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Neopan - Pol

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OPERATING INSTRUCTIONS

for the

Polarization Microscope "NEOPAN-POL I"

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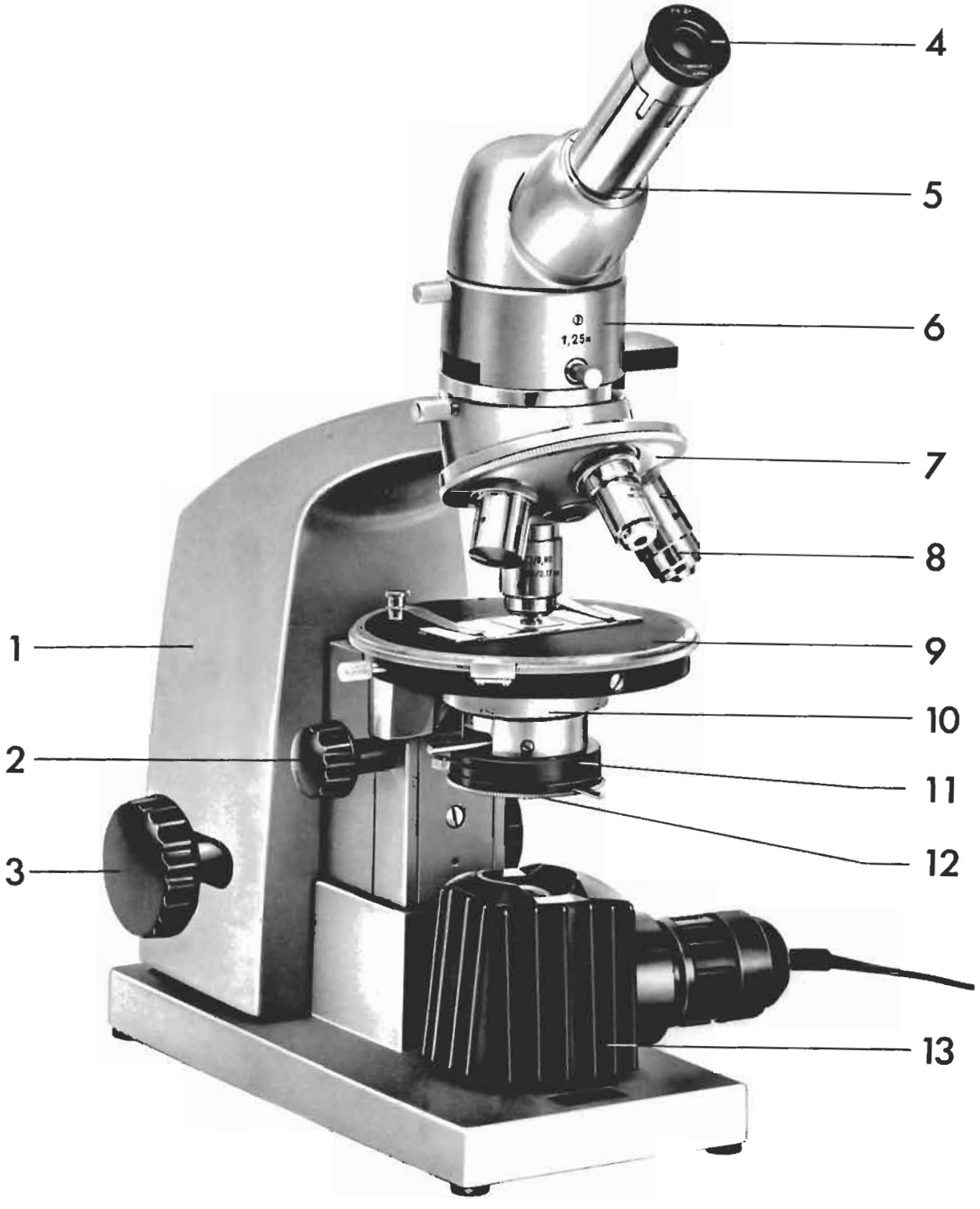

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SETTING UP INSTRUCTIONS AND DESCRIPTION OF THE MICROSCOPE

Locking screw

A red locking screw (14) is fitted on the underside of the base plate to relieve the load on the fine motion during transport and protect it against damage. This locking screw must be removed before starting to use the instrument; the microscope is tilted slightly to one side, the red screw is completely unscrewed and kept for future use.

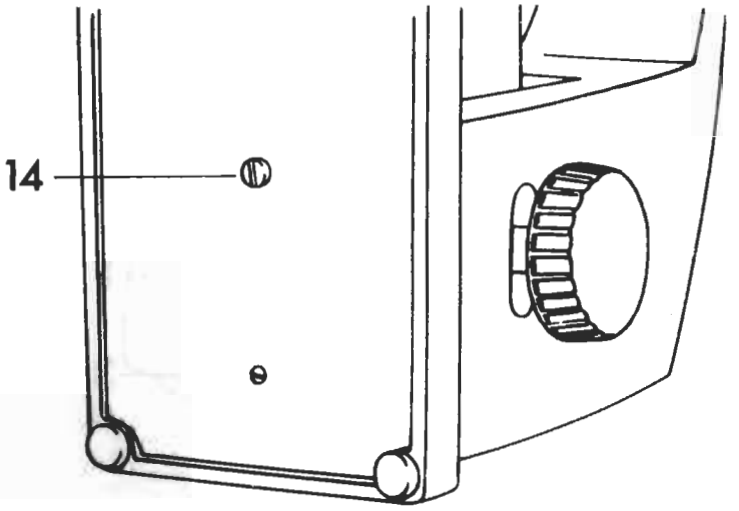


Fig. 2

Two-in-one focusing system

The coarse and fine adjustments for the microscope image which act on the stage are operated by a common control (2) using two separate mechanical movements.

Rotation of the control about its horizontal axis operates the coarse motion; pivoting the control about a vertical axis acts as the fine adjustment.

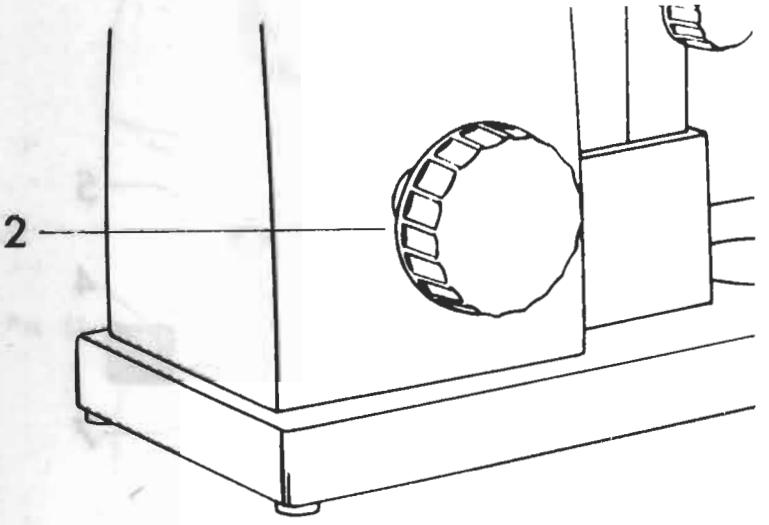


Fig. 3

Revolving nosepiece and transmitted light objectives

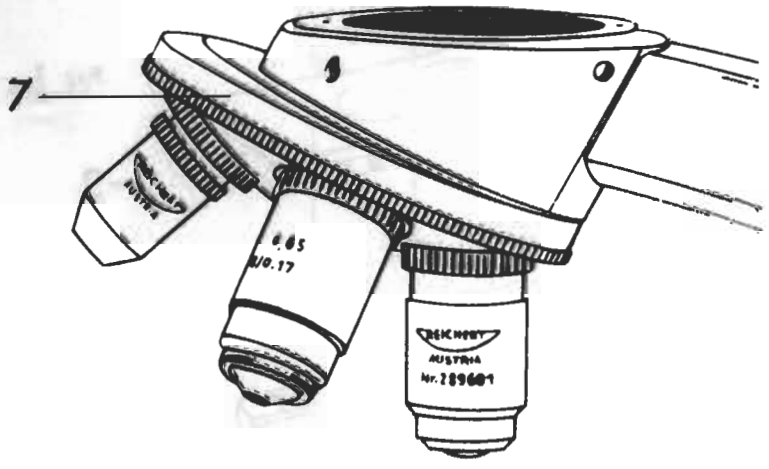
On the Neopan-Pol I the revolving nosepiece (7) is rigidly secured in position; it is used in conjunction with the centring rotating stage.

The objective 10/0,25 is screwed into the threaded hole of the nosepiece which is marked with a dot. The other objectives are fitted into the remaining holes so that clockwise rotation brings in objectives of increasing power.

Do not touch the objective front lens; especially when swinging in higher power objectives it is essential to ensure that the front lens does not collide with the specimen (lacquer rings, specimen edging) or the specimen holding device.

Fig. 4

The revolving nosepiece has pronounced click stops in the working position. All objectives are parfocalised and point centred to the nosepiece; after changing the objective the microscopic image remains clearly visible in the centre of the eyepiece and can be accurately focused by a slight readjustment of the focusing control.



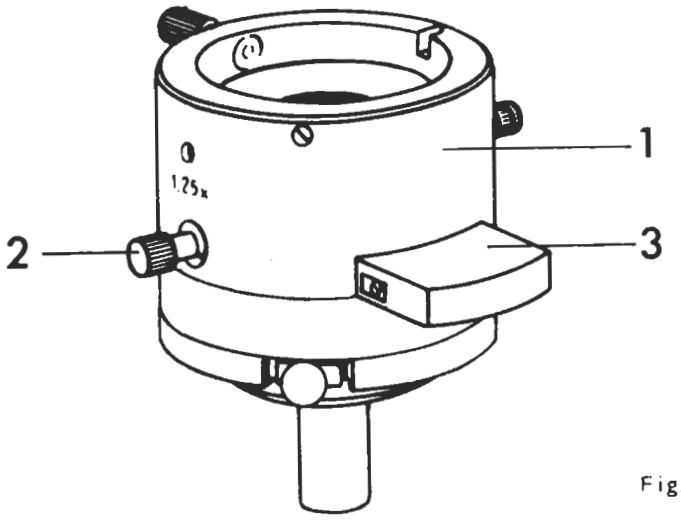


Fig. 5

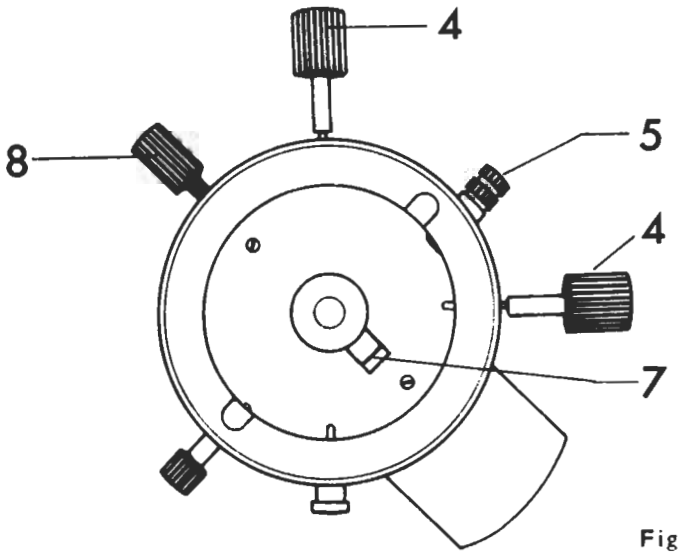


Fig. 6

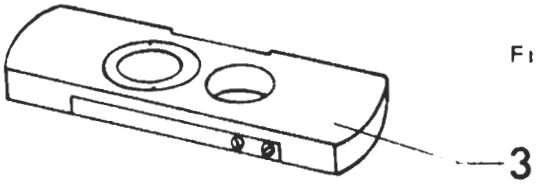


Fig. 7

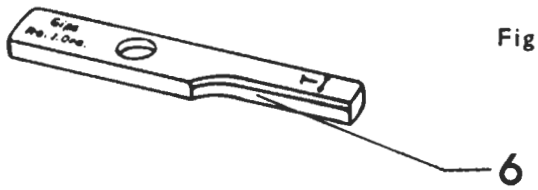


Fig. 8

Intermediate tube Pol

The intermediate tube Pol (1) contains a built-in Bertrand lens and the filter analyser. A compensator can also be fitted.

The magnification factor is 1,25x.

The intermediate tube Pol is fitted into the annular groove on the head of the stand so that the locating pin on the intermediate tube engages with one of the two recesses on the annular dovetail groove. The control knob (5) for the Bertrand lens can be either at the front or at the back. The intermediate tube is located in position with the clamping screw on the head.

The Bertrand lens can be centred, focused, and swung out when not required; it is used for investigating axial images. It is swung in and out with the knob (5); rotating the knob focuses the Bertrand lens on the rear focal plane of the objective and produces the axial image in sharp focus. The two hexagon socket screws (4) serve to centre the Bertrand lens to the crossline eyepiece.

A diaphragm (7) is arranged immediately above the Bertrand lens for stopping down to individual crystals, e.g. with the objective 63/0,80 down to a grain size of 0,1 mm dia. When it is necessary to stop down to even smaller crystals we recommend the use of the monocular body with built-in iris diaphragm, see Fig. 10. In this case the diaphragm (7) above the Bertrand lens is moved out of the beam using forceps.

Filter analyser

The filter analyser is rigidly mounted in the slide (3) and aligned North-South. After loosening the stop screw (2) the slide is pushed into the intermediate tube Pol so that the groove for the stop screw is at the top. Tightening up the stop screw then gives two stop positions in which the analyser is either in the beam or out of action.

Compensators

The standard instrument includes the compensator (6), a gypsum plate red 1st order. Other compensators (e.g. mica quarter wave or quartz wedge 1st to 3rd order) are available as accessories.

The compensators are inserted into the compensator slot underneath the analyser which is located SE-NW, after removing the cover.

The compensators are aligned with the direction of vibration of the slower beam (direction) perpen - dicular to the lenght of the compensator slot, i.e. SW-NE.

Bodies

The body is fitted on the intermediate tube Pol in either the dorsal or the frontal position. With the inclined monocular body it is important to ensure that the locating pin on the body engages with the groove on the intermediate tube Pol. The body is clamped with the clamping screw (8).

The bodies all have a tube factor of 1x.
All bodies can be used for orthoscopic and conoscopic observation on the Neopan-Pol 1.

a) Inclined monocular body MP, Fig. 9, and crossline eyepiece.
The Huyghenian crossline eyepiece H 6,3 x ♦ p is fitted into the body so that the locating pin of the eyepiece engages with one of the slots on the body tube. The crossline is then set either N-S and E-W or at 45° to this position. The eye lens of the eyepiece is adjustable to allow for variations in the observer's eyes. Before starting the microscopic observation the crossline must therefore be focused by rotating the eye lens mount.

b) Inclined monocular body P with built-in iris diaphragm, Fig. 10.
This body is used when the diaphragm in the intermediate body Pol is no longer sufficient to stop down to small crystals. During observations with this body the diaphragm on the intermediate tube is moved out of the beam.
The iris diaphragm in the body is adjusted with the knurled ring (9). For normal observations it is fully open.
The crossline eyepiece is inserted as described under a).

c) Inclined binocular body B, Fig. 11.
Insert a pair of eyepieces in the body. The interpupillary distance is adjusted by pivoting the two eyepiece tubes; the actual distance can be read in millimetres on the scale at the centre of the body. Differences in the strength of the two eyes are allowed for as follows: close the left eye, look into the right eyepiece with the right eye, focus the microscope on a specimen with the focusing system. Close the right eye and focus on the specimen with the left eye by moving only the adjusting ring (10) of the diopter adjustment.

d) Vertical photographic body F, Fig. 12.
The vertical photographic body is used to fit a photomicrographic camera or a projection equipment.

Fig. 9

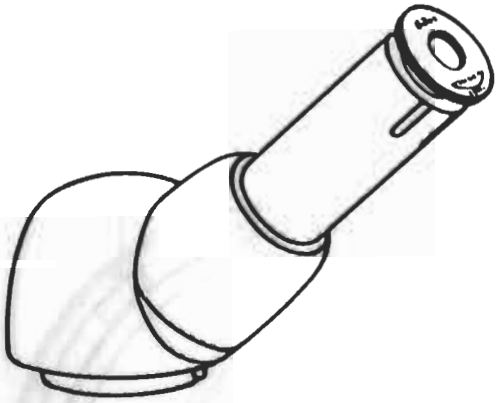


Fig. 10

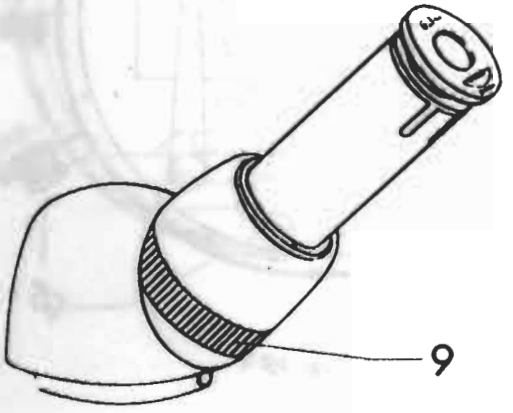


Fig. 11

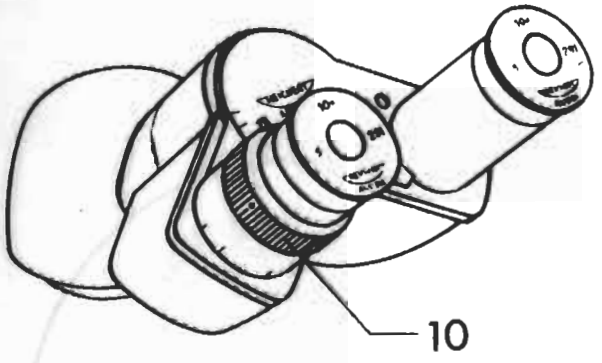
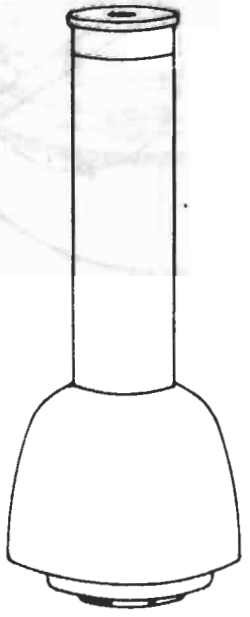


Fig. 12



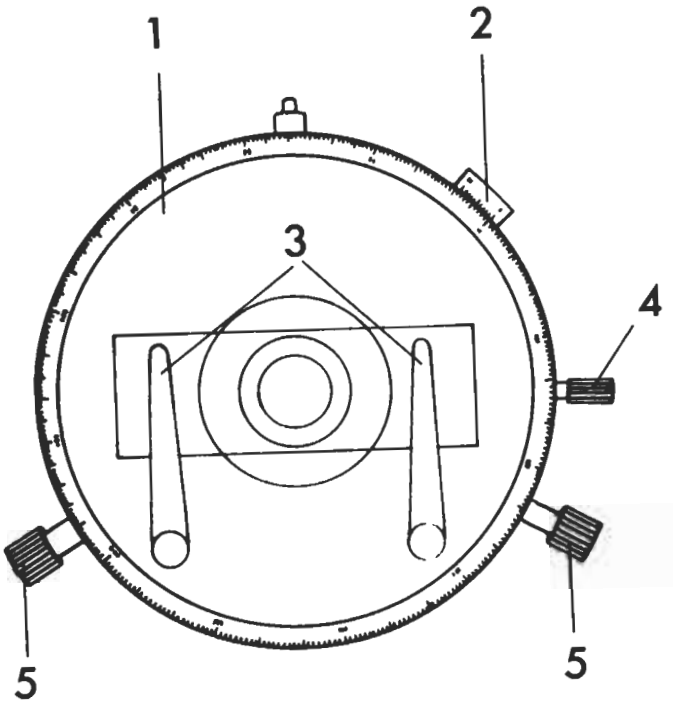


Fig. 13

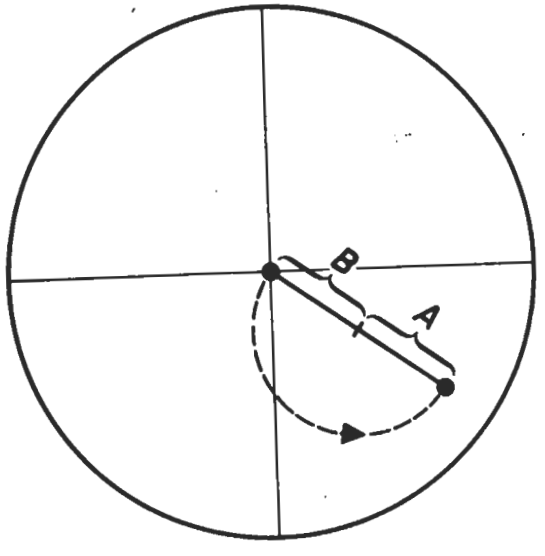


Fig. 14

Stage

The circular centring rotating stage (1) can be rotated through 360°. The actual stage position can be read on the vernier (2) to 0,1°. The rotating movement can be locked with the screw (4).

The specimen is secured to the stage with two specimen clips (3). The specimen movement is obtained by displacing the slide manually.

CENTRING THE ROTATING STAGE

The stage is centred with the two screws (5). The procedure is as follows:

Place a specimen on the stage and focus it with a low-power objective and the crossline eyepiece. Rotate the stage and note the approximate location of the centre of rotation on the specimen; bring this near the centre of the field by adjusting the two centring screws. Then move the specimen across the stage so that a clearly defined point lies at the centre of the crosslines.

Now rotate the stage through 180°. From its position after the 180° rotation the specimen point is returned to the centre of the crosslines by the following procedure: The first half of the distance (see Fig. 14, distance A) by operating the two centring screws of the stage; the second half (in Fig. 14 distance B) by moving the specimen on the stage. This 180° rotation followed by adjustment as described above has to be repeated as often as necessary until the specimen point remains in the intersection of the crosslines as the stage is rotated. When changing over to higher power objectives the stage centring can be improved by the same procedure if necessary.

When the stage has been centred it may be desirable to prevent decentring by unintentional operation of the centring screws (5); this can be ensured by simply pulling the knurled heads off the screws. When placing the knurled heads back into position it is important to ensure that the drive pins on the centring screws engage with the slots of the knurled heads.

Attachable mechanical stage (reference No. 40 03 01)

The attachable mechanical stage (6) which is available as an accessory is used for systematic scanning of the specimen on slides of the Giessen size (28 x 48 mm).

Remove the two specimen clips (3) from the stage. The mechanical stage is fitted with its two pins into the holes. The fixing screw (9) is screwed in with a coin and secures the mechanical stage to the main stage.

The specimen is clamped between the fixed and the spring-loaded jaws. The coordinate movements are operated by the controls (7) and (8). To assist in locating a certain specimen point if the stage is centred, the position of the coordinates can be read to the nearest 0.1 mm on millimetre scales with verniers.

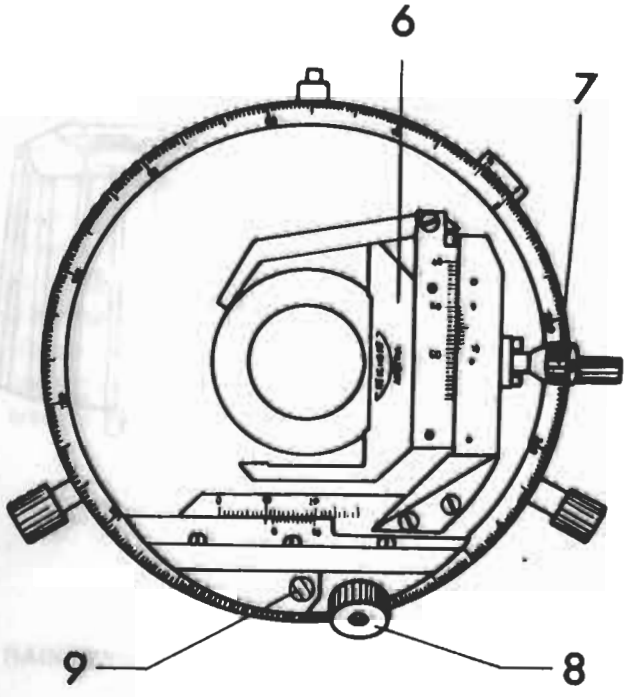


Fig. 15

Condenser

The 2-lens condenser (10) is fitted into the spring-loaded clamping sleeve of the condenser carrier so that the locating screw lines up with the locating slot. The condenser is clamped in position by means of the clamping screw at the side of the condenser carrier.

The front lens can be swung out with the lever (13). In this way the illumination aperture (i.e. the size of the fully-illuminated object field) can readily be adapted to the requirements when changing from low-power to high-power objectives. The front lens is swung out for low-power objectives up to 6,3/0,16; from the objective 10/0,25 upwards it is swung in.

The lever (11) serves for adjusting the aperture iris diaphragm.

Polarizer

The polarizer is mounted below the aperture iris diaphragm of the condenser. It is held in a mount which can be rotated through 360° and has click stops every 90°; the mount can be rotated with the knurled ring (12). The polarizer together with its mount can be swung out with a lever.

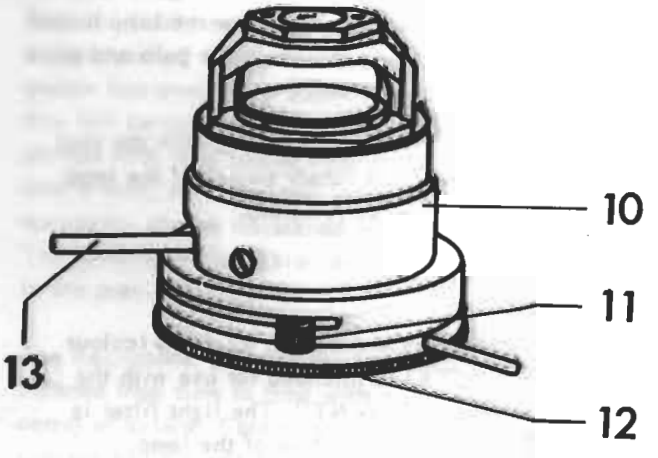


Fig. 16

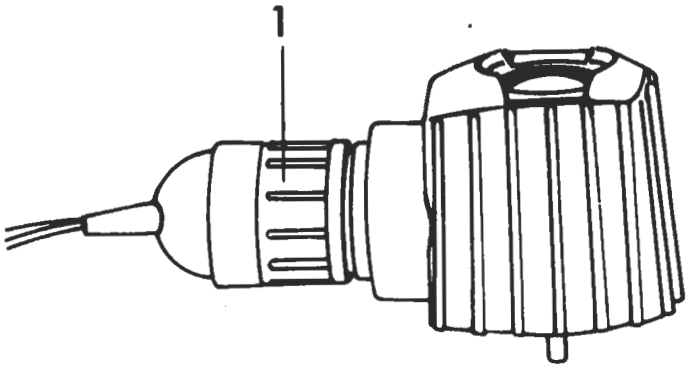


Fig. 17

MAINS LAMP "LUX NT"

The mains lamp "Lux NT", Fig. 17, is fitted with its locating pin into the hole in the mirror plate at the base of the microscope stand.

Fitting the bulb and connecting up the lamp

Note: Before screwing in the 25W bulb (reference No. 86 00 01), check that the indicated voltage corresponds to the actual mains voltage. Withdraw the lamp holder (1) from the lamp housing, screw in the bulb and slide the lamp holder back into position.

Connect the lamp to the mains supply with the plug and switch it on with the rotary switch of the lamp holder (1) (anti-clockwise rotation).

Daylight filter

The daylight filter, reference No. 02 44 33 (colour temperature 5500° K) is intended for use with the mains type lamp "Lux NT". The light filter is placed on the light exit aperture of the lamp.

DETAILS OF THE OBSERVATIONS

Adjusting the illumination for normal light

Place a specimen on the stage, move a low-power objective into position, e.g. 10/0,25, and switch on the lamp.

Swing out analyser, polarizer and Bertrand lens.

Swing in the condenser front lens and open the aperture iris diaphragm of the condenser with the lever.

Focus on the specimen with the two-in-one focusing system.

Adjust for the most uniform illumination of the field by sliding the lamp holder in its housing and by adjusting the height of the condenser.

Adjust the aperture iris diaphragm of the condenser to obtain the clearest and most contrasting micro - scope image; this is usually the case when the objective rear lens is brightly illuminated to about 2/3 of its diameter when viewed in the body after removing the eyepiece.

CHANGING TO HIGHER POWER OBJECTIVES

The revolving nosepiece is operated as described on page 3. After each change of objective the condenser adjustment should be corrected if necessary.

All higher power objectives are fitted with spring mounts which prevent damage to the specimen or the objective front lens if, for example, the stage is raised too high inadvertently. Before swinging in an oil immersion objective, focus first with the highest power dry objective and then place a drop of immersion oil on the specimen. The oil immersion objective is then swung in and must now be immersed in the drop of oil. Focus the microscopic image with the focusing system.

After use the immersion oil is first wiped off the specimen with a clean lint-free linen rag; then moisten the rag with a drop of xylene and use it to clean the specimen. The objective is cleaned in the same way.

Adjusting the illumination for polarized light

A. ORTHOSCOPIC OBSERVATIONS

Orthoscopic observation is the normal microscopic observation of the crystal specimen between crossed polarization filters.

The procedure is as follows:

Use first normal light illumination as described in the previous section. Then insert the analyser with the slide and swing in the polarizer. The Bertrand lens remains out of action.

Search for the "crossed" position of polarizer and analyser by rotating the polarizer. When observing a birefringent specimen this position is shown by the appearance of the interference colours. The click stops of the polarizer are set so that one of them is in the "crossed" position. If the specimen is now removed the field in the eyepiece appears dark.

Orthoscopic observation can be carried out with a small illumination aperture ("in parallel light") to intensify the interference colours; the front lens of the condenser is then swung out. A small illumination aperture can also be achieved by closing the aperture iris diaphragm of the condenser beyond the usual 2/3 position.

B. CONOSCOPIC OBSERVATIONS

Conoscopic observation is not an observation of the crystal specimen itself but an investigation of the interference phenomenon ("axial image") which appears in the rear focal plane of the objective. Conoscopic observations can be carried out with objectives from 25/0,45 upwards.

The procedure is as follows:

Focus on the specimen between the crossed polarization filters, with the Bertrand lens swung out, as described above for orthoscopic observation. The crystal to be investigated is placed in the centre of the field. Then fully open the aperture diaphragm of the condenser, swing in the condenser front lens and bring in the Bertrand lens with its control. The axial image which is now visible is focused by rotating the control of the Bertrand lens. If the Bertrand lens is not concentric to the crossline, it can be centred to it with the two hexagon socket keys supplied with the instrument.

When working with normal bodies it is possible to stop down to crystals of 0,1 mm dia., using for example the objective 63/0,80. The diaphragm in the intermediate tube Pol is inserted in the beam. The inclined monocular body with built-in iris diaphragm can be used to stop down to still smaller crystals. When using this body the diaphragm in the intermediate tube Pol remains out of action. The iris diaphragm in the body is then closed far enough (it can be seen indistinctly) until the required crystal has been selected. The Bertrand lens is now brought into action and the axial image is focused.

MAINTENANCE

As protection against dust the microscope is either placed into its case after use or protected by the plastic cover.

The eyepiece tubes must be closed by eyepieces or dust caps. Objectives or caps must be screwed into all threaded holes of the revolving nosepiece.

The optical parts of the microscope must be kept perfectly clean. Objectives and eyepieces must never be dismantled for cleaning by an untrained person. Only the freely accessible glass surfaces are cleaned, using a very fine brush from which all grease has previously been removed with ether. Any dirt particels which adhere to the glass are treated with lens tissue after breathing on them or with a soft, well-washed linen rag which if necessary can be moistened with petrol or xylene. The removal of immersion oil is described in detail in the previous section.

The mechanical parts of the microscope are thoroughly cleaned from time to time with a rag moistened with petrol or xylene. Care must however be taken to prevent any solvent passing into the guides or the sliding surfaces. Solvents destroy the grease film which is essantial for smooth movement. Sliding surfaces and guides are lubricated with special grease and should only be cleaned and serviced by an expert.

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