

INSTRUCTIONS FOR USING MICROSCOPE MODEL H



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CAUTION IN HANDLING

In observation

Place the slide glass on the stage, in an inverted position, so that the cover glass attached is underneath.

In transportation

Set the revolver at 10X. Lock the fine focus wheel by pushing the lock lever to the right. Slide the dust cover over the objective nosepiece to protect the inside.

Oiler

The oiler cap (red colored) is secured by slight tightening. If the oiler is not to be used for a long time and kept in the leather case, empty it. If not emptied, keep it in another place.

Batteries

Use two penlite batteries for illumination. When not in use for any length of time, they should be removed from the microscope.

Storing

Keep the microscope in a place free from dust and moisture.

Cleaning

Dust the surface of lens by means of a soft hair brush. To remove oil, grease etc., use soft cotton cloth soaked with a little quantity of xylol (not alcohol or ether).

Dismantling

Do not attempt to dismantle the microscope, especially the objectives in any case. If repair or adjustment is necessary contact your dealer or the manufacturer.

Neck strap

Avoid any swift motion while suspending the microscope by the neck strap, to prevent possible damage.

MICROSCOPE MODEL H

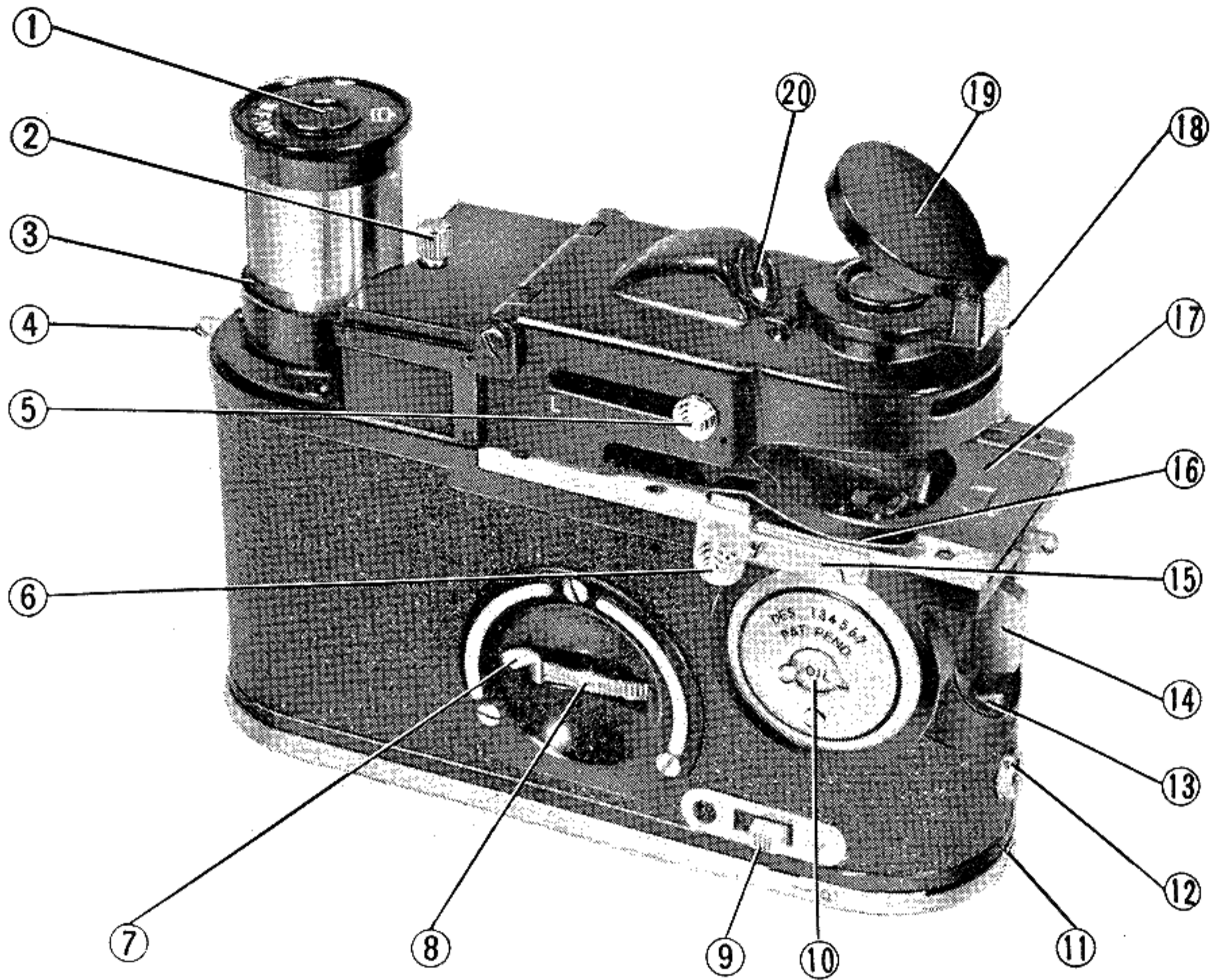


Fig. 1

- | | |
|--|--|
| 1. Eyepiece | 11. Variable resistor |
| 2. Battery housing cover locking screw | 12. Socket for 100 V. house current |
| 3. Screw thread for attaching Microflex (photomicrographic attachment) | 13. Objective magnification indicator (use a transformer—see p. 5) |
| 4. Eyelet for neck strap | 14. Objective nosepiece knob |
| 5. Condenser sliding knob | 15. Sliding stage |
| 6. Stage sliding knob | 16. Glass slide clip |
| 7. Fine focus locking screw | 17. Nosepiece cover |
| 8. Fine focus wheel | 18. Condenser diaphragm lever |
| 9. Electric illumination switch | 19. Reflecting mirror |
| 10. Oil opening | 20. Illuminating window |

MICROSCOPE MODEL H

IN THE LEATHER CASE



Fig. 2

- 21. Objective case
- 22. Fine focus wheel, locked
- 23. Oiler
- 24. Neck strap
- 25. Dust cover
- 26. Leather case

How To Use Microscope Model H

1. Holding microscope

Hold (Fig. 3) the microscope with both hands, your left hand forefinger or middle finger tip being placed on the fine focus wheel, and your right hand on the lower part of the microscope (to avoid the area around the nose piece knob), with the thumb and forefinger tip on the knobs of the stage. Look in the eye-piece with your left eye. However, if desired you

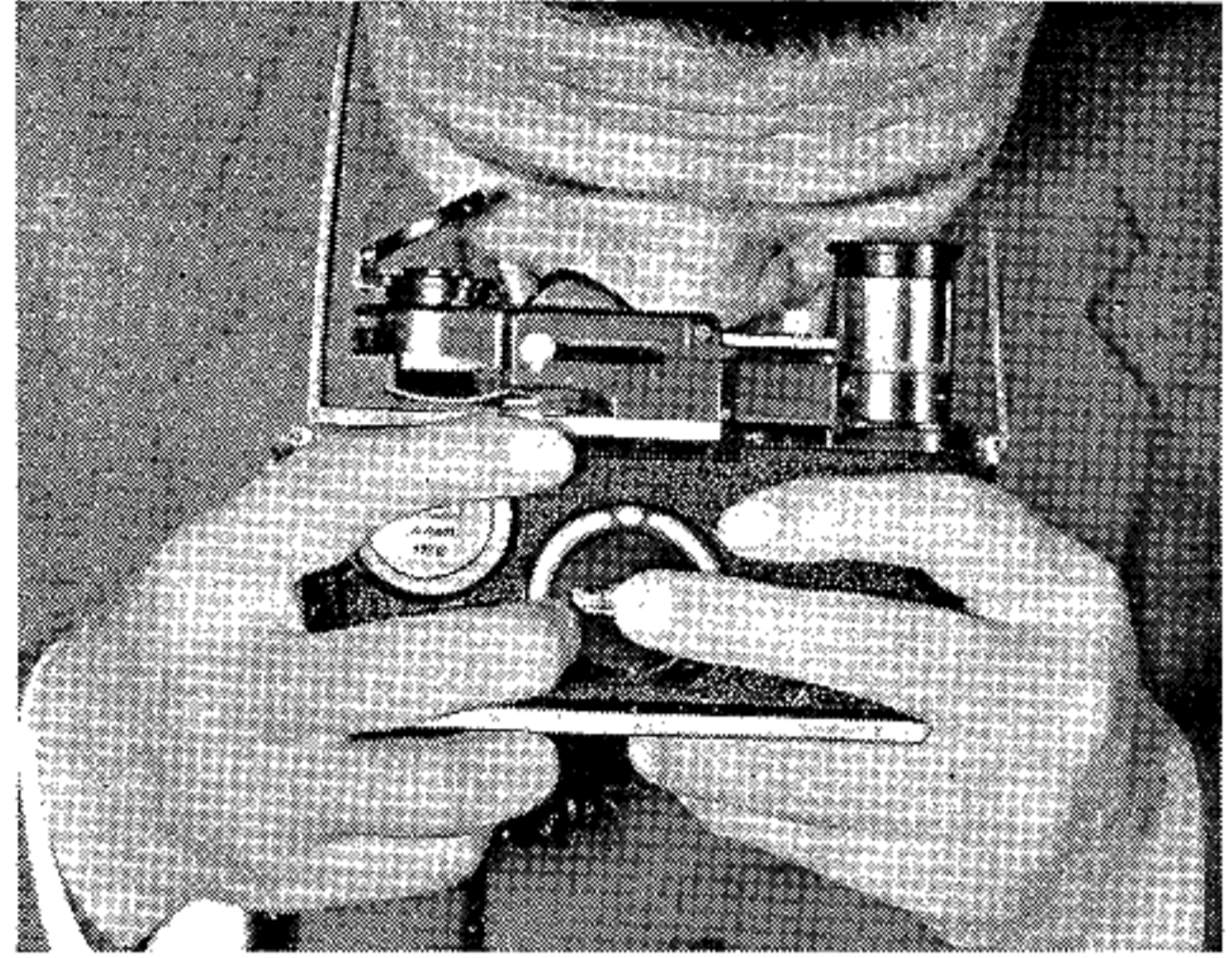


Fig. 3

can change the position of the left and right hand as described above, or also support the microscope with one hand. The microscope may be held somewhat inclined for the convenience of the viewer, except when examining a fluid preparation in which case the instrument should be kept horizontal.

In field work as a safety measure, secure the microscope by suspending it by the neck strap furnished. A camera tripod may also be used for which purpose a standard screw thread is provided on the base.

2. Illumination

a. Day-light illumination

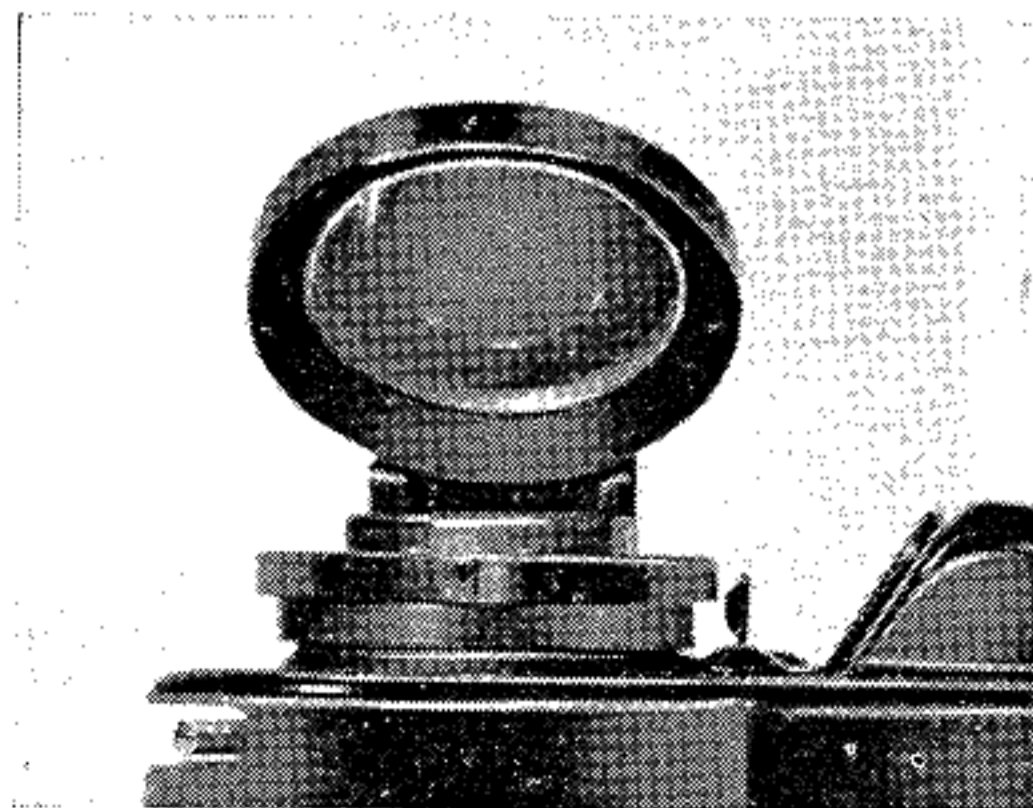


Fig. 4

If possible, use day-light illumination, to avoid battery consumption as much as possible. Day-light illumination is also preferable because of its lesser reddish tinge, as compared with artificial light. Lift up the illuminating mirror (Fig. 4) and turn it horizontally. Adjust its inclination and direction so as to attain the brightest field of view, when looking in the eyepiece.

b. Battery illumination

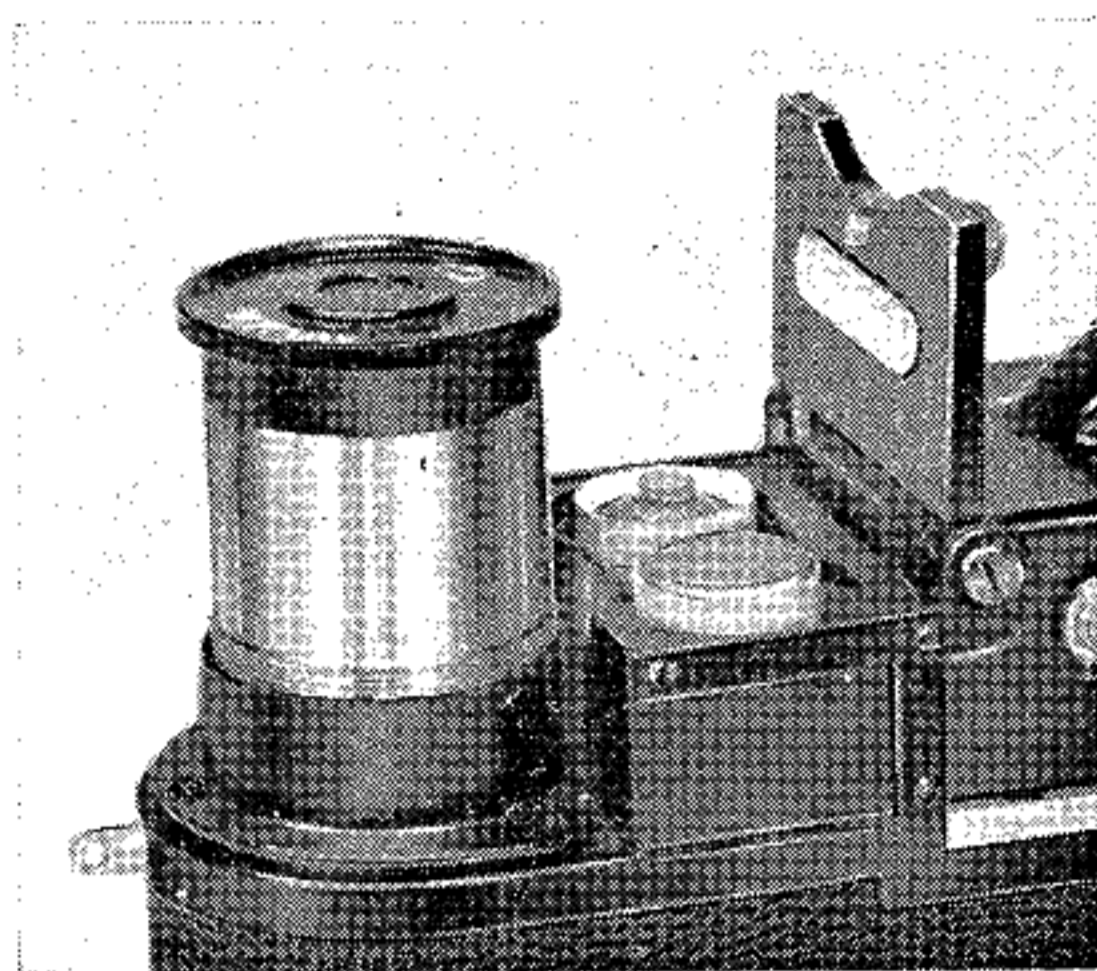


Fig. 5

This type illumination is necessary when the microscope is used without the benefit of sunlight or strong natural light or when it is passed from hand to hand for demonstration. As a source power two penlight 1.5 volt batteries are used which are inserted in series (their ends opposite to each other) (Fig. 5), after opening the battery housing cover by releasing the cover locking screw.

To attach 2.2 volt electric bulb (having a lenticular head), swing up the condenser mount. Adjust the bulb by adjusting the socket plate, so that the light is directed to the center of the illuminating window. It may sometimes be necessary to replace the bulb with another one, if correct positioning cannot be attained with a particular bulb.

The lamp bulb is turned on when the switch near the bottom is turned to the red mark. Turn the illuminating mirror horizontally until it click-stops so that the mirror faces the illuminating window. Adjust the inclination of the mirror so as to obtain the brightest illumination.

c. House current illumination

In this case it is necessary to use a 3-3.5 volt transformer* and to *remove the batteries* from the battery housing.

Connect the cord (available on order) to the socket near the bottom of the microscope (Fig. 6).

* A microscope support equipped with transformer will be furnished in the future.

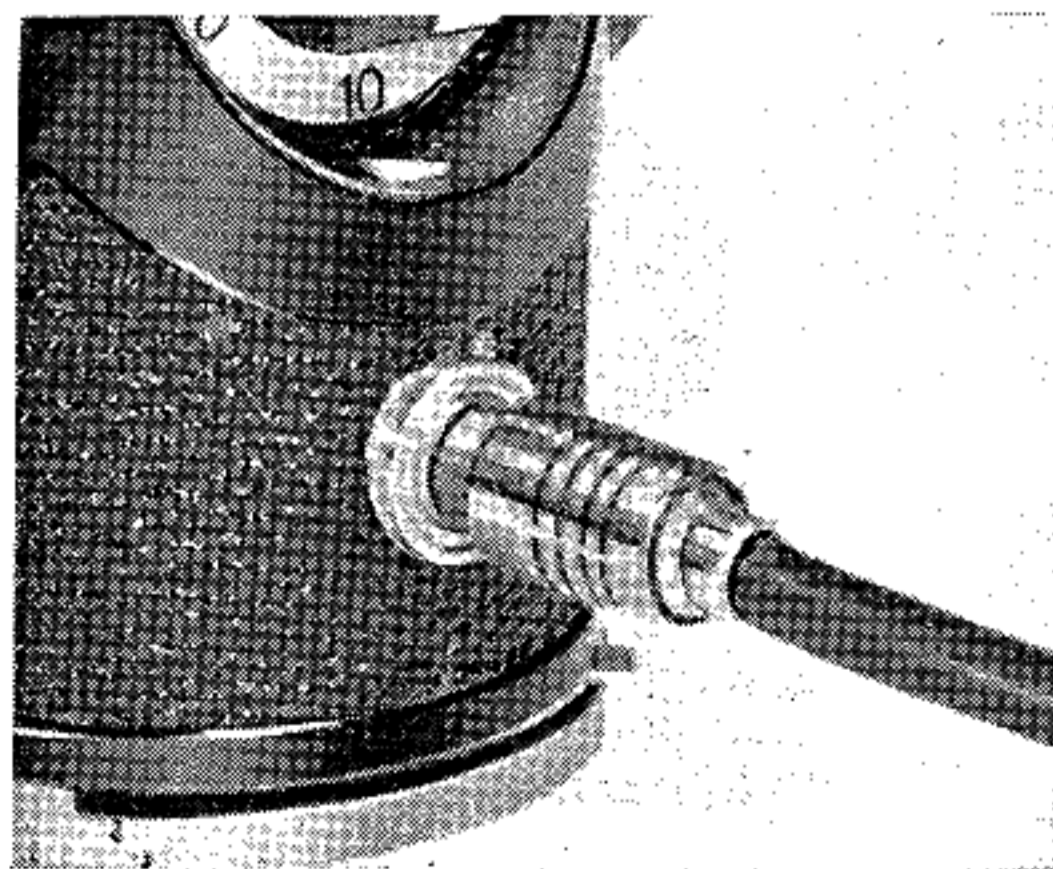


Fig. 6

If desired, the brightness may be increased by raising the voltage slightly over 3 volt. However, such use will shorten the life of the bulb.

3. Objective and eyepiece

- a. The microscope model H incorporates 10X and 40X objective and, in addition, 4X or oil immersion 100X objective can be interchangeably fitted and used. All the objectives are parfocal, that is, when one is focused all are in focus, as they are rotated into position, manipulation of the fine focus wheel only being required. The characteristics of the four objectives are as follows:

Magnification	4X	10X	40X	100X
Numerical aperture	0.1	0.22	0.65	1.25
Resolution (mm)	0.0027	0.0015	0.0004	0.0002
Depth of field (mm)	0.321	0.054	0.004	0.001

With the 40X objective, use 0.17mm thick cover glass, to obtain maximum image definition*. When using 100X objective, apply oil of refractive index 1.515 between the objective front and the specimen cover glass. It is recommended that anisol be used for this purpose.

b. Eyepiece

As a safety measure the eyepiece is securely screwed into the eyepiece tube. The 10X eyepiece supplied with the microscope, being of wide field type and providing a view field nearly as large as that of an ordinary 5X eyepiece, meets most requirements. However, if necessary, any standard eyepiece may also be used. Take care, in this case, not to tilt the microscope too much to prevent the eyepiece from dropping out.

* When examining an exposed preparation, use of "No-cover-glass objective" is recommended, which is available on order.

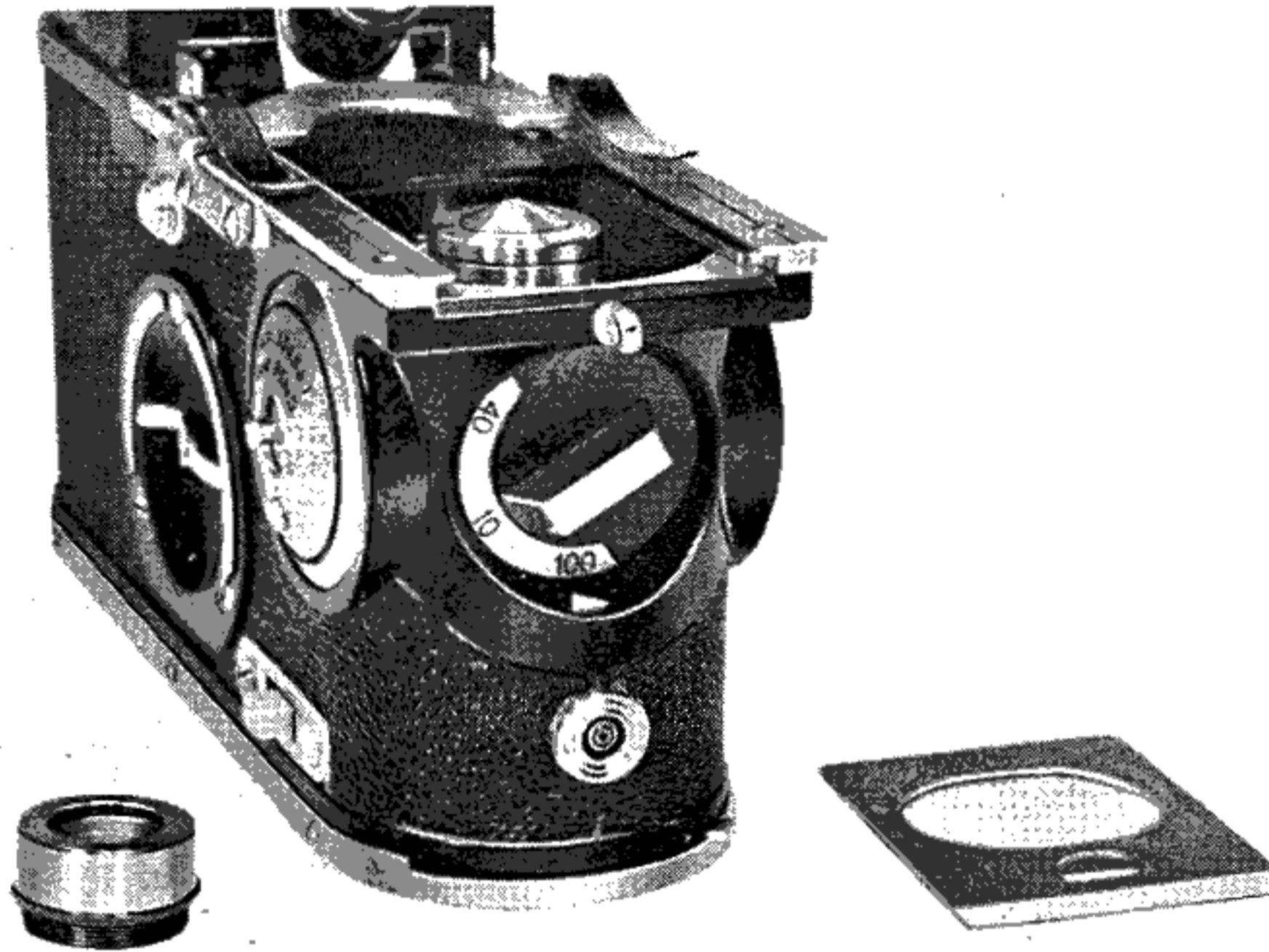


Fig. 7

4. Changing the objective

The built-in nosepiece incorporates 3 objectives and has a outside knob, the turning of which, to the left or right, (Fig. 7) bring the 10X* or 40X objective into play respectively. This can be manipulated easier by holding the knob with your right hand and turning the microscope with your left hand. The magnification being used is shown by an indication mark beneath the knob. It can also be determined by feeling the position of the knob without looking at the indication mark.

To change the 4X objective for the 100X or vice versa, swing up the condenser mount, pull out the nosepiece cover and expose the nosepiece. Either of the objectives has to

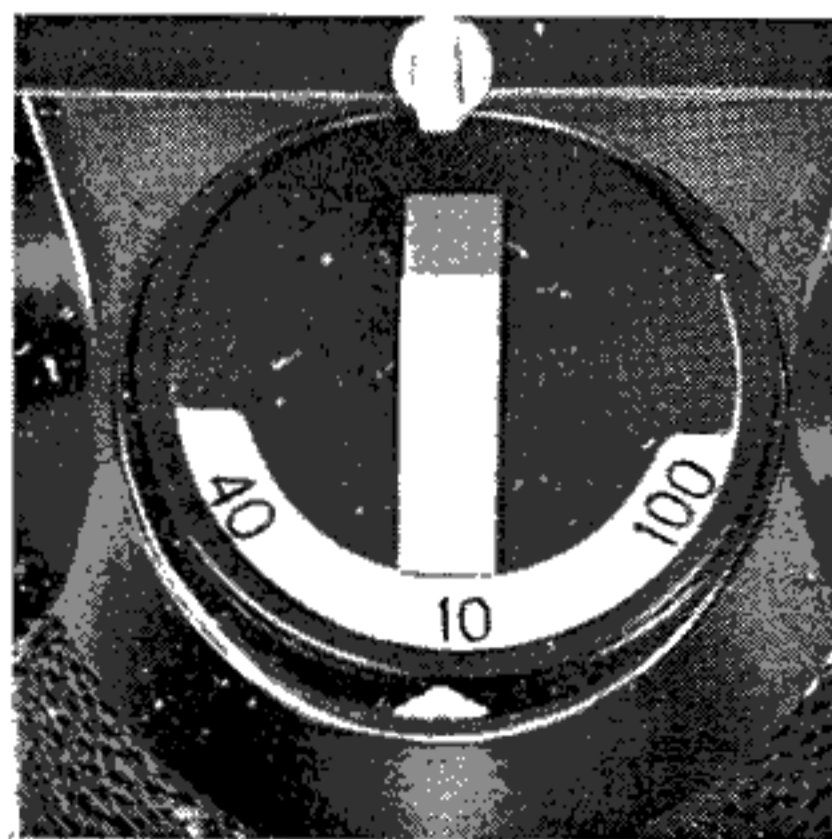


Fig. 8

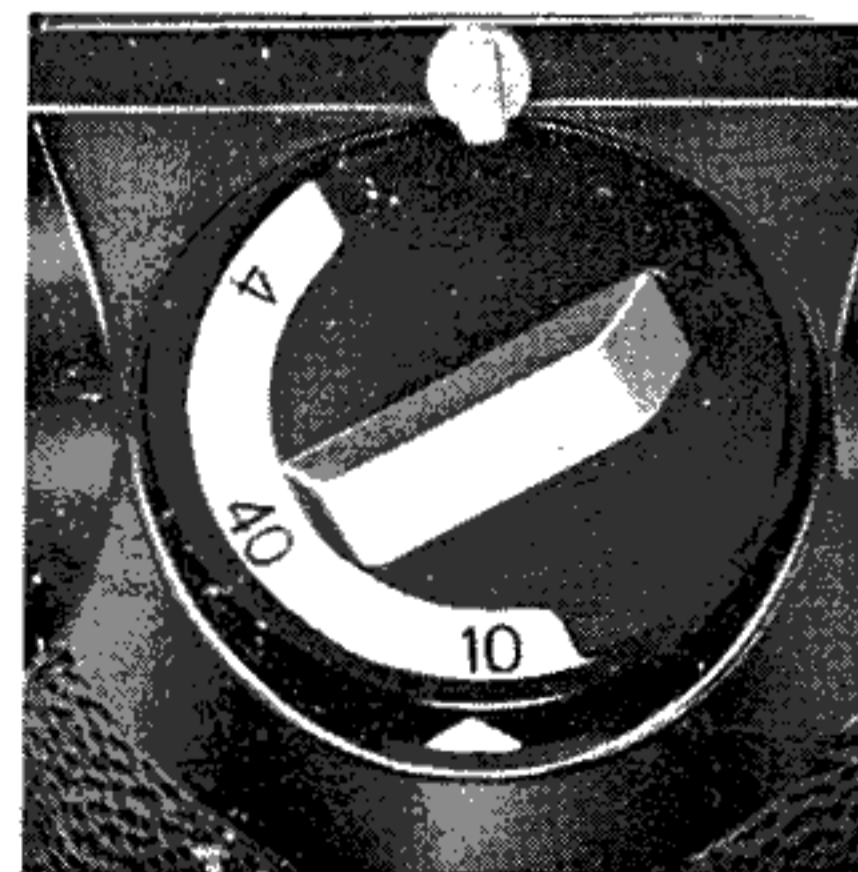


Fig. 9

* 10X objective is assembled as a part of the nosepiece and can not be removed.

be securely screwed in but without excessive force. After this, replace the cover, pull the knob and turn it right or left, until 100 or 4 figure (Fig. 8, 9) appears opposite the indicator mark respectively.

5. Condenser

- a. The condenser being an ABBE type consists of a semi-spherical and a convex lens.

When the sliding knobs, found on either side of the condenser assembly are moved and positioned at H (Fig. 10) the semi-spherical front lens is brought into position which is correct for higher magnifications with 10X—100X objectives of larger numerical aperture.

When the sliding knob is positioned at L (Fig. 11), the front lens of the condenser is moved aside, which is suitable for lower magnification with the 4X objective and also for manipulation of the specimen.

- b. Condenser diaphragm

Generally speaking, if the numerical aperture of the condenser is stopped down to 60–70% of that of the objective, the best image will be obtained.

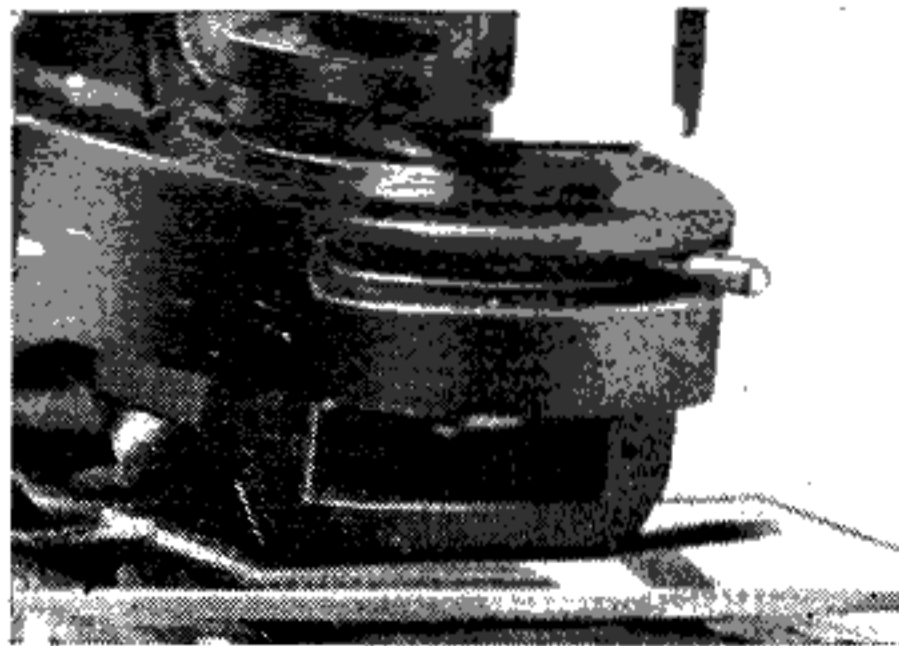


Fig. 12

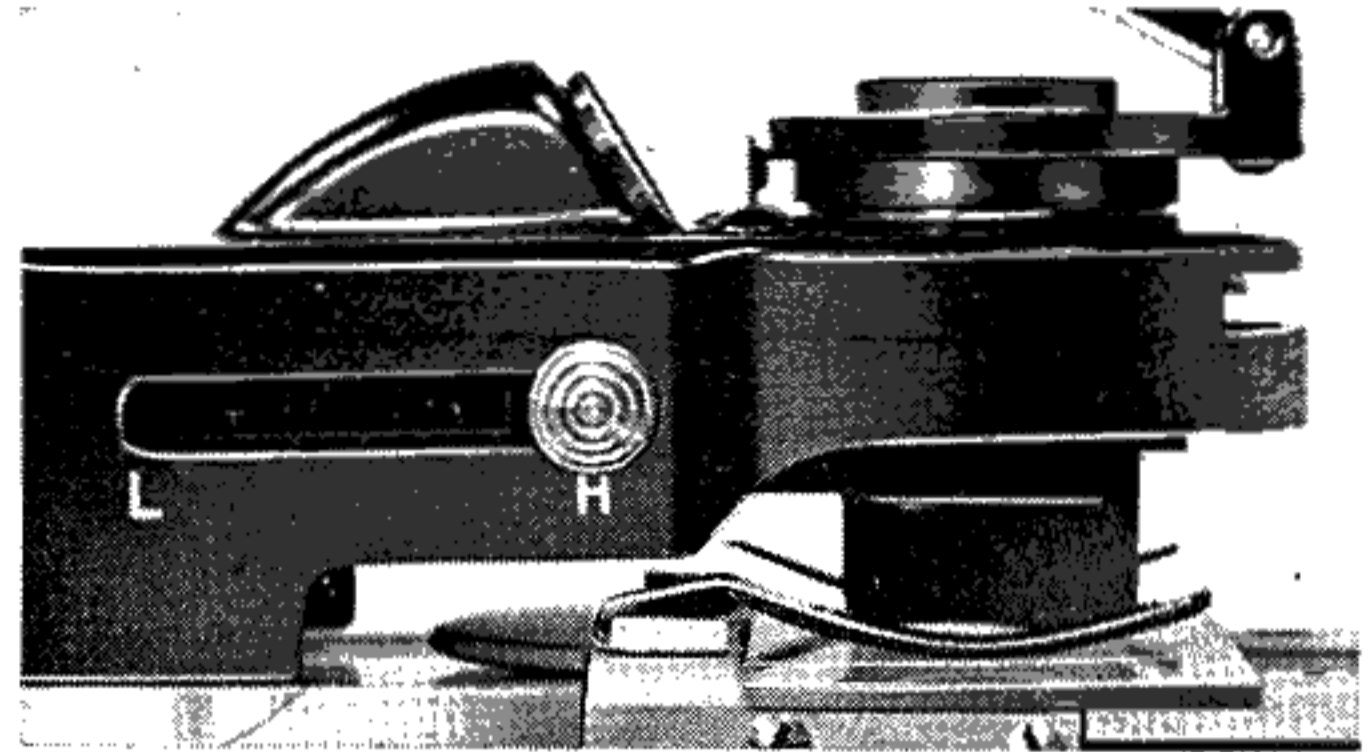


Fig. 10

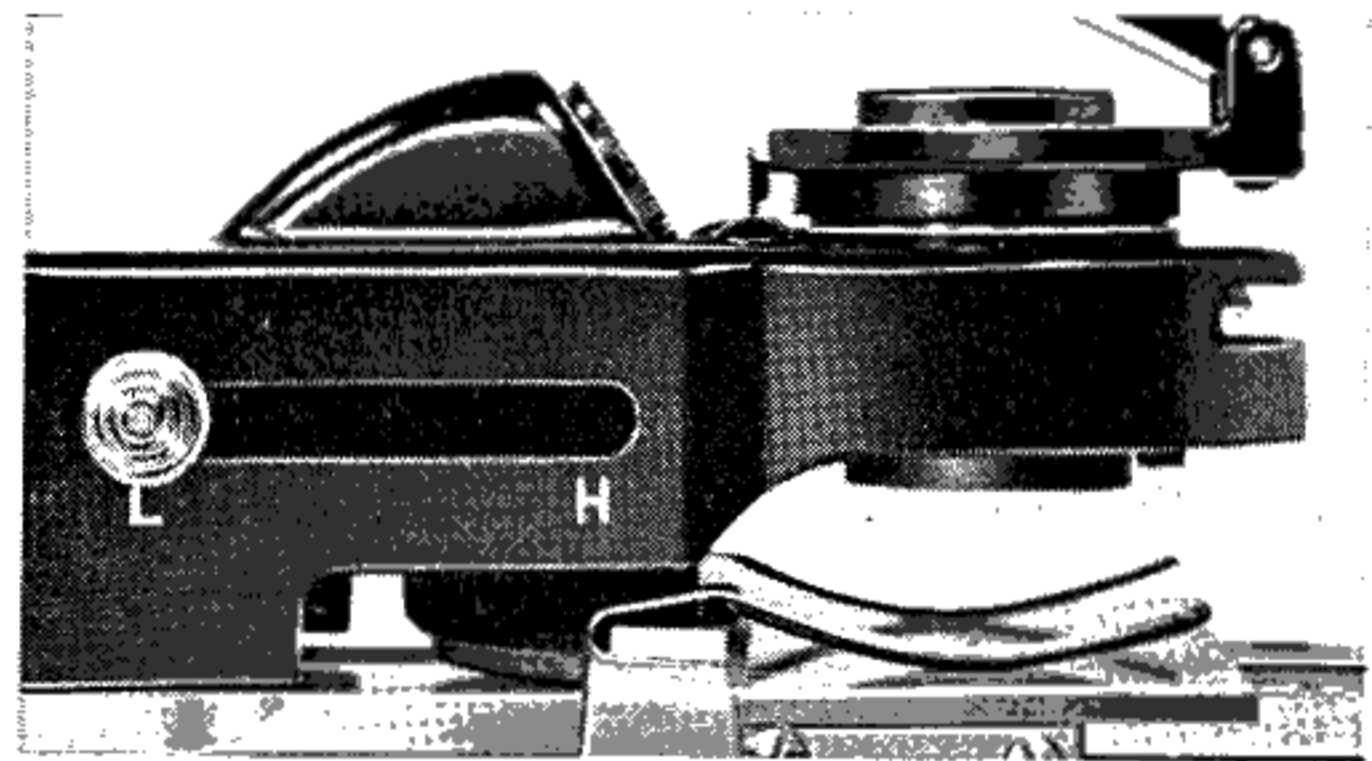


Fig. 11

For this reason, when using the oil immersion 100X objective, the numerical aperture of which is 1.25, there will be no need of applying oil between the condenser and specimen, since the numerical aperture reduces to about 0.8 in this case.

The condenser is provided with a diaphragm to adjust the aperture of condenser

according to that of the objective being used. Move the diaphragm lever found on the right end of the condenser mount (Fig. 12) towards you, until the diaphragm is fully opened.

Next, slowly close the diaphragm, by pushing the lever, until the best image can be obtained. For lower magnification, a smaller diaphragm aperture will usually be better. By closing the diaphragm a transparent specimen may be seen clearer because of increased contrast. However, when higher resolution is more important than contrast, a larger diaphragm aperture is recommended.

6. Mounting specimen

a. Position of specimen

Since an inverted optical system is used in this microscope, the specimen should be mounted upside down, that is, the slide should be slipped onto the stage with the cover glass attached on the underside. A properly mounted slide will not drop its cover glass nor will the fluid used to contain the specimen ooze out.

A slide glass of 25 mm \times 76 mm size and a cover glass of 18 mm \times 18 mm size and 0.17 mm. thick is recommended.

b. Inserting specimen

Insert the slide under the clips on the stage* holding its both ends with the right hand thumb and forefinger. Sideward movement is performed by moving the knobs (Fig.13) with the right hand thumb (and forefinger), forward or backward movement by holding both ends of the slide directly with the finger tips and moving it.

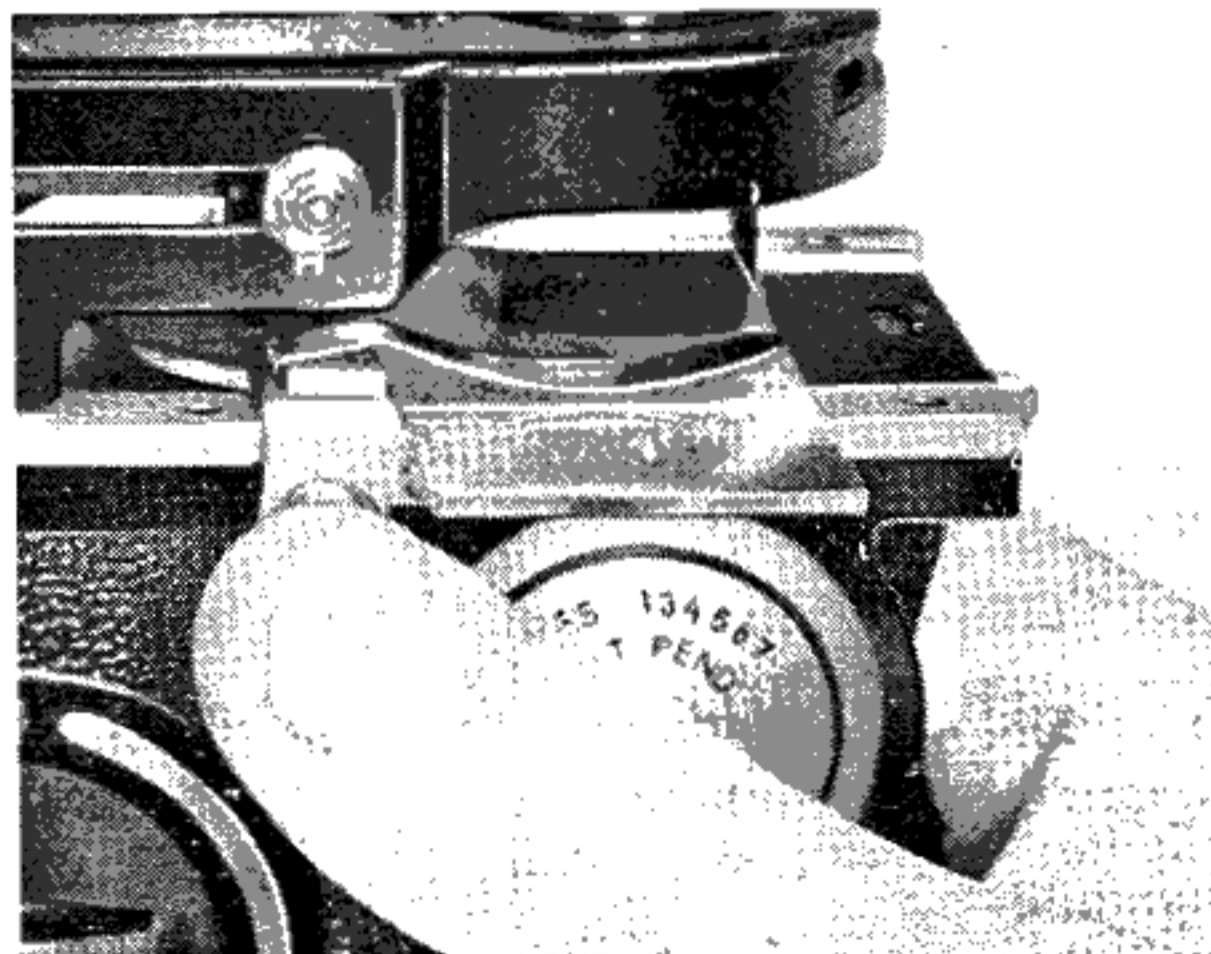


Fig. 13

The underside of the clips is lined with leather so as to give sufficient friction.

To adjust friction the clips may be bent slightly.

* Simplified crosswise travelling mechanical stage will also be available in the near future for this model of microscope.

c. Finding and marking specimen

Swing up the condenser mount and you can see the top lens of the objective through the slide glass. Place the specimen in position above the objective. The subject can then be very easily brought into the field of view.

If necessary, the position of the subject can be marked (Fig. 14) with ink on the upper side of the slide glass, without removing it from the microscope so that the subject may be easily found again.

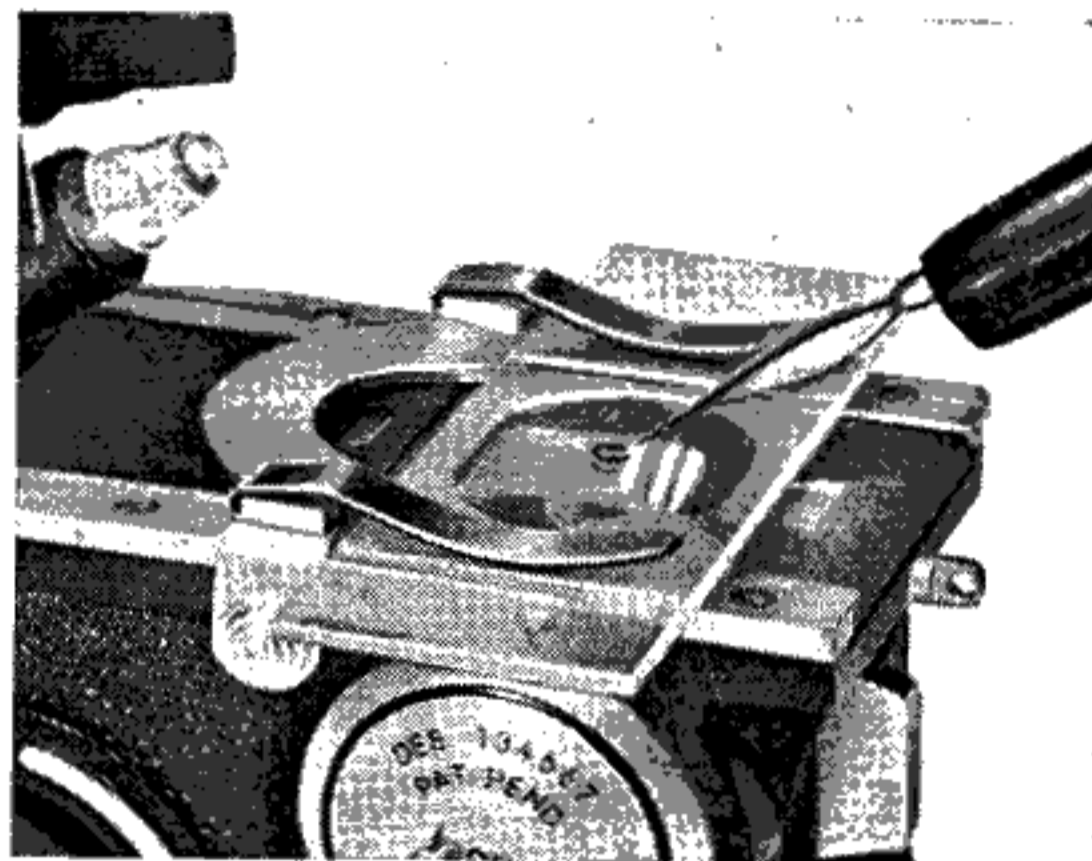


Fig. 14

7. Focusing

Focusing is done by turning the fine focus wheel (Fig. 15) with the left hand middle and fore fingers. The focusing range is about 0.5mm. When the 100X objective is raised to the limit, it will touch the specimen. However, there is no danger of damaging the specimen or objective, as the slide will spring up at that instant. Perfect parfocality is maintained for all the objectives, because of the inverted optical system used in the microscope. The thickness of the slide glass has no connection with the focusing. Therefore once sharp focus is obtained, it can be retained by only a slight turning of the fine focus wheel, no matter how many times

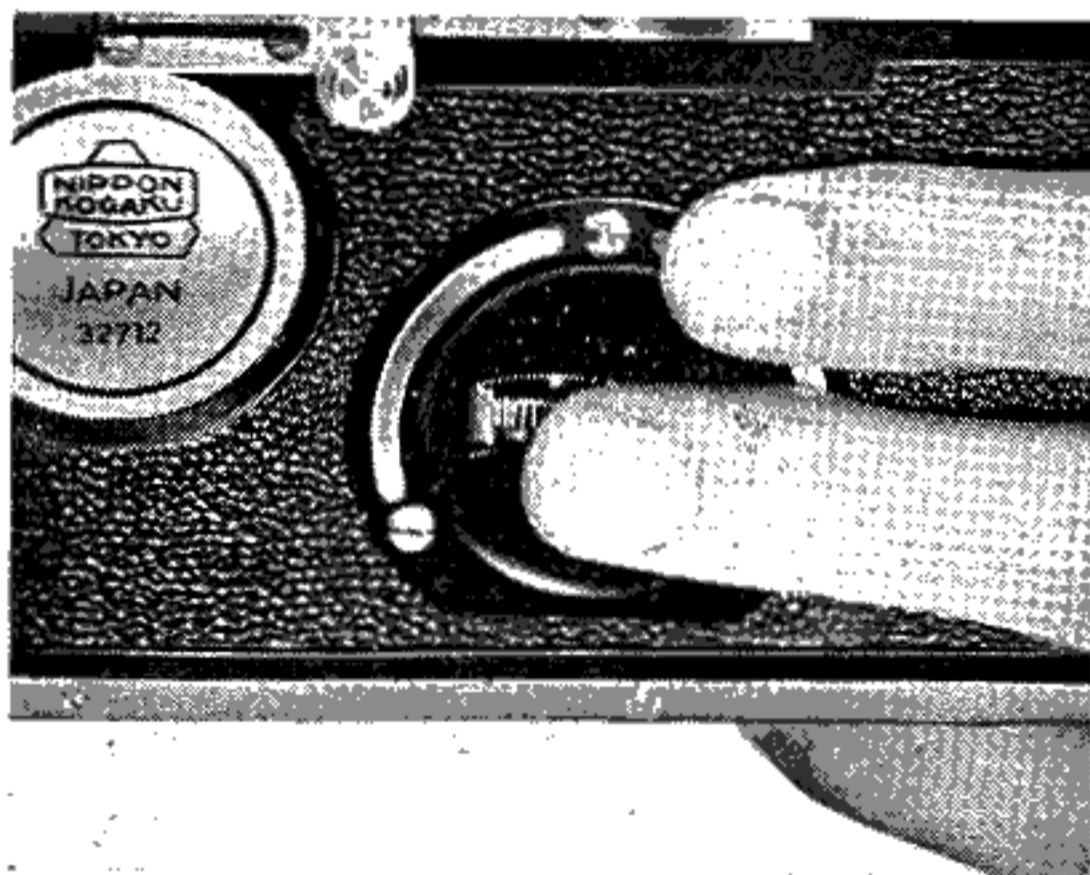


Fig. 15

the magnification or slide is changed. But when the 4X objective is exchanged for a high power objective, due to its deeper depth, further turning of the fine focus wheel may sometimes be necessary. This is also the case when using a haemocytometer slide or observing a drop preparation.

In case a sharp image cannot be obtained by only turning the fine focus wheel, check whether the specimen has been correctly mounted (the slide should be placed with the cover glass attached on the underside) or whether the objective nose-piece has not been rotated excessively which causes a improper positioning of the objective.

8. Oil immersion

When using the 100X objective, apply a small drop of anisol to the top of the objective by means of the oiler furnished with the microscope. For this purpose first open the oil hole and rotate the objective up to the hole, while keeping the microscope flat as shown in Fig. 16. Then, holding the nosepiece knob, turn the microscope upward until the oiled objective comes just under the specimen, so that the oil does not flow from the front lens. Then turn the fine focus wheel until a sharp image is obtained. Do not apply too much anisol, otherwise the oil may flow over the top of the objective. If the image is not clear after turning the fine focus wheel, examine the specimen from above with the condenser mount swung aside and see whether the quantity of anisol is too little or whether the oil contains air bubbles. If the former, add oil, and if the latter, remove the bubbles by gently moving the objective to and fro by means of the nosepiece knob.

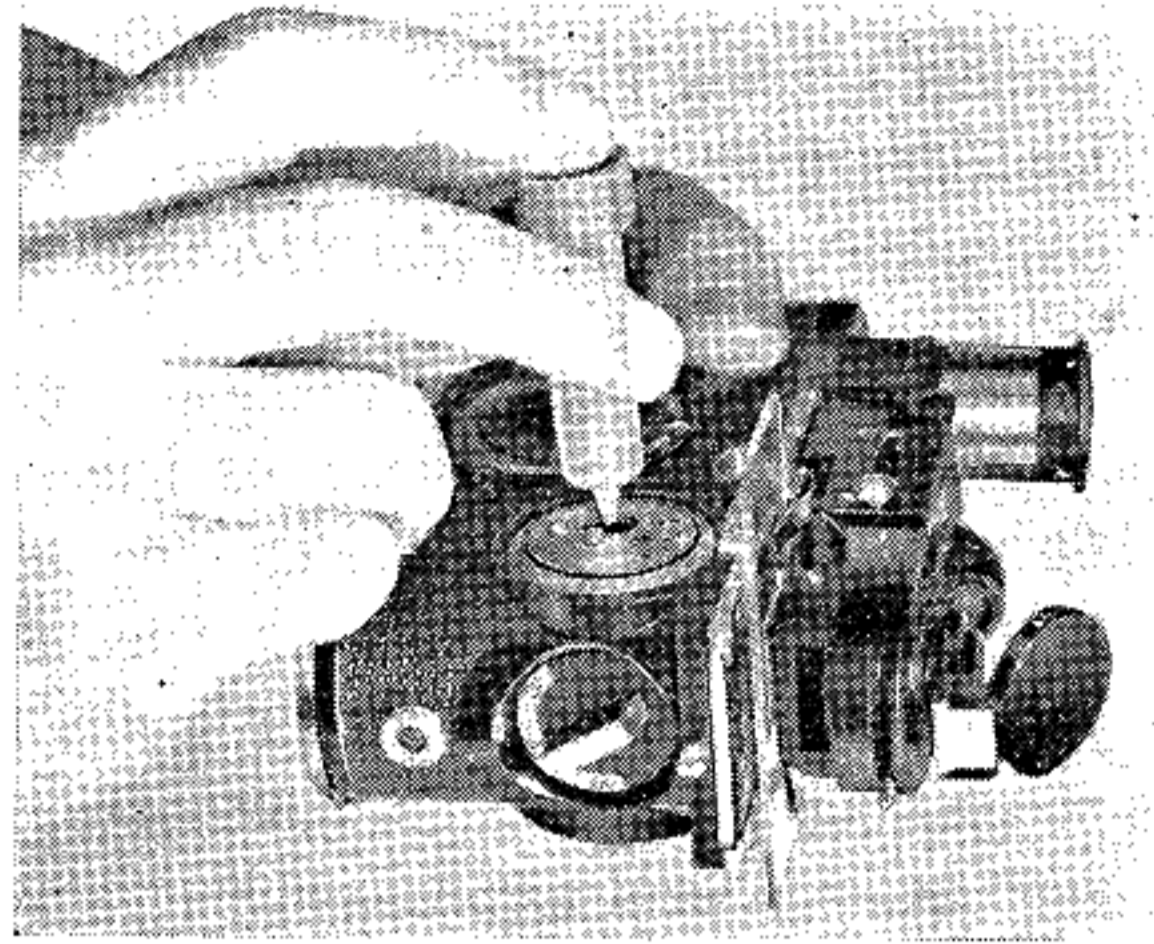


Fig. 16

Since anisol is volatile, there is generally no need for cleaning after observation. However, it is recommended that the top of the lens be cleaned with a soft cloth, before putting the microscope into the case. Note that the oil opening can be closed by pushing the knob to the left. The inside may be reached through the opening for removing dust or oil on the inside prism surface, etc.

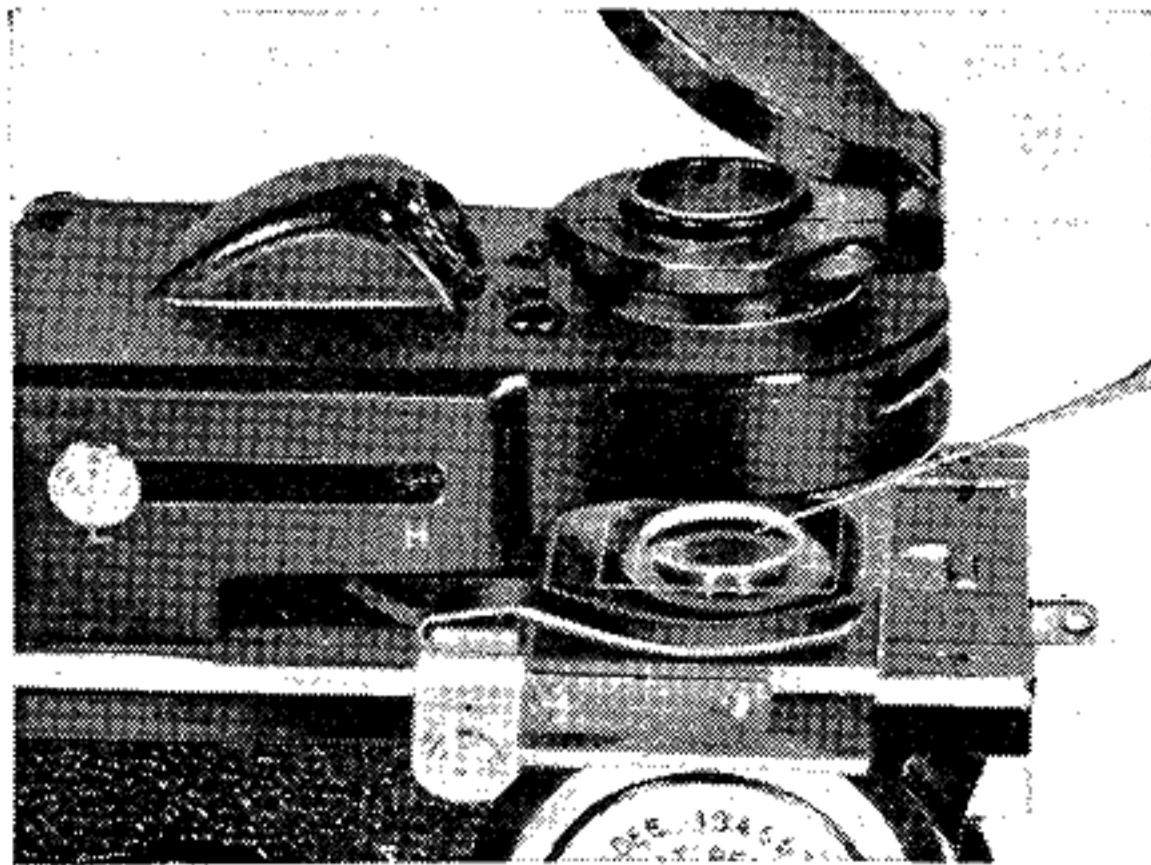


Fig. 17

9. Manipulation of specimen and haemacytometry

Use of a 25 mm × 76 mm large size slide glass with a cover glass attached underneath the holed slide (Fig. 17) facilitates manipulation of an exposed specimen with a needle or application of chemicals or staining reagents. In either case move the condenser lever to

the L position and increase the clearance of the condenser to 10mm. When using a large size slide glass, a slightly blurred image under a high power objective is unavoidable due to the slight bending of the cover glass.

In haemacytometry where a thick slide glass is to be used the clearance of the condenser should be increased. In addition, for obtaining sharp focus it will sometimes be necessary to insert small glass pieces under either end of the slide, lifting it to prevent the projections at the center from being touched by the objective.

The microscope model H is also useful for blood smear examination in field investigation of filariasis, malaria or trypanosomiasis. In this case, it is recommended to employ a 25mm × 76mm cover glass to cover the entire surface of the slide so as to protect the blood film, or, when the preparation is exposed, to use No-cover-glass Objective 40X furnished by N. K.

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CINE-NIKKOR, Lens for Cine Camera
PRO-NIKKOR, 35mm Projector Lens
APO-NIKKOR, Photo-Engraving Lens
NIKON, Binoculars
Astronomical Telescope
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