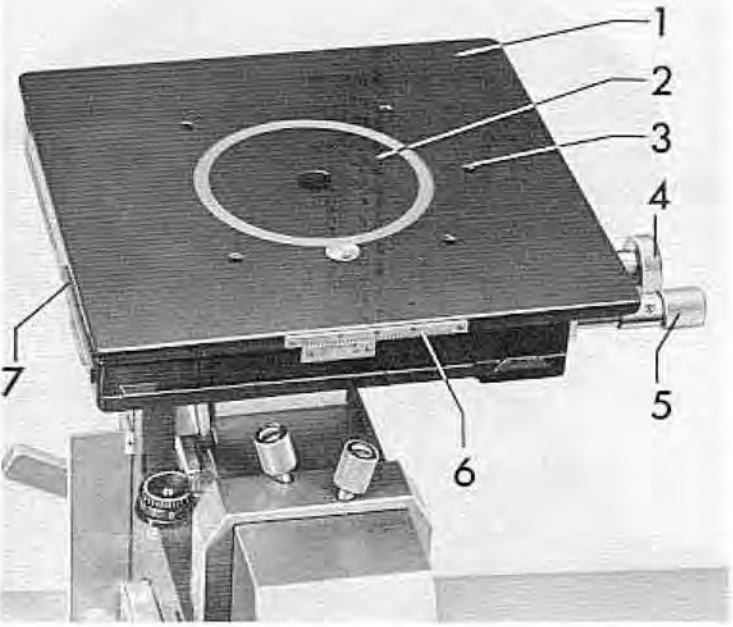


Fig. 13

Return the specimen point from this new position after the 180° rotation to the centre of the crosslines by the following procedure. The first half of the distance (see Fig. 12, distance A) by operating the two stage centring screws, the second half distance (see Fig. 12, distance B) by displacing the specimen with the two coordinate movements. Repeat this 180° rotation and the subsequent adjustment described above as often as required until the specimen point remains at the intersection of the crosslines as the stage is rotated. After changing to higher-power objectives the stage centring can be improved by the same method if necessary. The two caps are replaced in position to prevent unintentional operation of the centring screws.

Square mechanical stage

Two mutually perpendicular coordinate movements of 30 mm travel are provided for rapid systematic scanning of a specimen.

The forward-backward movement of the stage (1) is operated with the control (4), the left-right movement with the control (5). The positions of the forward-backward and left-right movements can be read on the millimetre scales (6) and (7) to the nearest 0.1 mm by means of verniers.

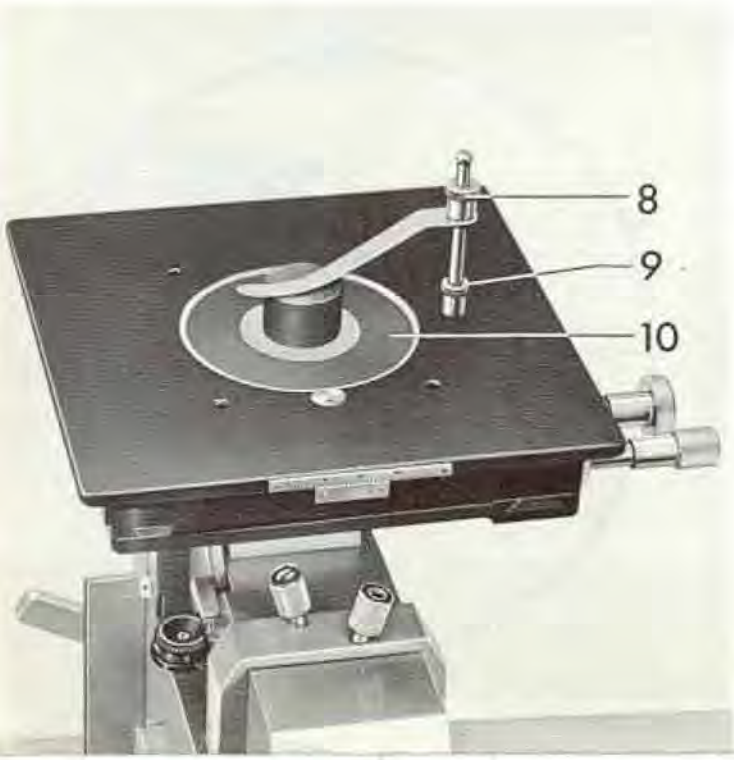
Stage insert rings

The stase rings are used when placing medium-sized or smallspecimens on the stage. When dealing with specially large specimens it is preferable to work without stage insert. The glass stage inserts (10) are used for medium-sized incident-light and transmitted-light specimens. Metal stage inserts (2) are intended for small incident-light specimens. The stage inserts are always placed into the stage aperture with the plane face upwards.

Specimen holder

The specimen holder (8) serves to secure simple, light specimens. The fixing screw with the knurled screw (9) is inserted into the tapped hole (3) on the stage. The spring is turned over the specimen and pressed down firmly to retain it.

Fig. 14



MAINS UNITS IN THE OPTICAL BENCH

Electrical connection

The mains units of the optical bench as well as the mains fuses are arranged at the works to suit the desired mains voltage. For safety reasons it is advisable, however, to check that the mains voltage agrees with the value marked at the socket (11) on the left side panel of the table frame.

The following mains units are built into the table frame:

For connection to a 6V or 12V low-voltage lamp:
regulating transformer No. 48 10 31 (16) with voltmeter for secondary voltages in the 6V and 12V range.

The regulating transformer is protected by
a 0,8 A fuse for 220 – 240 V
a 1 A fuse for 150 V and
a 1,25 A fuse for 100 – 125 V.

For connection to the mercury vapour lamp HBO 200 W/4:
mains unit No. 48 10 32 (15) for 220 V a.c. If the mains voltage differs from 220 V an additional intermediate transformer No. 48 10 33 is fitted.

This intermediate transformer is protected by
a 10, A fuse for 100 – 125 V
a 6,3 A fuse for 150 V and
a 4, A fuse for 250 V.

The microscope illuminators are connected up with non-interchangeable plugs. Sockets for this pupose are sunk into the left side of the table frame. They are, from back to front: socket (12) for the multi-point plug of the mercury-vapour lamp, socket (13) for the 12V low-voltage lamp and socket (14) for the 6V low-voltage lamp.

The electrical control and indicating equipment is mounted on the front of the table frame.

They are, from left to right :
The hour counter (17), the safety starter (18), and the switch (19) for the mercury-vapour lamp HBO 200 W/4. (The hour counter and also the control unit (15) No. 48 10 32 are only fitted in the optical bench if the "Me F2" is equipped with the "Mercurius II C" twin-lamp unit).

This is followed by the rotary switch (20), the signal lamp (21) and the voltmeter (22) for the low-voltage lamps. The top scale of the voltmeter is used for the 12 V range while the lower scale is intended for the 6 V range.

The mains cable must not be connected to the mains supply until the parts of the table top have been placed into position to prevent unintentional contact with the electrical cables and mains units.

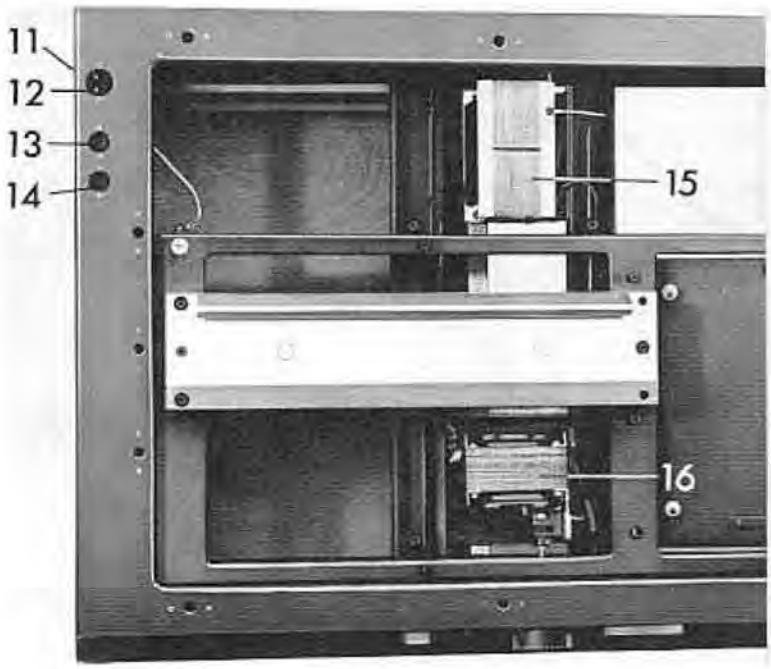
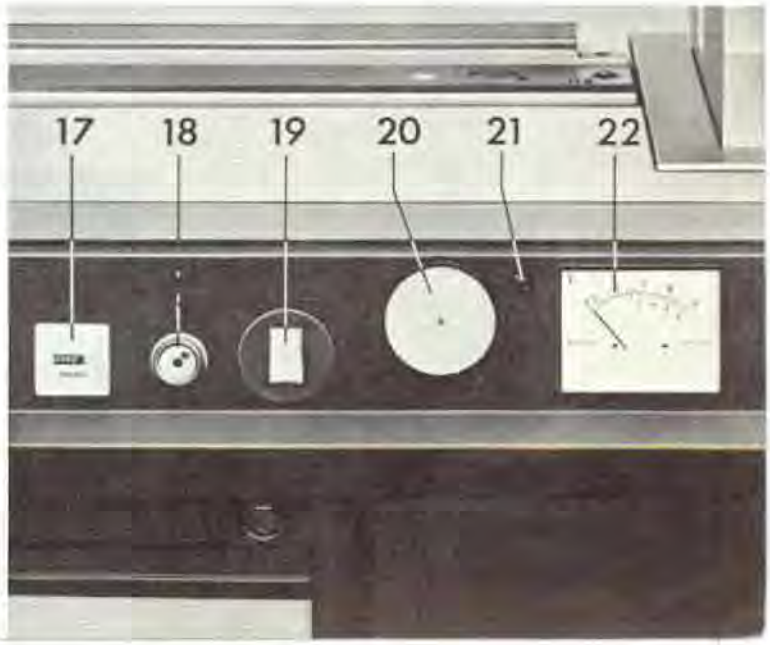


Fig. 15

Fig. 16



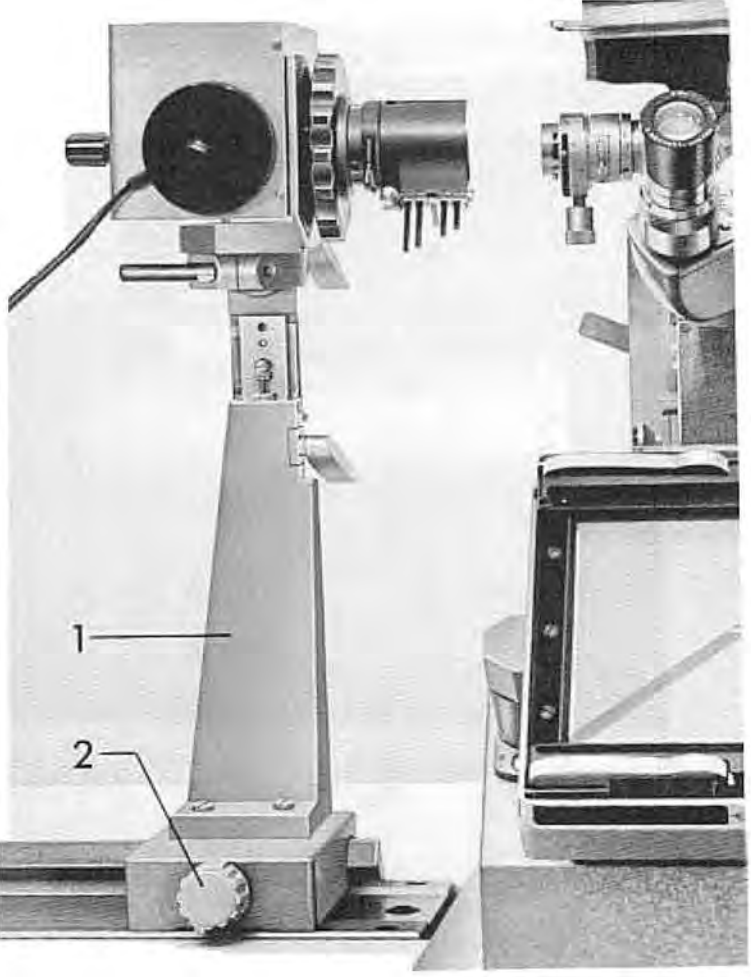


Fig. 17

LAMP HOUSING "Lux US"

Application

A separate lamp housing "Lux US" is provided for incident-light and for transmitted-light illumination. The following interchangeable lamp inserts can be fitted:

a) Insert for low-voltage quartz iodine lamp 12V, 100W.

b) Insert for low-voltage bulb 6V, 15W and the micro-flash equipment.

c) Insert for the miniature sodium lamp.

Only the use of the low-voltage quartz iodine lamp will be described here. Separate instructions are available for the micro-flash equipment and the miniature sodium lamp.

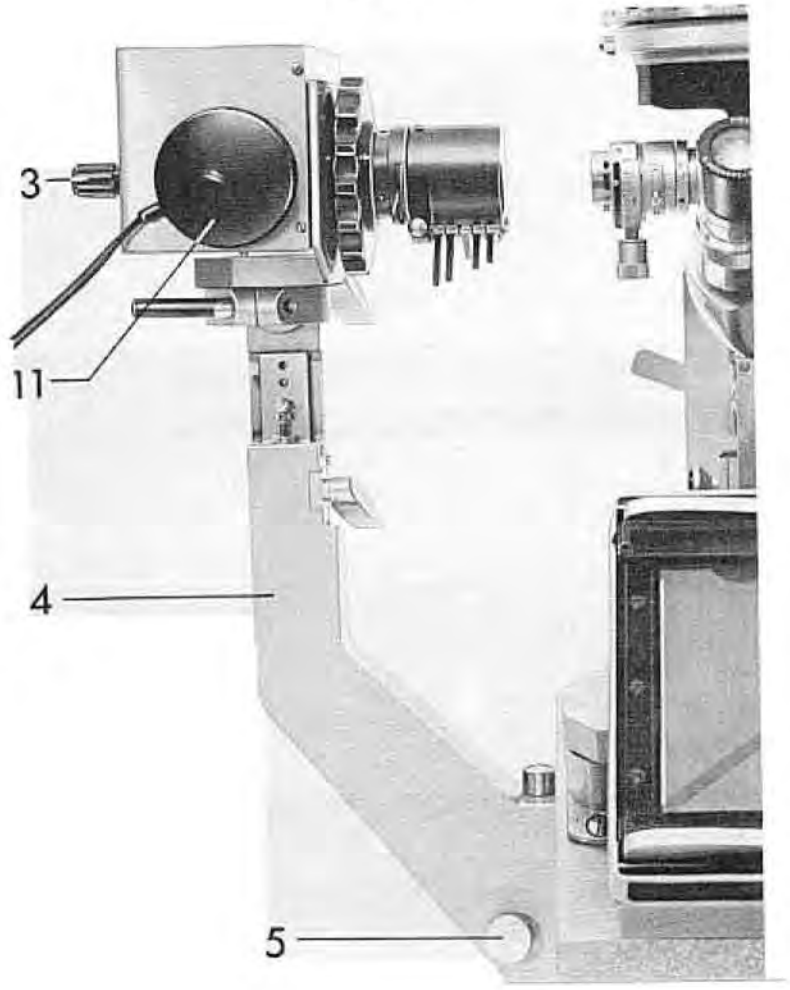
Lamp housing "Lux US" for incident-light illumination

a) With optical bench.
The lamp stand (1) with lamp housing is placed on the left section of the optical bench so that the index mark of the lamp stand is opposite the mark "US" on the opti bench. This is the operating position. The lamp stand is secured with the clamping screw (2).

b) Without optical bench.

The lamp bracket (4) is placed up to the shoulder on the support pin of the base which is secured to the side of the microscope stand. Swing the lamp bracket to the front into its operating position and secure it with the screw (5). After releasing the clamping screw the bracket can be swung to the back.

Fig. 18



For normal incident light microscopy or photomicrography the lamp column (8) is in its lowest position; the index line (9) is opposite the mark A. When working with the low-power photomicrography equipment the lamp column must be raised after releasing the clamping lever (10).

The lamp axis must be accurately horizontal, the index lines (6) must be opposite each other; any errors can be corrected by means of the tilting device after loosening the clamping lever (7).

Lamp housing "Lux US" for transmitted-light illumination

The fitting of the transmitted-light illumination equipment with the lamp housing is described on page 23.

Fitting the low-voltage quartz iodine lamp

Withdraw the lamp insert (11) from the lamp housing after loosening the clamping screw (3). Take the bulb out of the packing together with its protective cover and insert it carefully with its base into the holder (12) up to the stop.
For that purpose depress the two clamps on the lamp holder. After releasing the clamps the bulb is held firmly in its holder. Remove the protective cover and clean the bulb if necessary. Then insert the lamp holder into the housing so that the axis of the filament is perpendicular to that of the lamp collector and that the connecting cable points backwards. Temporarily fix the lamp holder with the clamping screw (3).

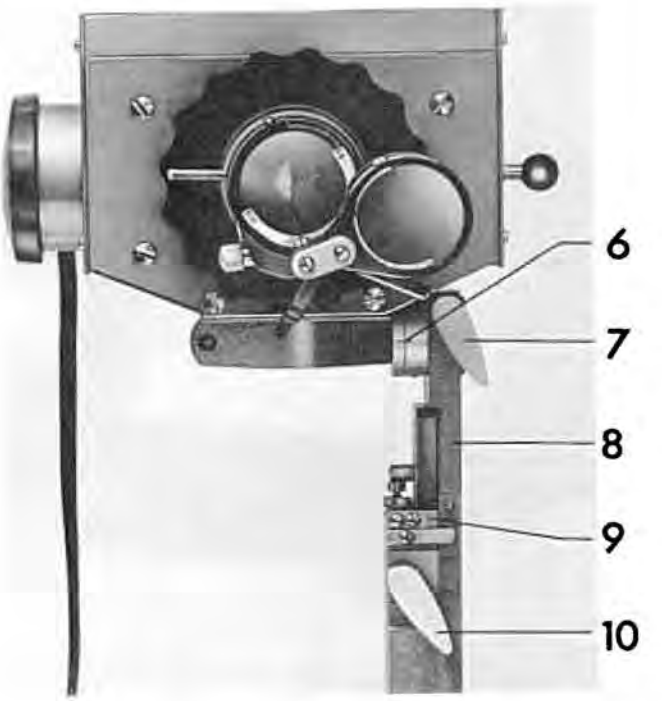
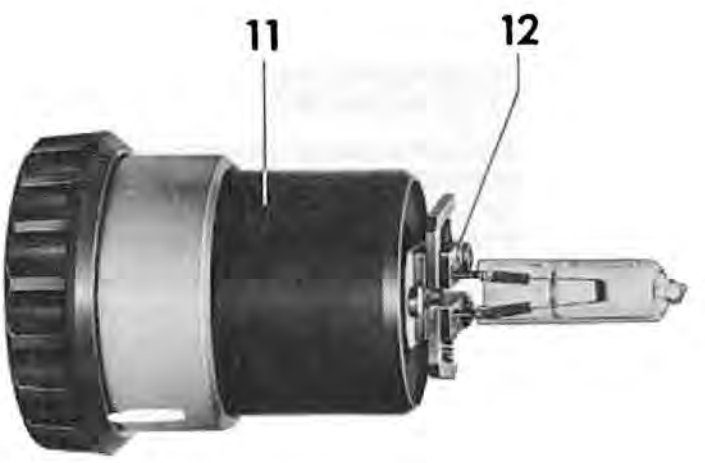


Fig. 19

Fig. 20



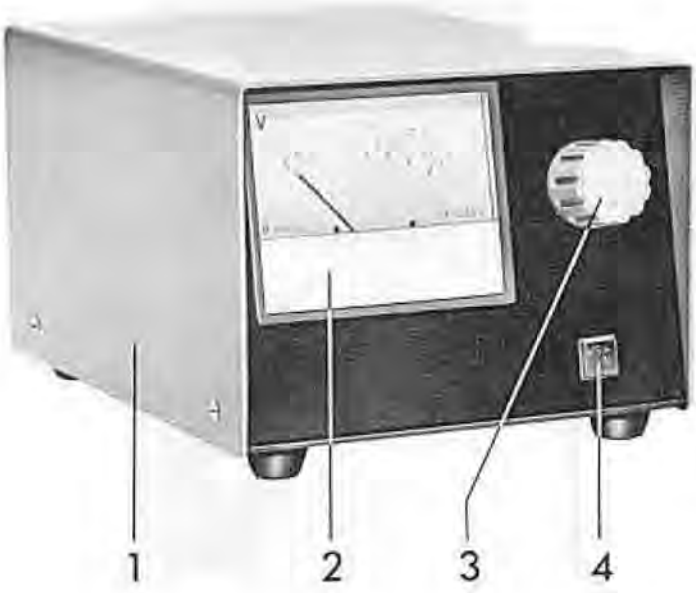


Fig. 21

Electrical connection of the low-voltage quartz iodine lamp

a) With optical bench.

Insert the special plug of the lamp cable into the 12V socket of the optical bench.

b) Without optical bench.

In this case the regulating transformer (1) is used. It is intended for supplying 6V and 12V low-voltage lamps.

If the mains voltage does not agree with the voltage indicated on the back of the regulating transformer it is possible to reconnect the transformer.

The four screws at the sides are removed, the cover is lifted off, and the transformer connections are altered in accordance with the circuit diagram. The cover is placed back into position. In addition the fuse on the back of the transformer has to be changed (1.25A for 100-225V, 9.8A for 220-250V).

The front of the transformer carries the voltmeter (2), the rotary switch (3) and the indicating lamp (4). The upper scale of the voltmeter is intended for the 12V range, the lower scale for the 6V range.

On the back are two sockets for the special non-interchangeable plugs of the 6V and 12V low-voltage lamps. Next to them is the socket for connecting the mains cable to the power supply.

The lamp is switched on by clockwise rotation of the switch on the appropriate transformer. The red indicating lamp lights up. The desired brightness is obtained by the continuous adjustment of the rotary control. The pointer of the voltmeter indicates the voltage.

We recommend the use of higher voltages on the low-voltage quartz iodine lamp only when they are actually required, otherwise the life of the bulb will be reduced.

Adjusting the low-voltage halogen lamp.

Switch on the lamp, insert the green filter of the filter set, swing out all the other filters. Swing out the frosted screen with the control (4/Fig. 26).

On the incident-light equipment, move the lamp stand with "Lux US" lamp housing away from the microscope or swing the incident-light lamp bracket away to the back.

Hold a sheet of paper in front of the light exit aperture of the lamp. Focus the image of the lamp filament on the paper by adjusting the lamp condenser with the control (6/Fig. 26). Release the clamping screw of the lamp holder and withdraw the latter slightly from the lamp housing.

Two images of the filament can now be seen on the projection surface; one is the filament image produced directly by the condenser while the second is the mirror image produced by the reflector in the lamp housing (see Fig. 25a). Adjust the lamp condenser so that the two images appear equal in size and in sharp focus. Rotate the lamp holder so that the two images are at the same height (Fig. 25 b). Then slide the lamp holder into the lamp housing until the two images are superimposed. This ensures that the bulb filament is now exactly in the optical axis from reflector to condenser. If there are some dark gaps between the individual turns (Fig. 25c), a slight rotation of the lamp holder is sufficient to fill them with bright parts of the mirror image (Fig. 25d); it may help to rotate the lamp in the lamp holder through 180°. Clamp the lamp holder permanently with the clamping screw.

This adjustment remains unchanged until a new lamp is fitted.

Clamp the lamp stand back into its working position or swing the lamp bracket to the front again.

LOW-VOLTAGE LAMPS "Lux FN" AND "Lux FNI"

Application

The low-voltage lamp "Lux FN" (11) is used for incident light illumination, the "Lux FNI" lamp for transmitted light illumination.

The lamp housing can be fitted with the insert for a 6V, 30W low-voltage bulb or the micro-flash equipment.

Low-voltage lamp "Lux FN" for incident-light illumination

Slide the lamp bracket (13) up to the shoulder on the support pin of the base which is secured to the side of the microscope stand. Swing the lamp bracket to the front into its operating position and secure it with the screw (14). After releasing the clamping screw the lamp bracket can be swung to the back.

For normal incident light microscopy or photomicrography the lamp column (8) is in its lowest position; the index line (9) is opposite the mark A. When working with the low-power photomicrography equipment the lamp column (8) must be raised after releasing the clamping lever (10).

The lamp axis must be accurately horizontal, the index lines (7) must be opposite each other; any errors can be corrected by means of the tilting device after loosening the clamping lever (6).

Low-voltage lamp "Lux FNI" for transmitted-light illumination

The fitting of the transmitted-light illumination equipment with the low-voltage lamp is described on page 23.

Inserting the bulb

Move the lamp condenser as far away as possible from the lamp housing with the lever (5). Release the screw (12) and withdraw the lamp holder downwards from the lamp housing. Screw the bulb with its pre-centred base firmly into the holder.

After the bulb has been fitted, slide the holder back into the lamp housing and align it so that the axis of the bulb filament is perpendicular to the optical axis of the condenser. Clamp the lamp holder temporarily with the screw.

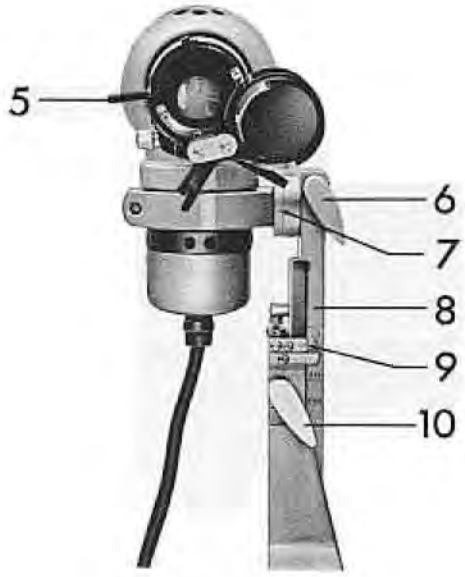
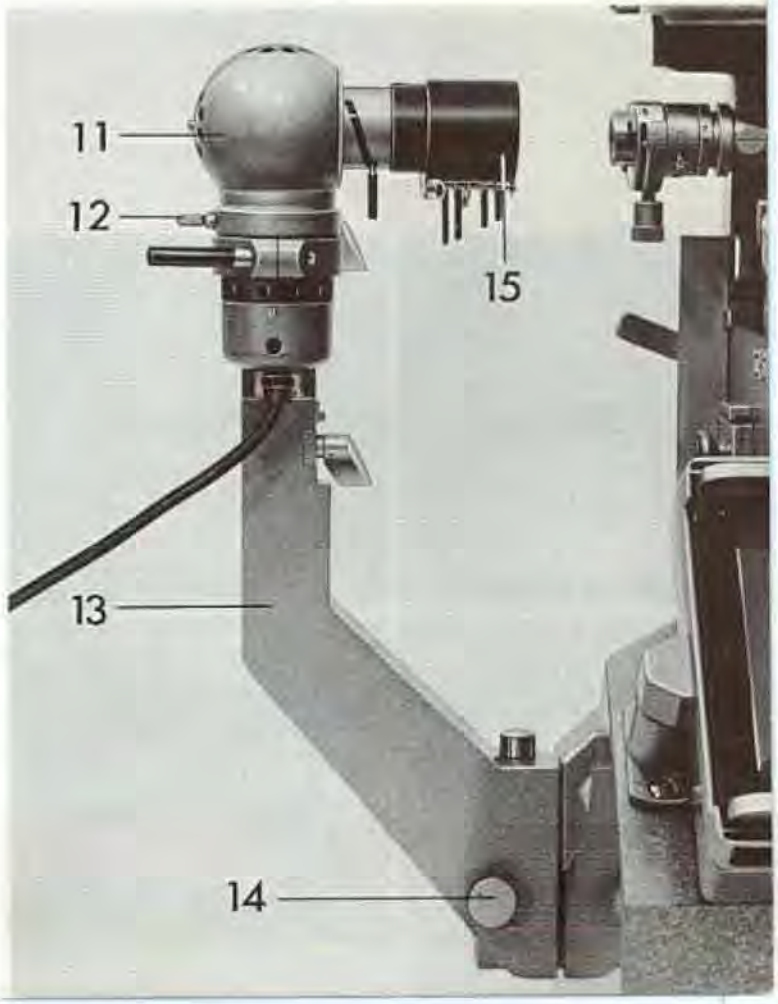


Fig. 22

Fig. 23



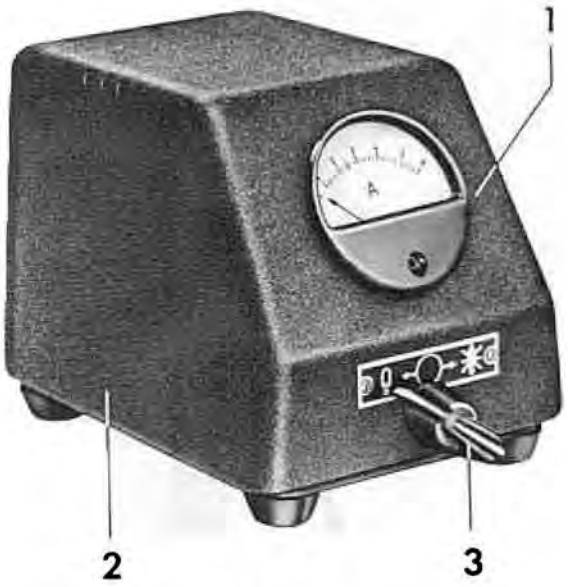


Fig. 24

Regulating transformer

For alternating current only! If the mains voltage differs from the voltage marked on the transformer cable, pull the cover (2) outwards slightly to the right and left at the bottom and lift it off; the connections of the regulating transformer (1) are then changed according to the circuit diagram and the cover is replaced in position. Connect the 3-pin plug of the lamp cable to the transformer. With the transformer switched off, knob (3) towards the left, connect it to the mains supply; then switch it on by rotating the knob clockwise and adjust it to the desired current. The ammeter pointer must not move beyond the red line at "5 Ampere".

Bulb adjustment

Switch on the lamp and swing out all filters of the filter attachment. With the incident-light equipment swing the lamp bracket to the back.

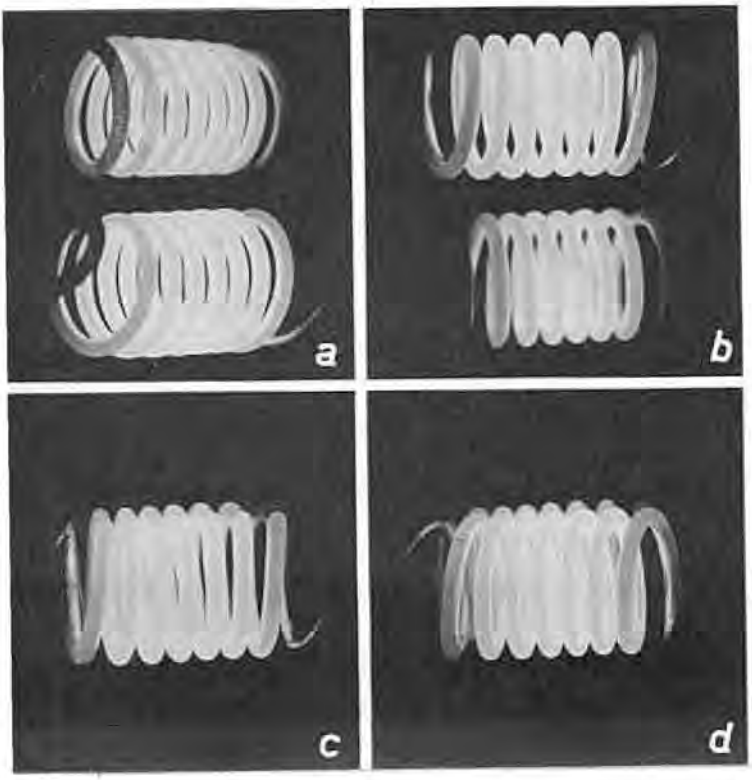
Place a sheet of white paper in front of the light exit aperture of the lamp. Focus the image of the bulb filament in the projection plane by adjusting the condenser with the adjusting wheel. Release the screw (12) again, Fig. 23. Pull the lamp holder slightly out of the lamp housing.

Two images of the filament can now be seen on the projection surface; one is the filament image produced directly by the condenser while the second is the mirror image produced by the reflector in the lamp housing (Fig. 25a). Rotate the bulb holder so that both filament images appear in their full length (Fig. 25b). Then slide in the bulb holder up to its shoulder so that the two images are superimposed. This ensures that the bulb filament is now exactly in the optical axis from reflector to condenser. If there are some dark gaps between the individual turns (Fig. 25c) a slight rotation of the bulb holder is sufficient to fill them with bright parts of the mirror image (Fig. 25d); if necessary the bulb holder can also be rotated through 180°. Secure it in its final position with the screw (12), Fig. 23.

This adjustment remains unchanged until a new bulb has to be fitted.

Swing the lamp bracket to the front into its working position and secure it with the clamping screw.

Fig. 25



FILTER EQUIPMENT

Filter attachment

Both the incident-light and the transmitted-light illuminators have a filter attachment with swing-out light filters. On the incident-light illuminator the filter attachment is clamped directly to the light exit aperture of the lamp housing. On the transmitted-light illuminator the filter attachment is mounted on the transmitted-light lamp carrier.

The filter attachment contains the following filters:

Frosted daylight filter (colour light blue), for reducing the light intensity and adjusting the colour of the illuminator to that of daylight. For colour-correct exposures on panchromatic photographic material.

Green Filter,

usually used for black-white photomicrography provided correct tone reproduction is not necessary. A powerful contrast filter for red specimens. Also used occasionally in microscopy of unstained or unetched specimens (phase contrast) to achieve a clearer image.

Neutral filter, medium and dark,
for reducing excessively intensive illumination.

Frosted screen in "Lux US" lamp housing and diffusion screen in push-on mount

Using the built-in frosted screen in slide on the lamp housing "Lux US" and the diffusion screen in push-on mount ensures uniform illumination of the field, especially at low magnifications.

The frosted screen is in position when the rod (4) is pushed in up to the stop; when the rod (4) is pulled out of the lamp housing up to the stop the screen is out of the beam.

The diffusion screen in push-on mount is placed on the light exit aperture of the opaque illuminator.

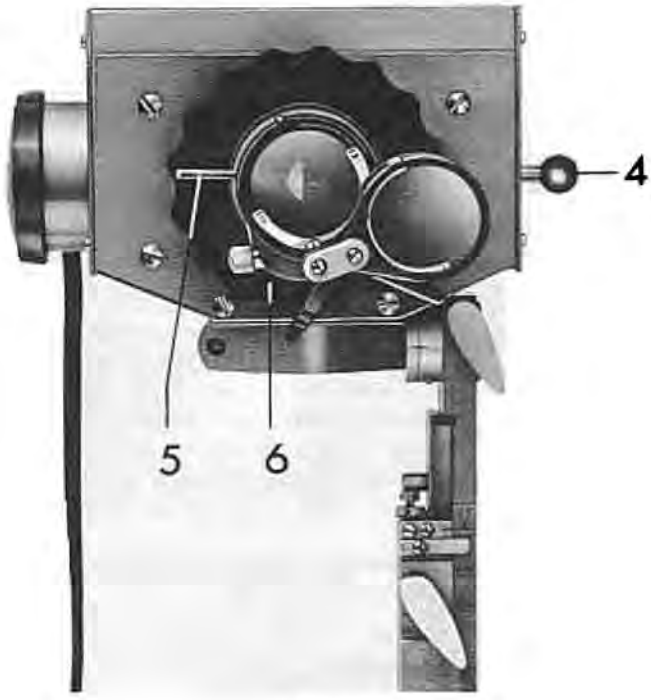


Fig. 26

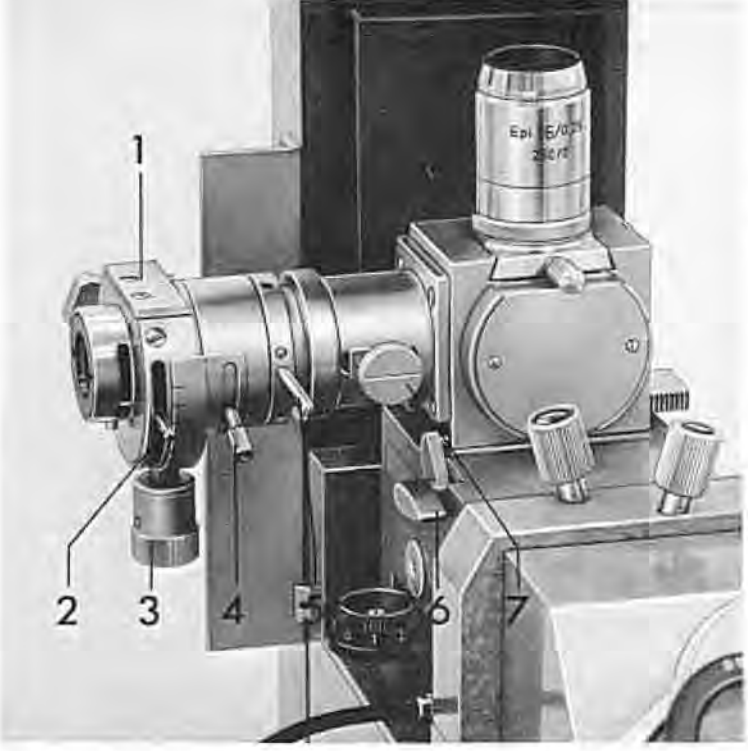


Fig. 27

INCIDENT-LIGHT ILLUMINATION EQUIPMENT

Fitting the universal opaque illuminator

Move the stage to its highest position with the coarse control. Push down the locking lever (6) and slide off the cover from the optical system. Slide the universal opaque illuminator (1) into the dovetail guide of the optical system up to its stop and secure it with the locking lever. Always place the cover or an objective on the opaque illuminator as protection against dust.

Setting the incident-light bright ground illumination (internal illumination), Fig. 29.

a) Place the specimen on the stage and clamp it with the specimen holder.

b) Raise the stage with the coarse control. Insert the incident light objective (e.g. 16/0.25) into the guide on the opaque illuminator in place of the covering slide and push it up to the stop. Insert an aplanatic compensating eyepiece into the body. Move the deviating prism with the lever into the position for visual observation.

c) Fully open the field and aperture-iris diaphragms with the levers (5) and (2); both levers point up at an angle. Also fully open the lamp field diaphagm, Fig. 26/5; it remains open during all observations with the opaque illuminator.

d) Optimum image quality can only be achieved if the aperture-iris diaphragm is imaged by the illumination lens in the rear focal plane of the objective. The optimum adjustment for each case is obtained by loosening the screw (4), sliding the unit along and retightening the screw (4), using the following positions:

Centre position (marked with a dot):

for incident-light bright ground illumination and for steep-oplique incident-light bright ground illumination from 16/0,25 objective magnification upwards and oblique incident light darkfield illumination.

Upper stop:

for incident-light dark ground illumination.

Lower stop:

for steep-oblique incident-light bright ground illumination with an 8/0.15 objective.

e) Using the knob (3) the aperture-iris diaphragm is centred to the optical axis; the knob has a click stop in the centre position.

f) Swing out the central diaphragm with the knob (7); the index line on the knob is horizontal.

g) Move the lamp to its operating position, switch it on and swing in the frosted daylight filter to reduce the light intensity.

h) Focus on the specimen with the coarse and fine motions.

i) Close the field-iris diaphragm with the lever (5) until it is visible in the field and then open it again until just beyond the boundary of the field. Further opening results in excessive illumination and loss of contrast in the microscopic image.

j) Set the aperture-iris diaphragm with the lever (2) so that an image of maximum clarity and contrast is obtained. This is the case when the rear lens of the objective (when viewed in the observation tube after removing the eyepiece) is illuminated over about two-thirds of its diameter, see Fig. 28.

The scale on the lever (2) serves for rapid repetition of a satisfactory setting, especially for photomicrography.

k) Adjust the lamp condenser, Fig. 26/6, to achieve the brightest and most uniform illumination of the field.

l) Change the objective or the eyepiece to achieve a higher total magnification.

When changing the objective the Fixfocus stop is locked before raising the stage with the coarse motion; the stage is then lowered with the coarse motion up to the stop and the microscopic image focused with the fine motion alone.

Check the adjustment of the field and aperture-iris diaphragms and the lamp condenser.

Setting the steep-oblique incident-light bright ground illumination ("pseudo-relief"), Fig. 31.

a) Same adjustment as for incident-light bright ground illumination (a) to (c) and (f) to (k).

b) Close the aperture-iris diaphragm with the lever (2) further than normal.

With the objective 8/0.15 the nut (4) of the illuminating lens for the aperture-iris diaphragm is at its lowest stop; with higher power objectives, i.e. from 16/0.25, it is in the centre position. Using the knob (3) for steep-oblique bright ground illumination, move the aperture diaphragm until the desired relief effect has been achieved. The optimum adjustment is obtained when the rear lens of the objective is illuminated as shown in Fig.30 when seen in the viewing tube after the objective has been removed.

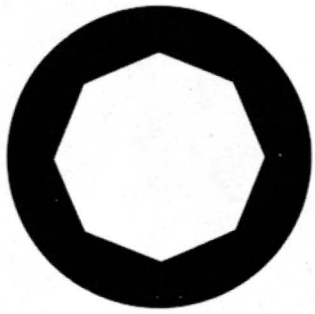


Fig. 28

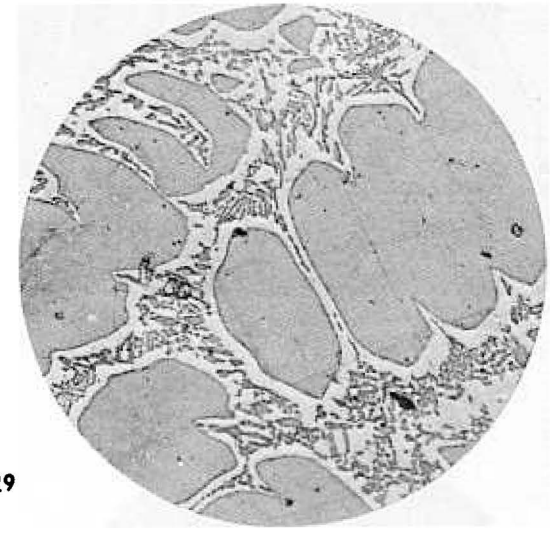


Fig. 29

Fig. 30

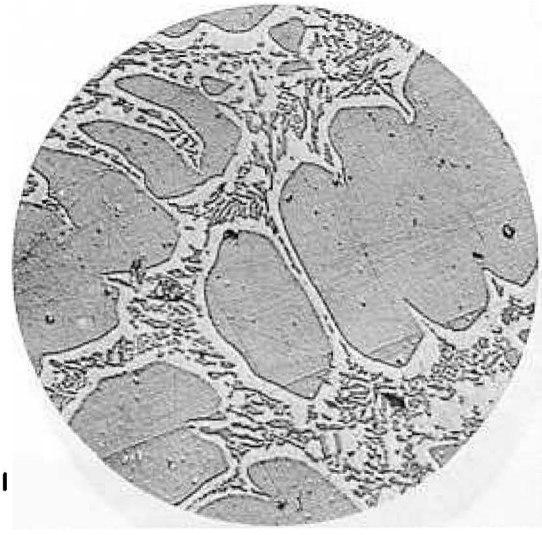


Fig. 31

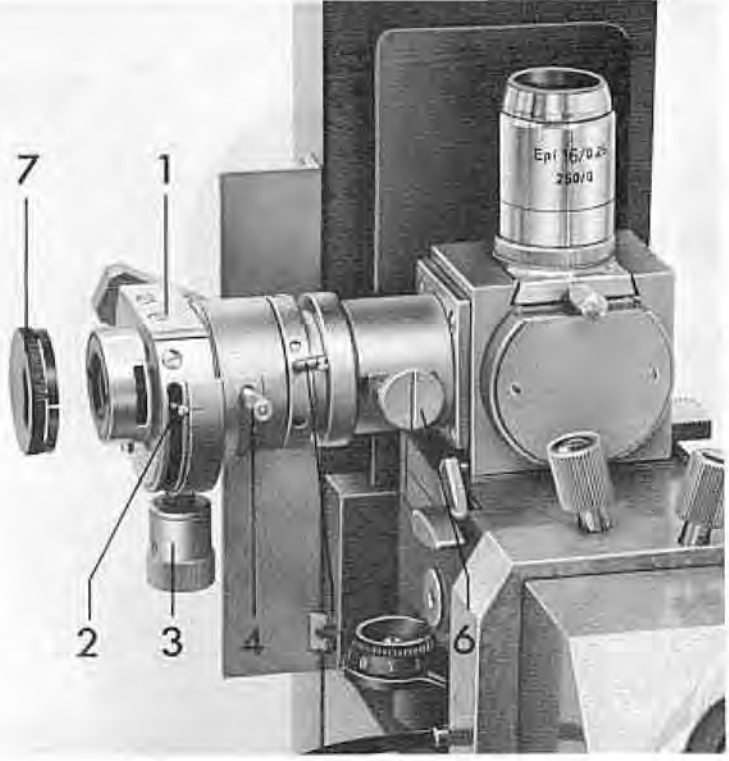


Fig. 32

Setting the incident-light dark ground illumination (external illumination), Fig. 33.

a) Place the specimen on the stage and clamp it with the specimen holder.

b) After raising the stage, insert an epilum objective into the opaque illuminator and a pair of eyepieces into the viewing tube as required to obtain the desired magnification.

c) Fully open the field and aperture-iris diaphragms with the levers (5) and (2); both levers are sloping upwards.

d) Adjust the illuminating lens for the aperture-iris diaphragm; loosen the screw (4), slide it to its upper stop and clamp it again.

e) Using the knob (3) centre the aperture-iris diaphragm to the optical axis; the knob has a click stop in its centre position.

f) Bring in the central diaphragm with the knob (6); the line on the knob is vertical.

g) Move the lamp to its operating position, switch it on and swing-out all light filters.

h) Focus on the specimen with the coarse and fine motions.

i) Adjust the lamp condenser to give the brightest and most uniform illumination of the field.

Setting for one-sided incident-light dark ground illumination, Fig. 34.

a) Same adjustment as for normal incident-light dark ground illumination but clamp the knurled nut (4) of the illuminating lens in its centre position.

b) Place the sector diaphragm (7) on the illuminating tube of the opaque illuminator. Rotate the sector diaphragm to obtain the optimum setting.

Fig. 33

Fig. 34

TRANSMITTED-LIGHT ILLUMINATION EQUIPMENT

Fitting the transmitted-light illumination equipment

Unscrew the cover plate on the stage carrier (17) at the back of the stage. Fit the transmitted-light illumination equipment (15) with its mounting plate into the opening and secure it with the clamping screw (16).

Insert the transmitted-light lamp bracket (8) and the low-voltage lamp with its dovetail into the slide of the illumination carrier (13) and secure it with the clamping lever on the left side of the illumination equipment.

The transmitted-light illumination equipment can remain fitted to the microscope during incident-light work. The illumination carrier swings itself out automatically after the locking knob (14) is rotated.

Fitting the bulb, electrical connection and adjustment of the bulb are described in the sections for low-voltage lamps.

Transmitted-light slide carrier and transmitted-light objectives

Push down the locking lever (19) and slide the cover or the opaque illuminator off the optical system. Slide the transmitted-light slide carrier (18) into the optical system and retain it with the locking lever. Slide off the cover from the transmitted-light slide carrier and push on a transmitted-light objective on slide up to the stop. All transmitted-light objectives are marked with a black point.

The main optical data are engraved on the objective; they are: type of objective, magnification and aperture, also details of tube length and cover slip correction. In addition the appropriate phase ring is marked for work with the phase contrast attachment, and the appropriate annular diaphragm for the contrast condenser.

Two-lens condenser with swing-out front lens

Slightly lower the condenser carrier (12) with the control (9), insert the condenser (10) into the split clamping sleeve of the condenser carrier so that the locating screw is aligned with the slot. Secure the condenser with the clamping screw.

The front lens of the 2-lens condenser can be swung out with the lever (11). In this way the size of the illuminated field or the illumination aperture can be adjusted rapidly to the actual requirements.

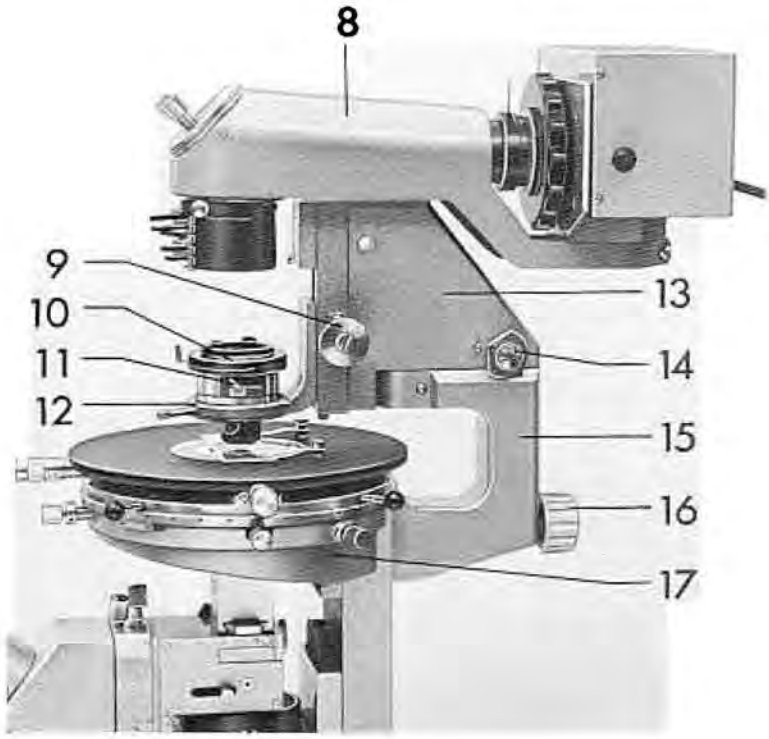
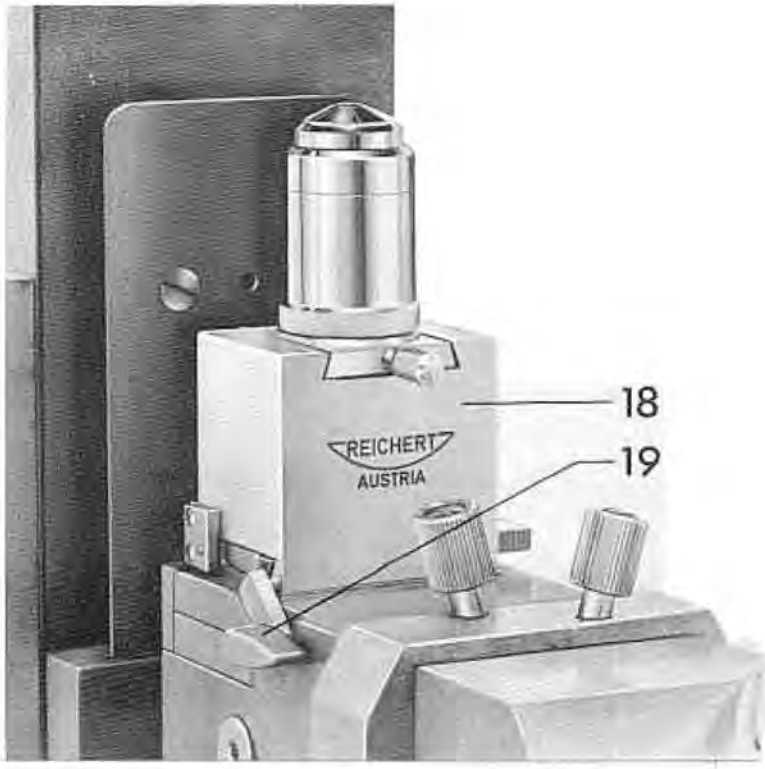


Fig. 35

Fig. 36



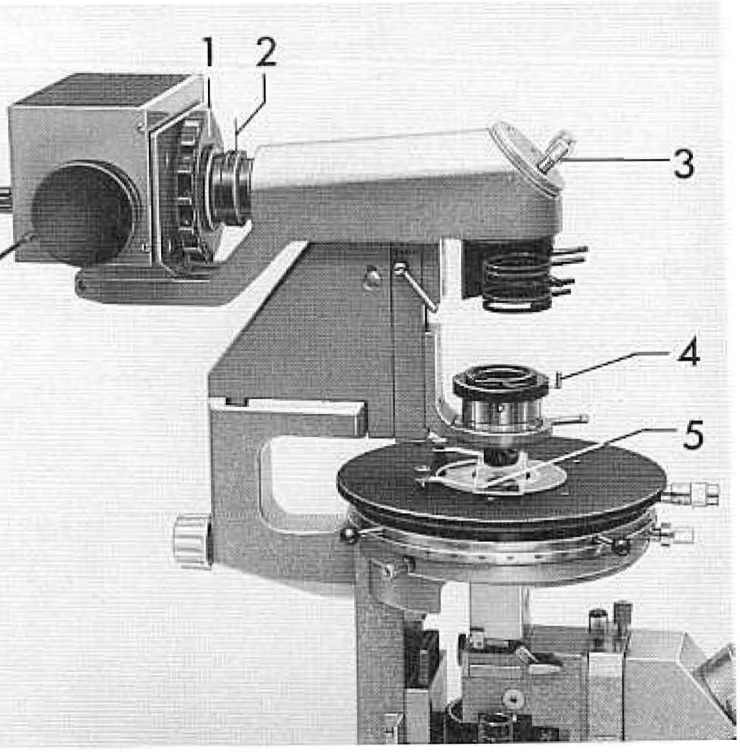


Fig. 37

Setting the transmitted-light bright ground illumination

a) In transmitted-light work it is usual to employ the glass stage insert with a 35mm diameter aperture. Place the slide on the stage insert so that the cover slip is completely within the aperture. The specimen clips (5) are used to secure the specimen in position when working with the oil immersion objective.

b) Slide in a transmitted-light objective, for example 16/0.25; insert the eyepiece into the body. Switch on the lamp and swing in a neutral filter in place of the frosted daylight filter. Move the deviating prism with its lever into the position for visual observation. Swing in the front lens of the 2-lens condenser with the lever. Slightly close the aperture-iris diaphragm with the lever (4).

c) Focus on the specimen with the coarse and fine motions.

d) Close the lamp field diaphragm with the lever (2), focus on the image by raising or lowering the condenser and centre it in the middle of the field with the two centring screws (3). Open the field-iris diaphragm with the lever until just beyond the boundary of the field. Further opening causes excessive illumination and loss of contrast in the microscopic image, see Fig. 38.

e) Adjust the aperture-iris diaphragm of the condenser with the lever (4) so that a microscopic image of maximum clarity and contrast is obtained; this is usually the case when the rear lens of the objective (when viewed in the observation tube after removing the eyepiece) is illuminated over approximately two-thirds of its diameter.

f) Adjust the lamp condenser (1) to obtain the brightest and most uniform illumination of the field.

g) Change the objective or eyepiece to obtain a higher total magnification.

When changing the objectives the Fixfocus stop is locked before raising the stage with the coarse motion; the stage is then lowered with the coarse motion up to the stop and the microscopic image focused with the fine motion alone.

Check the adjustment of the field and aperture-iris diaphragms and the lamp condenser.

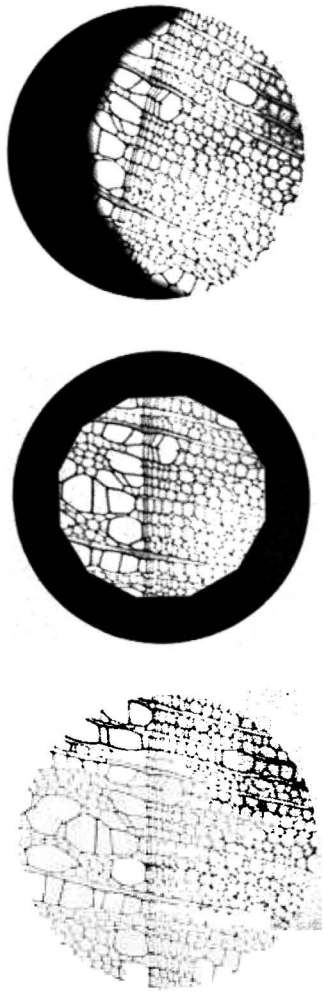


Fig. 38

ADDITIONAL EQUIPMENT FOR OBSERVATIONS IN POLARIZED LIGHT

Rotating filter analyser

When this is supplied subsequently, slightly unscrew the knurled screw at the back of the microscope (10); the rotating filter analyser (6) is then fitted from the right in place of the spacer, inserting it far enough into the opening of the optical system until it is visible on its other side. Tighten the screw again.

The analyser can be moved backwards and forwards between two stop positions. When it is moved in up to the stop the analyser is in the beam; when it is moved out against its stop it is out of the beam.

The filter analyser can be rotated through 360°. The measuring range is visible in the window (7) and is marked for every 45°; the measuring drum (8) is graduated in 45 degrees and the vernier permits reading to an accuracy of 0.1°. When the measuring drum is rotated, a cam mechanism moves at the same time the graduation range in the window (this is the reason for the non-uniform movement).

The analyser can be readjusted by holding the measuring drum in the 0° position and rotating the screw (9) with a coin until the field is completely dark when polarizer and analyser are crossed.

Incident-light filter polarizer

Place the polarizer (11) on the illumination tube of the universal opaque illuminator so that the locating pin engages with the locating slot of the polarizer at the bottom on the illuminating tube; clamp it with the screw (12).

The polarizer can be rotated; it has index marks at 0°, 90°, 180°, and 270°. By operating the lever (13) the rotating sector diaphragm for one-sided incident-light dark ground illumination, see page 22, can be swung in place of the polarizer.

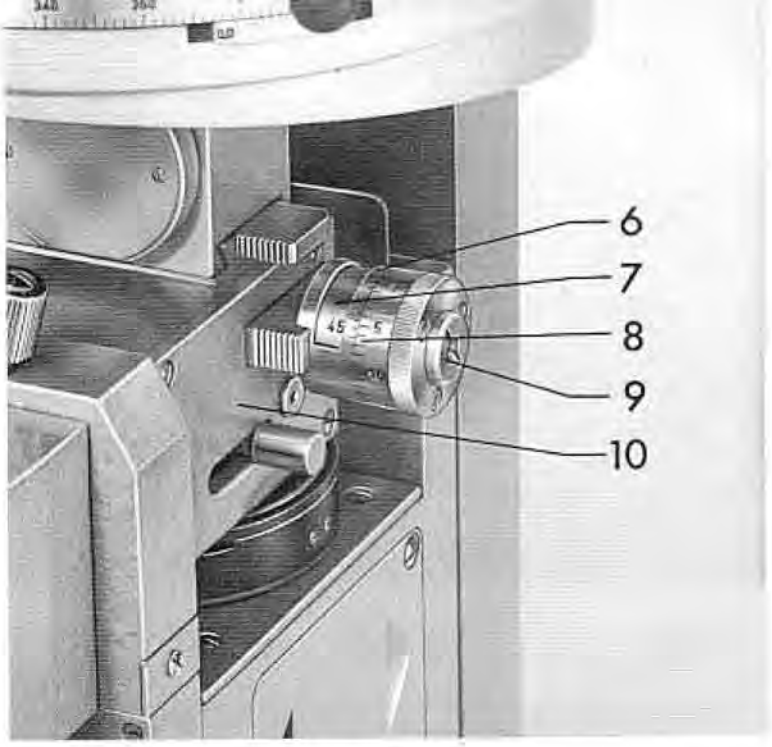
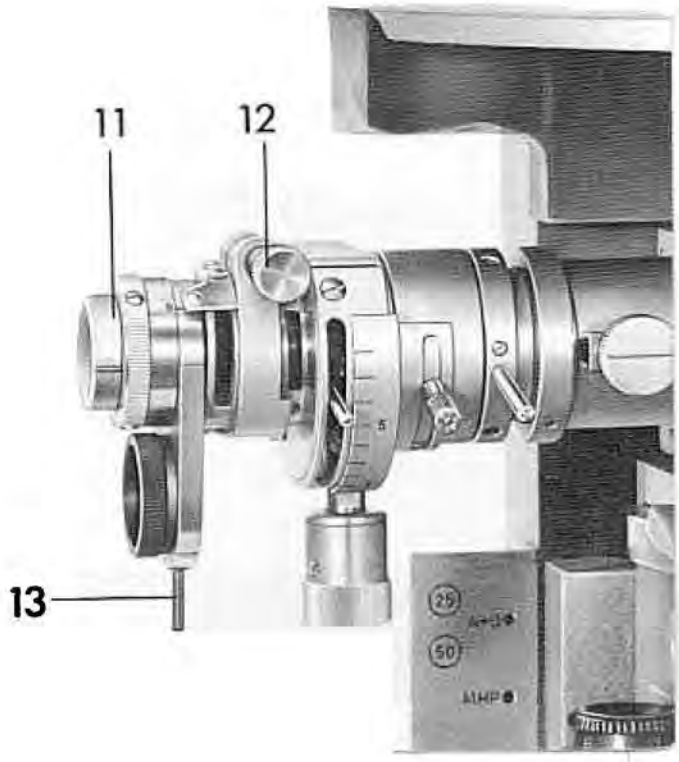


Fig. 39

Fig. 40



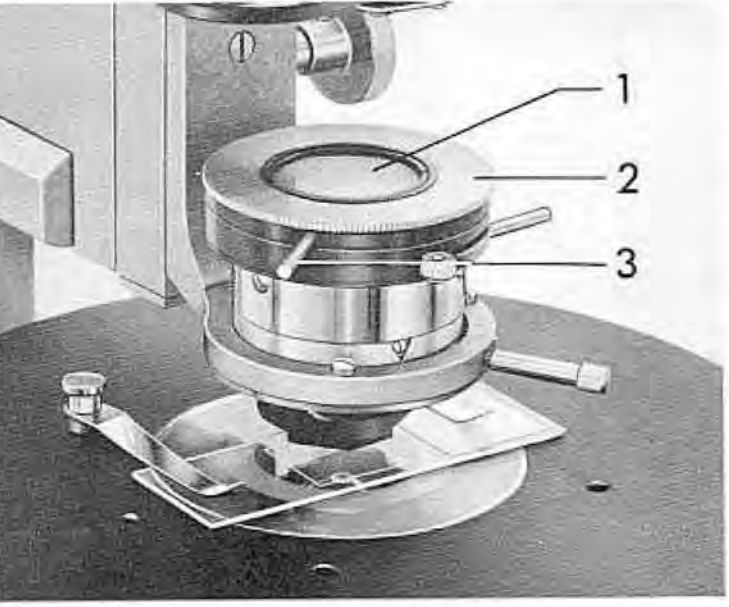


Fig. 41

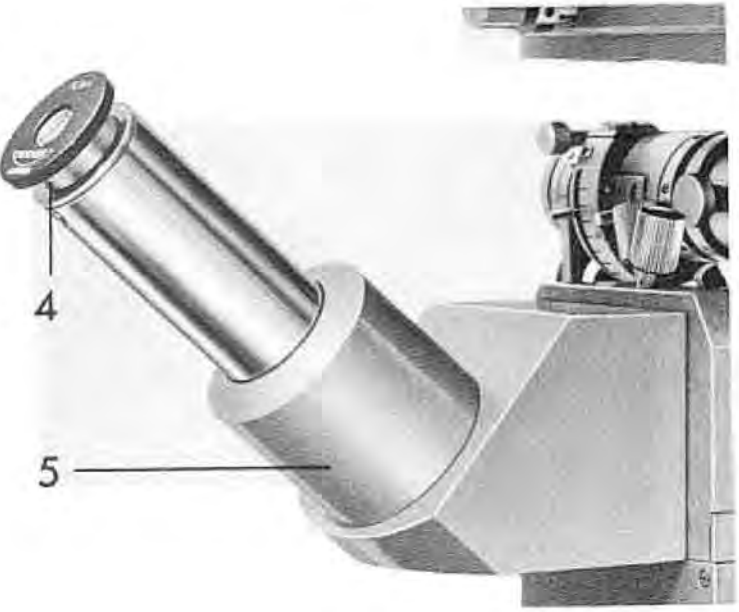
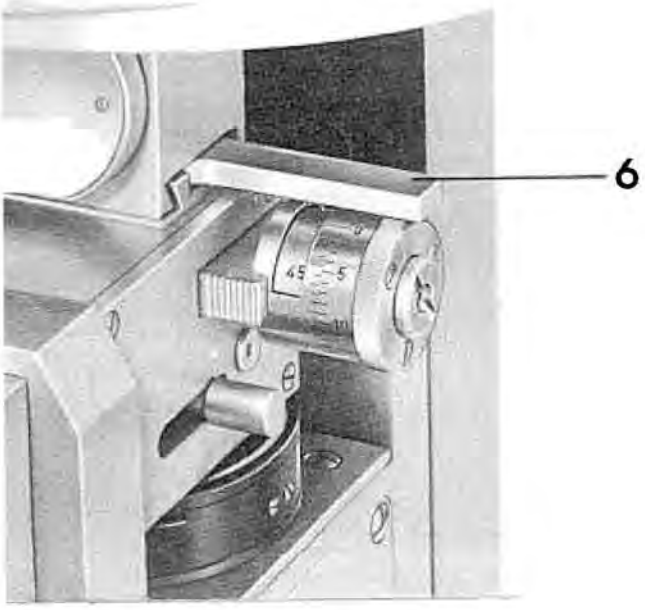


Fig. 42

Fig. 43



Transmitted-light polarizing condenser

The 2-lens condenser is described in detail on page 23. The polarizer (1) is carried in a mounting which can be rotated through 360° by means of the ring (2) and which has click stops every 90°.

The polarizer can be swung out with the lever (3).

Monocular body and crossline eyepiece

The monocular body (5) is used for work in polarized light, see also page 9.

Insert the crossline eyepiece (4) into the body so that the locating pin of the eyepiece engages with the locating slot of the body tube. The crosslines are then aligned N-S and E-W.

Variations in the observer's eyes are taken into account through the adjustable eye lens. Before starting work on the microscope the crosslines should be focused by rotating the eye lens mount.

Compensators

The following compensators (6) are available as accessories: gypsum red 1st order, mica quarter-wave, quartz wedge 1st to 3rd order. The compensators are orientated with the vibration plane of the slower beam (direction σ) at 45° to the length of the metal slider (direction E-W).

The compensator slot is located above the analyser and is lined up E-W.

Conoscopic investigations

Conoscopic investigations are not observations of the crystal specimen itself but a study of the interference phenomenon (axial image) appearing in the rear focal plane of the objective. The investigations are best carried out with objectives whose numerical aperture N.A. ≥ 0.45.

When adjusting for conoscopic observation the microscope is first focused on the crystal specimen between crossed polarizer and analyser. The aperture-iris diaphragm of the illumination equipment (condenser or universal opaque illuminator) is then opened completely. The axial image is observed either with the axial image eyepiece or with the Klein magnifier in conjunction with the Czapski eyepiece.

Eyepiece for axial images

Insert the eyepiece (7) into the body in place of the crossline eyepiece. The axial image is focused by rotating the eye lens mount.

Czapsky eyepiece and Klein magnifier

Remove the eyepiece from the viewing tube and secure the Klein magnifier (8) with the clamp (10) to the viewing tube. The magnifier is swung out and the Czapsky eyepiece (9) is then inserted into the tube. An iris diaphragm is visible in the field with which a particular particle of the crystal specimen can be selected. The iris diaphragm on the C Czapsky eyepiece is adjusted by rotating the eyepiece eye lens mount; focusing consists of axial movement of the eye lens mount.

After swinging in the Klein magnifier the rear focal plane of the objective becomes visible and with it the axial image. The axial image is focused by axial movement of the magnifier. The Klein magnifier carries a micrometer scale focused by the adjustable eye lens mount which is used for measuring out the axial image.

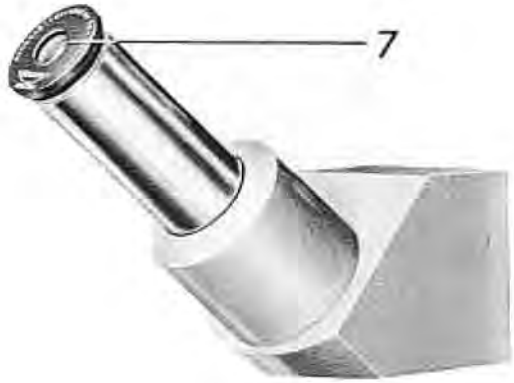


Fig. 44

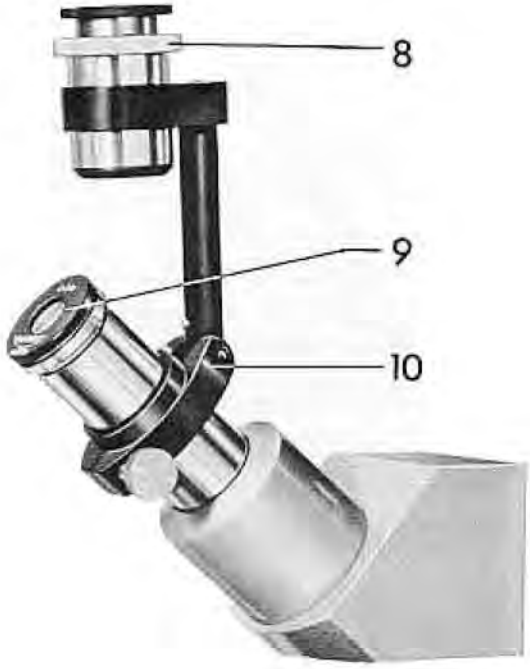


Fig. 45

Fig. 46

Fig. 47

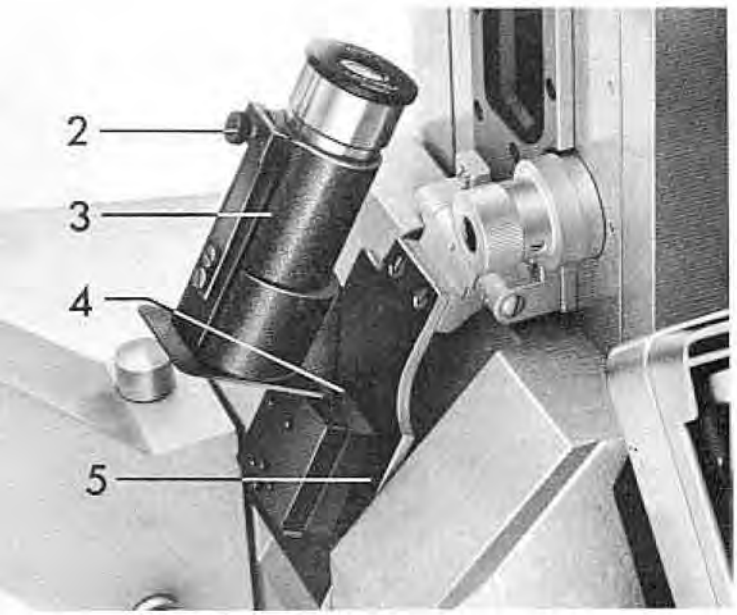
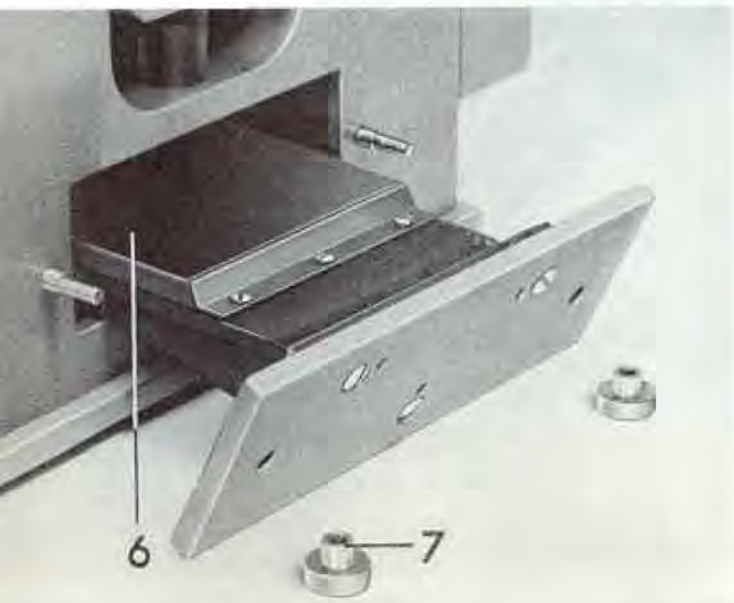


Fig. 48

Fig. 49



PHOTOMICROGRAPHIC BELLOWS CAMERA

For all photomicrography the small deviating prism in the optical system which passes the optical beam into the body has to be swung out with the lever (13), see Fig.7.

Camera shutter

The camera shutter (1) is a self-winding sector shutter with settings for T, B and instantaneous exposures from 1 sec to 1/125 sec. It is operated by a wire release which is screwed to the shutter.

NOTE: The selected exposure time must only be set when the shutter is closed.

Photographic eyepiece holder and photographic eyepieces

Swing out the cover plate (5) on the left of the housing. Insert the photographic eyepiece with its locating groove into the holder (3) so that the clip engages with the groove. Tighten the clamping screw (2) and swing back the eyepiece holder together with the cover plate.

Photomicrography is carried out with the aplanatic compensating eyepieces PK4X Foto, PK5X Foto, PK6.3X, PK8X etc.

When working with the low-power photomicrography equipment the cover plate is opened, the stop (4) is depressed and the eyepiece holder (3) is then withdrawn downwards.

Camera diverting mirror

The camera diverting mirror (6) should only be taken out if cleaning is absolutely essential. For this purpose the two nuts (7) at the back of the microscope base have to be removed. The mirror carrier is carefully pulled out of the base. The mirror surface must only be dusted with a soft, grease-free brush or better still blown off with a blowball.

International camera back

a) The frosted focusing screen (8) with clear diagonal strip, in frame.

b) Cassettes: the Linhof double cassette (12) 9 x 12 cm or 4 x 5 in, and the Polaroid cut film cassette (13), model 1500, are used on the international camera back (10) by means of the spring back device.

For this purpose the frame (11) of the focusing screen is pulled back slightly at the top against the spring force and the cassette is inserted between the camera back (10) and the focusing screen frame (11). To remove the cassette it is first moved back slightly and can then readily be taken out.

The Polaroid intermediate focusing screen (16), the Graflex-Polaroid roll film cassette (14) and the Rollex cassette can only be fitted after removing the focusing screen frame (11). For this purpose the two spring clips (9) on the right and left of the focusing screen are pushed down so that the frame can be moved upwards and then removed. The Polaroid intermediate focusing screen, the Graflex-Polaroid roll film cassette or the Rollex cassette can then be fitted to the camera back by means of the sliders (15) on both sides.

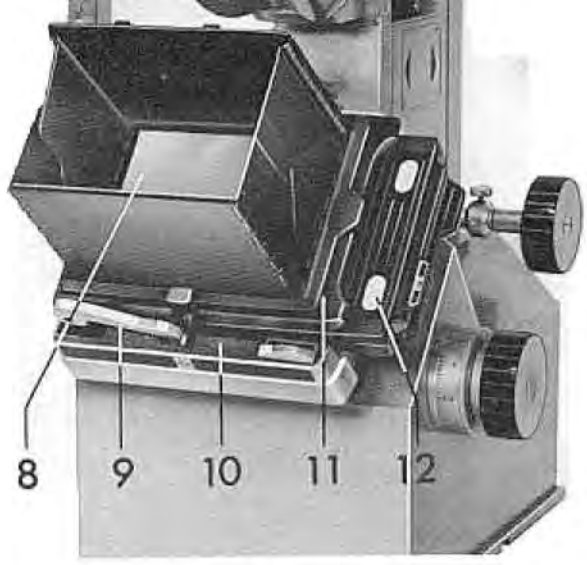


Fig. 50

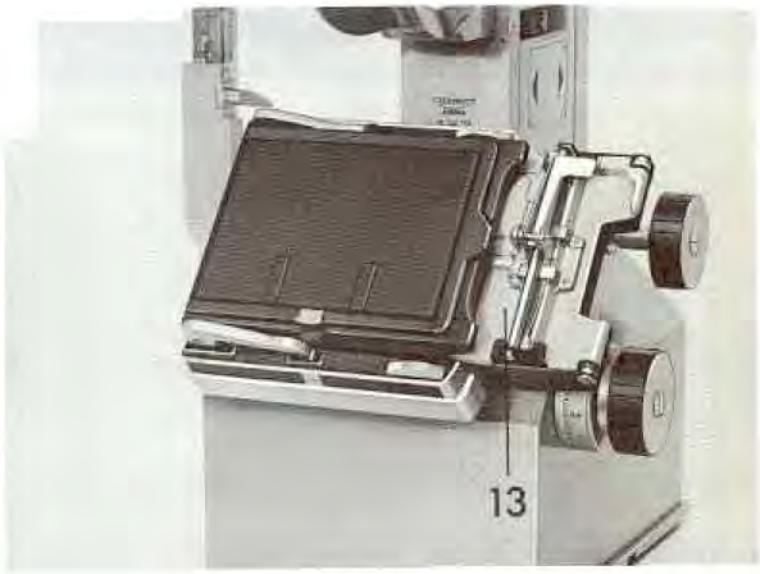
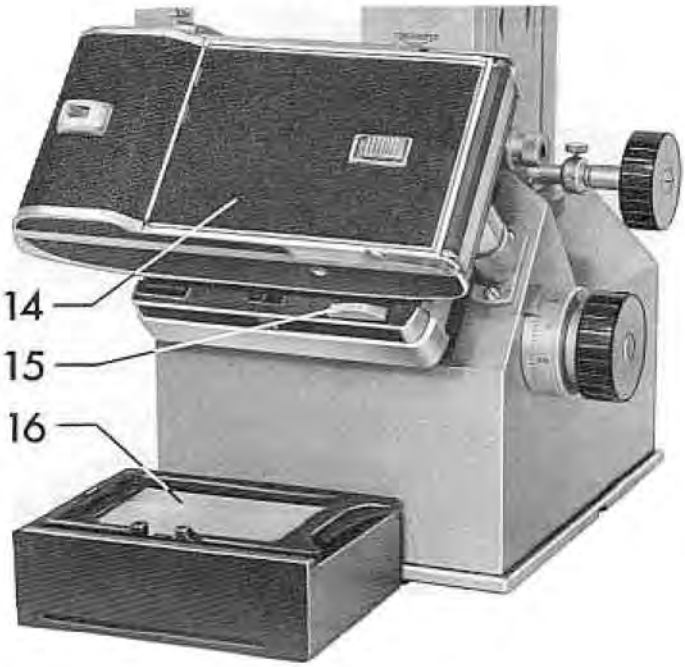


Fig. 51

Fig. 52



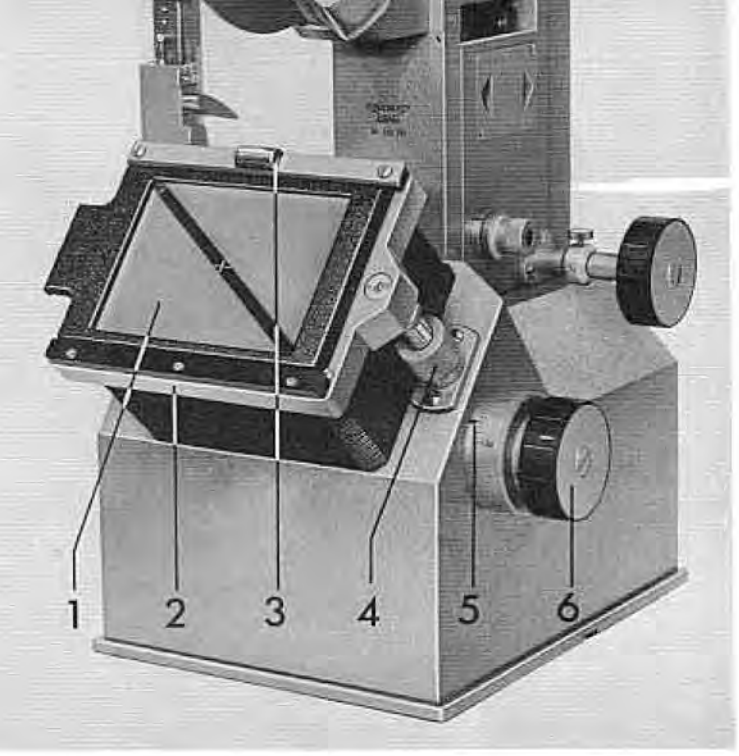


Fig. 53

Cassette frame for metal cassettes

The cassette frame (2) has a spring strip (3) which has to be moved up to change the focusing screen (1) or the cassettes.

a) Focusing screen, frosted, with clear diagonal strip, in frame.

b) Universal cassette, suitable for plates and cut film.

c) Roll film cassette for 6 x 9 cm (2¼ x 3¼ in) roll film, with mask for the sizes 6 x 6 cm (2¼ x 2¼ in) and 4 x 6 cm (1½ x 2¼ in). Its use is explained in the operating instructions supplied with the roll film cassette.

d) Intermediate frame with international camera back to take all photographic accessories suitable for use with the international camera back.

Focusing magnifier

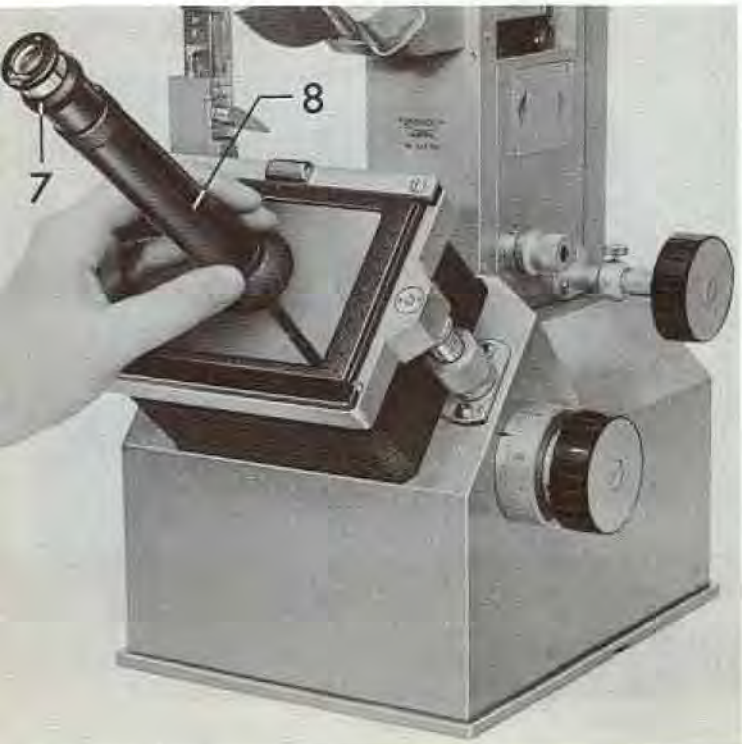
The focusing magnifier (8) is used to focus the photomicrographic image on the clear diagonal strip of the focusing screen or on a clear screen.

The focusing magnifier must be set exactly vertically above the crosslines in the centre of the focusing screen by means of the spherical base after lossening the clamping ring (7). Focus the magnifier on the crosslines of the focusing screen and secure it with the clamping ring.

The focusing magnifier must always be lined up by means of the spherical base so that its optical axis coincides with the direction of the light rays in the camera.

During focusing it should be noted that the maximum sharpness of the image should be obtained not in the centre of the field but approximately 1/6th of the image diagonal from it.

Fig. 54



Determining the exposure time

a) With the "REMIPHOT" exposure meter.

The exposure time can be accurately determined with the "REMIPHOT" exposure meter; full details are given in the operating instructions.

b) By trial exposures with the grey wedge, No. 02 69 91 or 02 48 01.

Place the grey wedge (9) into the mask underneath the cassette and photograph it together with the image during a trial exposure with an extended exposure time. Choose on the negative the strip which is correctly exposed. The number which is also photographed on this strip is 20, say. The correct exposure time is then 20% of the trial exposure time with the grey wedge.

c) By trial exposure with a cassette.

The cassette slider is divided by lines into six strips.

During the exposure the cassette slider is first pulled out fully so that it exposes the entire area. The first exposure is made with an intentionally short exposure time, for example 2 sec. The slider is then pushed in by the width of one strip and a further exposure of 2 sec is made. The next strips are exposed for 4, 8, 16 and 32 sec. After the film has been developed the strip with the correct exposure is selected. In calculating the exposure time it must be remembered that each strip is exposed twice as long as the previous one.

The exposure times are therefore in the ratio 1 : 2 : 4 : 8 : 16 : 32.

In our example we had the following exposure times:

Fig. 55

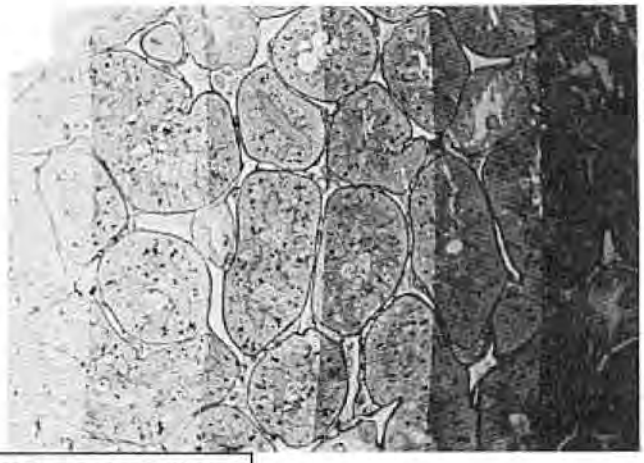


Fig. 56

Part exposure of the individual strips			Total exposure of the individual strips	
1st strip	2	seconds	2	seconds
2nd strip	2+2	seconds	4	seconds
3rd strip	2+2+4	seconds	8	seconds
4th strip	2+2+4+8	seconds	16	seconds
5th strip	2+2+4+8+16	seconds	32	seconds
6th strip	2+2+4+8+16+32	seconds	64	seconds

d) With the Reichert "Photo-Automatic"

Also when using a bellows-type photomicrographic camera the exposure time can be accurately determined with the "Photo-Automatic". Please see our instruction mansual for further reference.

Photomicrographic magnification

After loosening the clamping device (4) it is possible to adjust the bellows length of the camera with the control (6), Fig. 53. This produces a change in the magnification "M" in the film plane. The camera factor "p" varies between 1.46 and 2.18 and is read against the line 5, see Fig. 53.

Determining the photomicrographic magnification "M":

a) The magnification is calculated by the following formula:

$$M = M_{Obj} \times M_{Eye} \times p$$

The objective is selected from the table below. Please note that the desired overall magnification should be smaller than or equal to the appropriate total magnification for the objective. The limit of the appropriate total magnification = objective aperture X 1000.

Appropriate total magnification	incident light objectives		Transmitted light objectives	
1300	Fluorite Oil	125/1.30		
1250			Achromatic Oil Iris	160/1.25
900	Fluorite	80/0.90		
800			Achromatic	100/0.80
750	Fluorite	63/0.75		
550	Achromatic	40/0.55		
550	Epilum	40/0.55		
450			Achromatic	40/0.45
250	Achromatic	16/0.25	Achromatic	16/0.25
250	Epilum	16/0.25		
150	Achromatic	8/0.15		
150	Epilum	8/0.15		
80	Plane	4/0.08	Plane	4/0.08

b) The logarithmic scales in Fig. 57 permit rapid evaluation of the optimum objective-eyepiece combination and at the same time give the required camera factor.

Example:

Required is a 500X total magnification in incident-light photomicrography. An incident-light objective Epi 40/0.55 is available. Find the eyepiece magnification and the camera factor.

The two given values are marked on the logarithmic scales in Fig. 57. The line joining these points is continued and intersects the scale at a point which gives the eyepiece magnification and the camera factor.

Result: Aplanatic compensating eyepiece 6.3X, camera factor 1.98,
or Aplanatic compensating eyepiece 8X, camera factor 1.56.

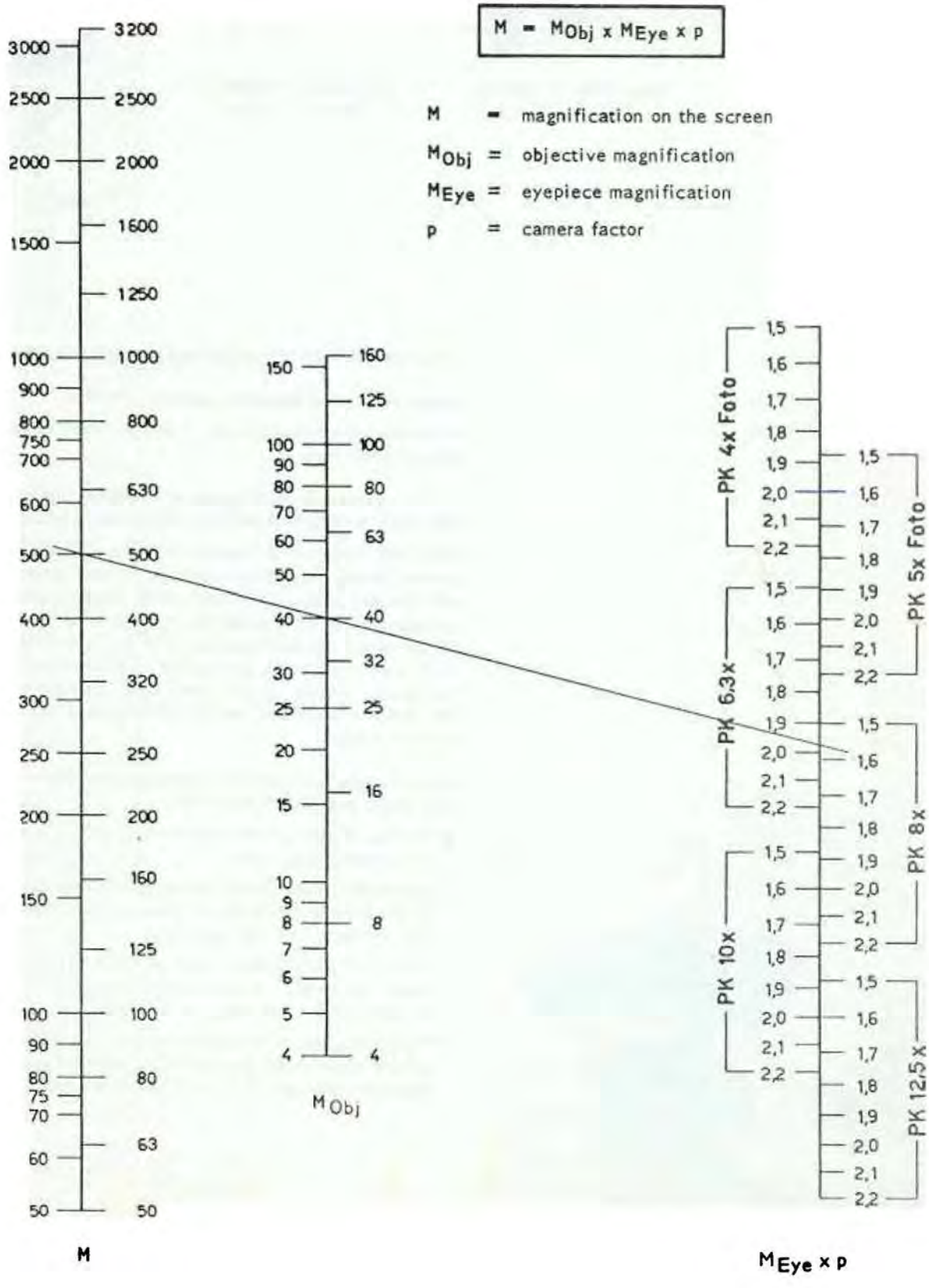
c) For very accurate work the photomicrographic magnification is determined from the projected image or from the micro photograph of a specimen micrometer according to the formula:

$$M = \frac{D}{d}$$

D length on image

d length on specimen micrometer

DIN and ASTM magnifications on the frosted screen of the "Me F2" Universal Camera Microscope



Neu–Polar f = 100 mm
4,7:1 – 6,4:1

Neu–Polar f = 50 mm
11,5:1 – 15,1:1

Dallmeyer f = 25,4 mm
23,8:1 – 30,7:1

Fig. 58

LOW-POWER PHOTOMICROGRAPHY EQUIPMENT

Removing the photographic eyepiece holder

Withdraw the eyepiece holder from the cover plate as described on page 28.

Removing the universal opaque illuminator, the transmitted-light objective carrier and the microscope portion

Raise the stage to its highest position with the coarse control. Swing out the incident-light low-voltage lamp with bracket or move the lamp stand slightly away from the instrument. Push down the locking lever and withdraw the universal opaque illuminator or the transmitted-light slide carrier. After loosening the knurled screw remove the optical system. The viewing tube need not be removed from the stand but work is restricted to the use of the bellows camera.

Incident-light work with the photographic lenses Dallmeyer f=25.4 mm and Neu-Polar f=50 mm.

A) Vertical bright ground illumination with incident-light illumination equipment.

a) Insert the intermediate fitting (3) into the annular groove of the fine motion slide in place of the microscope portion and clamp it with the screw (4).

b) Insert the photographic lens on slide (2) with the incident-light illumination equipment (1) from the left into the dovetail of the intermediate fitting.

c) Move the lamp to its operating position and adjust the height of the lamp column (5) so that the index line is opposite the mark P 25 or P 50 on the setting scale.

Fig. 59

d) Set the camera shutter to T and open it with the wire release.

e) Place a specimen on the stage and switch on the lamp; the lamp field diaphragm remains fully open and the coarse adjustment is made with the coarse control. The dot is opposite the mark 25 or 50 on the setting scale.

f) If the image illumination is not central, correct the setting of the lamp tilting device.

g) Set the lamp condenser to give the brightest and most uniform illumination of the field.

h) Completely open the objective aperture diaphragm with the ring (6) in the case of plane specimens; with 3-dimensional specimens close it only so far as is essential to achieve the required depth of focus.

B) Oblique illumination with the oblique illumination mirror.

a) Loosen the two knurled screws (7) and lift off the incident-light illumination equipment (1). Insert the oblique illumination mirror (8) into the mirror carrier.

b) Raise the stage to its highest position with the coarse control. Insert the intermediate fitting (3) in the annular groove of the fine motion slide in place of the optical system. Insert the photographic lens on slide (2) from the left into the dovetail guide of the intermediate fitting.

c) Move up the lamp column (5) to its stop and switch on the lamp. Set the lamp with the tilting device exactly to the centre of the oblique illumination mirror.

d) Set the stage with the coarse control so that the dot is opposite the mark 25 or 50 on the setting scale.

e) Set the camera shutter to T and open it with the wire release.

f) Place a piece of paper on the stage and adjust the lamp illumination to the centre of the stage with the concave face of the oblique illumination mirror (8). The lamp field diaphragm is fully open.

g) Place the specimen on the stage. Focus on it with the coarse and fine motions.

h) Set the lamp condenser to give the brightest and most uniform illumination of the field.

i) Completely open the objective aperture diaphragm with the ring (6) in the case of plane specimens; with 3-dimensional specimens close it only so far as is essential to achieve the required depth of focus.

Fig. 60

Transmitted-light work with the photographic lenses Dallmeyer f=25.4 mm and Neu-Polar f=50 mm.

a) Fit the transmitted-light illumination equipment as indicated on page 23.

b) Insert the spectacle condenser (3) in place of the 2-lens condenser into the clamping sleeve of the condenser carrier and clamp it in position.

c) Raise the stage to its highest position with the coarse control. Insert the intermediate fitting (6) in the annular groove of the fine motion slide in place of the optical system. Insert the photographic lens on slide (5) without the incident-light illumination equipment into the dovetail of the intermediate fitting.

d) Set the camera shutter to T and open it with the wire release.

e) Place the specimen on the stage, switch on the lamp and focus with the coarse control. The dot is opposite the mark 25 or 50 on the setting scale.

f) Completely close the lamp field diaphragm with the lever. Raise the condenser carrier with the control (2) to its top stop. Centre the outline of the field diaphragm on the focusing screen with the two centring screws (1) until it is in the middle of the field.

g) Completely open the lamp field diaphragm with the lever. Lower the condenser carrier to its bottom stop.

h) Set the lamp condenser to give the brightest and most uniform illumination of the field.

i) Completely open the objective aperture diaphragm with the ring (4) in the case of plane specimens; with 3-dimensional specimens close it only so far as is essential to achieve the required depth of focus.

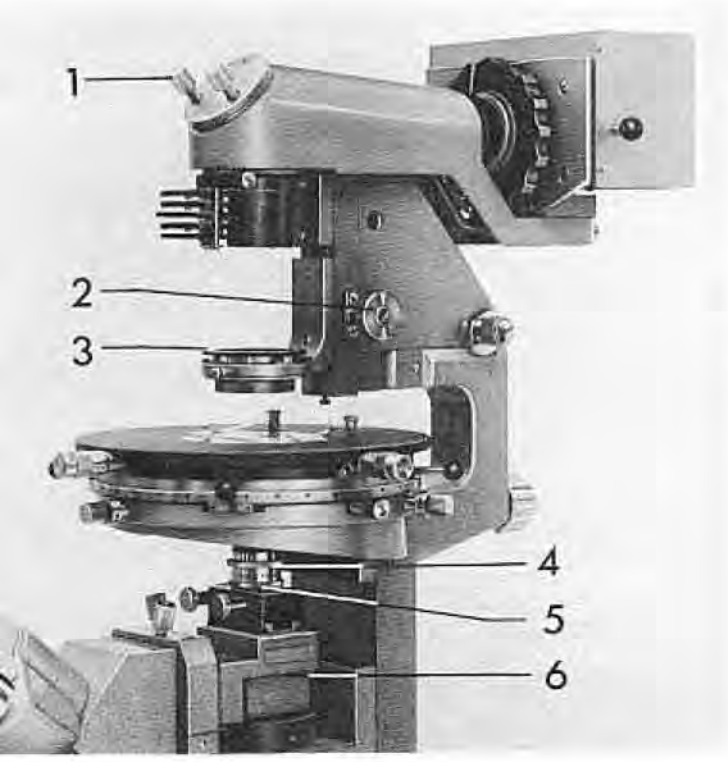


Fig. 61

Incident-light work with the photographic lens Neu-Polar f = 100 mm.

A) Vertical bright ground illumination with incident-light illumination equipment.

a) Raise the stage to its highest position. Remove the optical system and fit the photographic lens (9) on the intermediate fitting with the incident-light illuminating equipment (8) in the annular groove of the fine motion slide and secure it with the clamping screw (10).

b) Move the lamp to its operating position and adjust the height of the lamp column (11) so that the index line is opposite the mark P 100 on the setting scale. Swing in the condenser front lens (7).

c) Set the camera shutter to T and open it with the wire release.

d) Place the specimen on the stage, switch on the lamp and fully open the lamp field diaphragm. Focus on the specimen with the coarse control. The dot is opposite the mark 100 on the setting scale.

e) Set the lamp condenser to give the brightest and most uniform illumination of the field.

f) If the image illumination is not central, correct the setting of the lamp with the tilting device.

g) Completely open the objective aperture diaphragm with the ring (1), see Fig. 63, in the case of plane specimens; with 3-dimensional specimens close it only so far as is essential to obtain the required depth of focus.

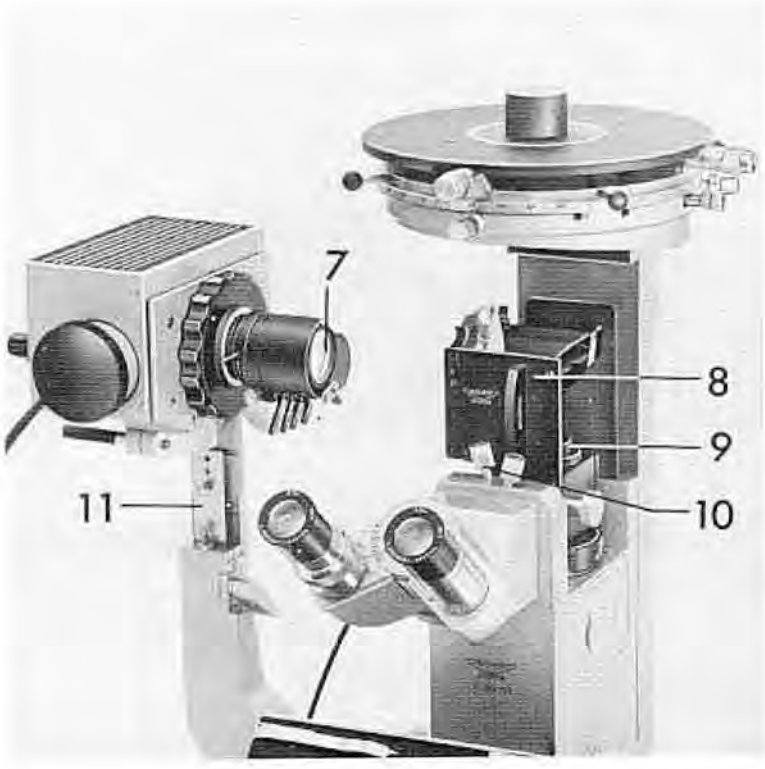


Fig. 62

B) Oblique illumination with the oblique illumination mirror.

a) Release the clamping device with the knurled knob (3) and lift off the incident-light illumination equipment (8), Fig. 62. Insert the oblique illumination mirror (5) into the mirror carrier.

b) Raise the stage to its highest position with the coarse control. Insert the photographic lens (2) on the intermediate fitting in the annular groove of the fine motion slide in place of the optical system and secure it with the clamping screw (4).

c) Move the lamp to its operating position and raise the lamp column (7) up to its stop. Swing in the condenser front lens (6).

Switch on the lamp and line up the light from the lamp exactly to the centre of the oblique illumination mirror (5) with the tilting device.

d) Set the stage with the coarse control so that the dot is opposite the mark 100 on the setting scale.

e) Set the camera shutter to T and open it with the wire release.

f) Place a piece of paper on the stage and adjust the lamp illumination to the centre of the stage with the plane face of the oblique illumination mirror (5).

g) Place the specimen on the stage. Focus on it with the coarse and fine motions.

h) Set the lamp condenser to give the brightest and most uniform illumination of the field.

i) Completely open the objective aperture diaphragm with the ring (1) in the case of plane specimens; with 3-dimensional specimens close it only so far as is essential to achieve the required depth of focus.

Fig. 63

Transmitted-light work with the photographic lens Neu-Polar f = 100 mm.

a) Fit the transmitted-light illumination equipment as indicated on page 23.

b) Insert the spectacle condenser (10) from underneath in place of the 2-lens condenser into the clamping sleeve of the condenser carrier and clamp it in position.

c) Raise the stage to its highest position. Insert the photographic lens (2) on the intermediate fitting without the incident-light illuminating equipment in the annular groove of the fine motion slide in place of the optical system and secure it with the clamping screw (4).

d) Set the camera shutter to T and open it with the wire release.

e) Place the specimen on the stage, switch on the lamp and focus with the coarse control. The dot is opposite the mark 100 on the setting scale.

f) Completely close the lamp field diaphragm with the lever (12). Raise the condenser carrier with the control (9) to its top stop. Focus the image of the lamp filament on the focusing screen with the lamp condenser and centre it to the middle of the field with the two centring screws (8).

g) Completely open the lamp field diaphragm with the lever (12).

h) Set the lamp condenser (11) to give the brightest and most uniform illumination of the field.

i) Completely open the objective aperture diaphragm with the ring (1) in the case of plane specimens; with 3-dimensional specimens close it only so far as is essential to obtain the required depth of focus.

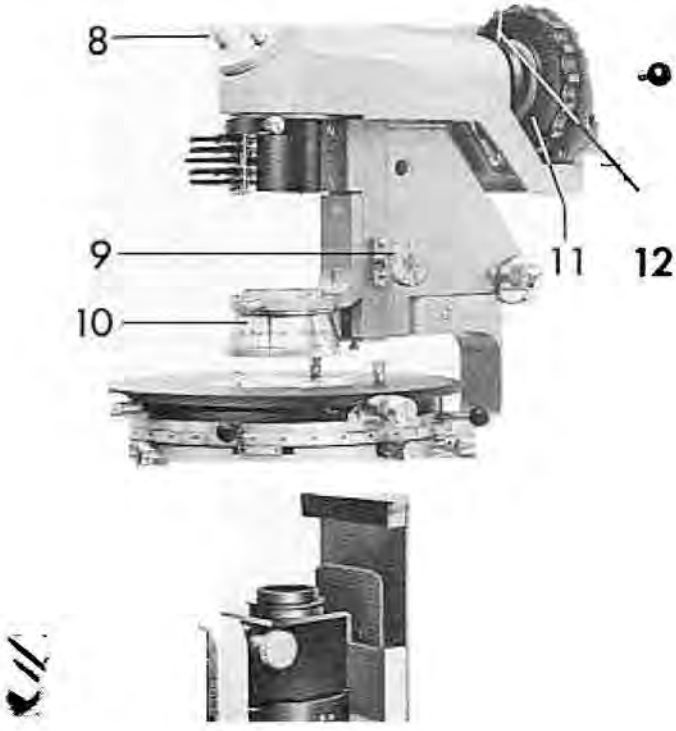


Fig. 64

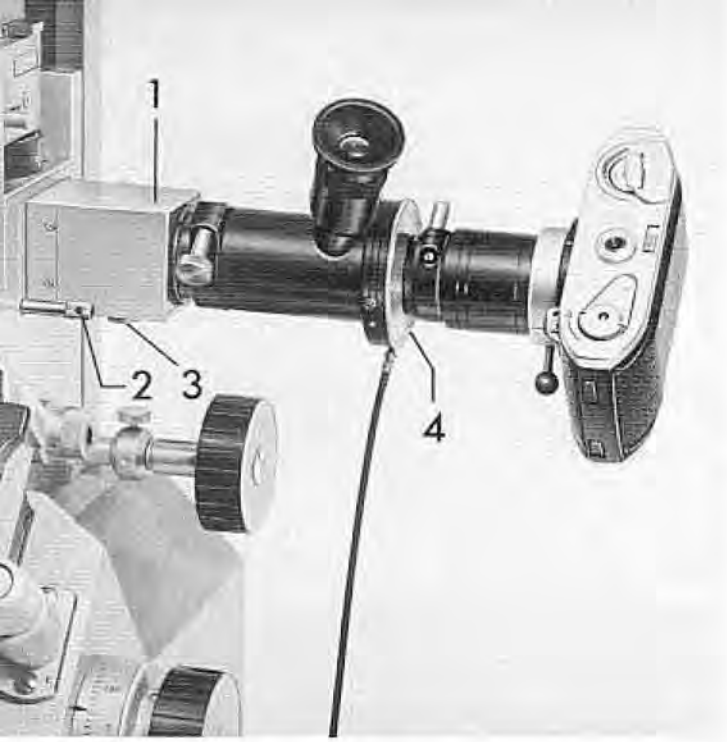


Fig. 65

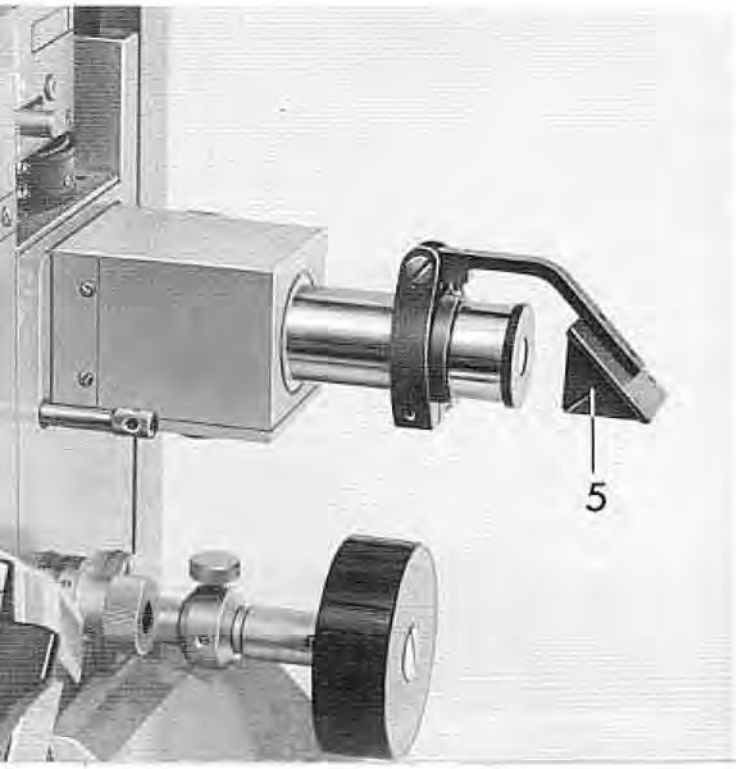


Fig. 66

PHOTOMICROGRAPHY AND MICRO PROJECTION

Inserting the sliding deviating prism.

The rectangular cover plate on the right-hand side of the microscope stand is removed after unscrewing the two screws. The deviating prism (1) with its mounting flange is inserted into the opening and secured with the two screws (2).

The sliding deviating prism either allows the beam to pass into the bellows camera or diverts it when the photomicrographic camera is in use; it is operated by the knob (3).

Position for work with photomicrographic camera:

move knob to left stop.

Position for work with bellows camera:

move knob to right stop.

The sliding deviating prism is not suitable for work with the "KINEKONNEX" micro cine equipment; the deviating prism No. 17 06 01 is supplied for that application.

Fitting the photomicrographic camera "Kam VBX" or the "REMICA III".

The photomicrographic miniature camera is fitted as indicated in the operating instructions for the "Kam VBX" photomicrographic camera and the "REMICA III" photomicrographic miniature camera.

When working with the camera the shutter on the microscope stand is set to T and opened with the wire release. The exposure time is set on the shutter of the intermediate camera fitting (4).

PHOTO-AUTOMATIC

The Photo-Automatic can be mounted on the sliding deviating prism (see Fig. 65, part 1) into which the photographic tube (35 mm Ø) is screwed in. A camera adapter ring is not required. Whenever an optical bench is available, the camera is mounted on the camera support (see page 4, Fig. 1).

Projection Prism.

Screw the photographic tube (25 mm Ø) into the sliding deviating prism (1). Mount the projection prism (see Fig. 66, part 5) on the photographic tube by means of the clamp in such a way that its is aligned to the projection surface. The projection surface can be the worktop or a wall behind the microscope, for example.

Swing up the projection prism and fit the eyepiece back into the photographic tube. After the projection prism has been swung in again the microscopic image is thrown on the projection surface.

MICROSCOPE ACCESSORIES

Magnetic specimen holder

Remove the stage insert ring from the stage aperture. Insert the magnetic specimen holder (6) with its two locating pins into the holes of the stage and secure it with the screw (12).

The specimen is secured with plasticine to a soft iron slide (11) by means of the mounting press (14). The slide is then placed against the magnetic holder which is perpendicular to the optical axis of the microscope, and secured in this position by the magnet. The force with which the slide is held can be adjusted with the knob (8).

After releasing the screw (10) the specimen can be rotated about its axis by means of the ring (9). The controls (7) provide height adjustment of the specimen.

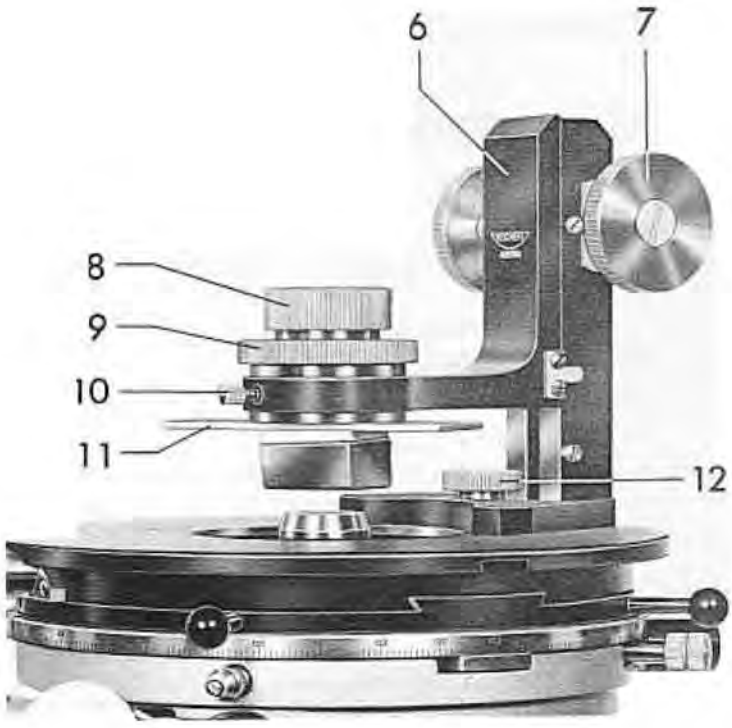


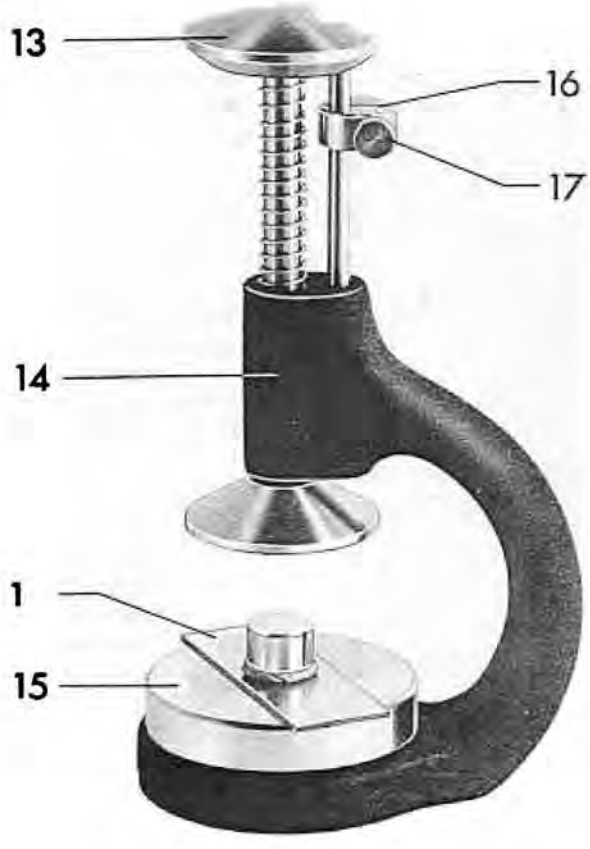
Fig. 67

Mounting press

The mounting press (4) is used to align the polished face parallel to the slide. The slide (11) together with the specimen mounted on plasticine is placed on to the anvil (15). A piece of paper is placed on the specimen to protect the polished surface. Press down the head (13) by hand until the specimen is accurately parallel.

If several specimens have to be set to the same height, prepare the first specimen as described above but maintain the hand pressure on the head. With the other hand loosen the clamping screw (17) and move the height stop (16) up against the top of the frame; secure it there with the clamping screw.

Fig. 68



SPARES

Spares and reference numbers

a) For the basic instrument

Specimen clips, 2 off	00 10 01
Stage inserts, glass	
Aperture 20 mm diameter	40 14 23
Aperture 35 mm diameter	40 14 24
Wire release	85 00 01
Focusing screen, for international camera back, in frame	16 06 22
Focusing screen, for cassette frame for metal cassettes, in frame	02 60 01

b) For the illumination equipment

Incident-light stage micrometer	14 47 01
Transmitted-light object micrometer	89 00 02
Low-voltage bulb 6V, 30W	15 69 01
Low-voltage quartz iodine lamp 6V, 100W	86 00 15

c) For low-power photomicrography equipment

Clear glass mirror for incident-light illuminasion equipment	
for the Neu-Polar f = 100 mm	44 02 23
for the Neu-Polar f = 50 mm	44 03 23
for the Dallmeyer f = 25.4 mm	44 11 24

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We are constantly endeavouring to still further improve our instruments and to adapt them to the requirements of modern test and research methods. This involves, in certain cases, modifications in the mechanical and optical structure or our instruments. All descriptions and illustrations in catalogues and instruction manuals as well as specifications relating to the mechanical features and optical data must not be regarded as binding.