No. 663,649. Patented Dec. 11, 1900.

H. ZIRNGIBL.

MICROSCOPE.

Application filed June 14, 1900.

(No Model.)

Fig. 1.

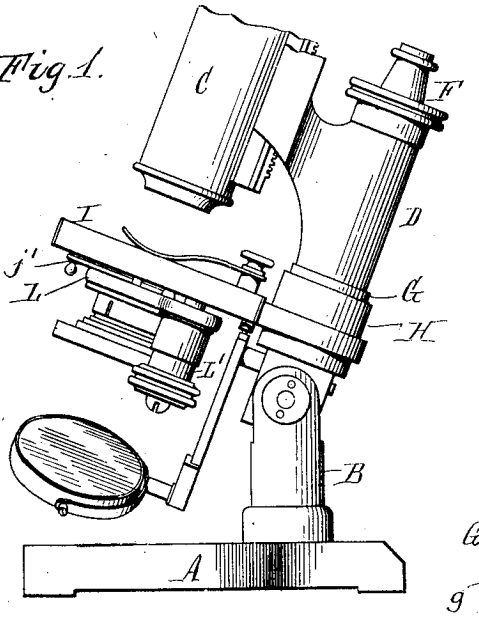


Fig. 2.

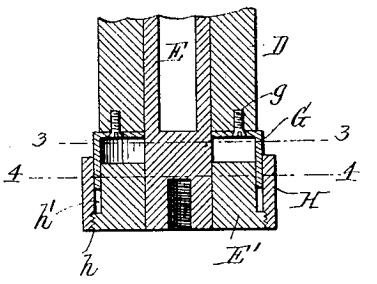


Fig. 3.

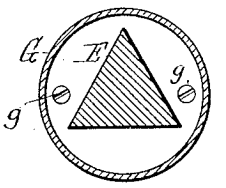


Fig. 4.

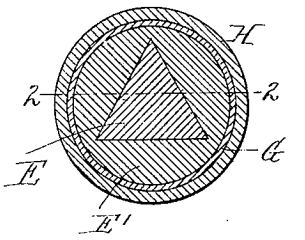


Fig. 7.

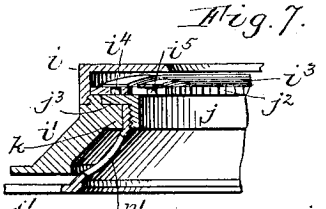


Fig. 5.

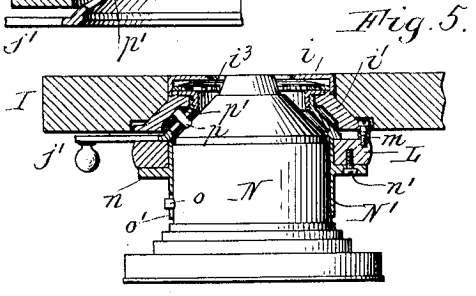


Fig. 6.

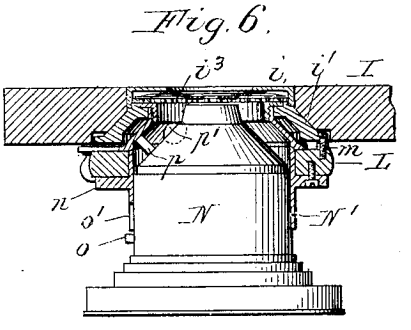


Fig. 8.

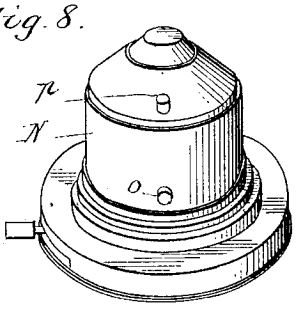
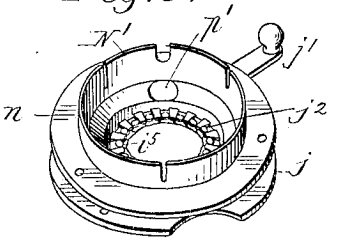


Fig. 9.



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UNITED STATES PATENT OFFICE.

HERMANN ZIRNGIBL, OF BUFFALO, NEW YORK, ASSIGNOR TO THE SPENCER LENS COMPANY, OF SAME PLACE.

MICROSCOPE.

SPECIFICATION forming part of Letters Patent No. 663,649, dated December 11, 1900.

Application filed June 14, 1900. Serial No. 20,230. (No model.)

To all whom it may concern:

Be it known that I, HERMANN ZIRNGIBL, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Microscopes, of which the following is a specification.

This invention relates to microscopes and similar instruments in which the lens-tube is carried by a vertically-movable sleeve, which is raised and lowered on the usual pillar by an adjusting device commonly known as the "fine adjustment." Heretofore the construction of these instruments has been such that when the sleeve is raised out of contact with the base of the pillar the lower portion of the pillar is exposed more or less. This construction is undesirable, because dust and grit are liable to be deposited on the pillar and enter between the same and the surrounding sleeve, and when this occurs the pillar and the sleeve are cut by the grit and the sleeve is caused to bind on the pillar, thus interfering with the action of the fine adjustment and rendering the same inaccurate.

One of the objects of my invention is to overcome these objections by providing the instrument with a simple guard or protector which effectually excludes dust from the pillar in all positions of the fine adjustment.

In using a condenser with microscopes as hitherto constructed the operator sometimes forgets to open the upper iris-diaphragm before inserting the condenser in its holder, or after having inserted the condenser attempts to close the diaphragm before removing the condenser, and in either case the delicate leaves of the diaphragm are liable to be buckled or otherwise injured.

It is a further object of my invention to provide the instrument with a simple and inexpensive device which renders it impossible to insert the condenser in its holder sufficiently to come in contact with the upper diaphragm-leaves when the latter are closed or to close the leaves while the condenser is in position for use, thus guarding against injury to the diaphragm by a careless or improper manipulation of these accessories.

In the accompanying drawings, Figure 1 is a fragmentary side elevation of a microscope provided with my improvements. Fig. 2 is a detached longitudinal section, on an enlarged scale, of the lower portion of the pillar, the sleeve of the fine adjustment, and the dust-guard, the plane of the section being in line 2 2, Fig. 4. Fig. 3 is a transverse section in line 3 3, Fig. 2, looking upward. Fig. 4 is a transverse section in line 4 4, Fig. 2. Fig. 5 is a detached sectional elevation, on an enlarged scale, of the main stage and the substage comprising the upper and lower iris-diaphragms, the condenser, and its holder, showing the position of the parts when the condenser is fully inserted in the holder. Fig. 6 is a similar view showing the position of the parts when it is attempted to insert the condenser in the closed position of the upper iris-diaphragm. Fig. 7 is a detached vertical section of the upper iris-diaphragm and its casing, on an enlarged scale. Fig. 8 is a perspective view of the condenser. Fig. 9 is an inverted perspective view of the condenser-holder and the upper iris-diaphragm and its shell detached from their supporting-arm.

Like letters of reference refer to like parts in the several figures.

A is the base of the instrument; B, the standard rising from the same; C, the lens-tube; D, the vertically-movable sleeve which carries the lens-tube, and E the usual triangular or prismatic pillar on which the sleeve slides. E′ is the enlarged base of the pillar, which is pivotally connected with the standard B in a well-known manner, and F is the adjusting-screw of the fine adjustment, whereby the sleeve D is operated. These various parts are common and form no part of my invention.

G is a dust-cap, preferably of cylindrical form, which is secured to the lower end of the sleeve D and which snugly overlaps the cylindrical base E′ of the pillar. This cap is secured to the sleeve by screws *g*, which pass through holes formed in the head of the cap or by other suitable fastenings, and the cap is provided with a triangular opening for the passage of the pillar, as shown in Fig. 3. The cap moves up and down with the sleeve and is made of sufficient length to overlap the base of the pillar when the sleeve is adjusted to its uppermost position.

H is a ring or collar which snugly surrounds the dust-cap G and which is secured at its lower end to the lower end of the pillar-base E′, preferably by a screw-thread, as shown at *h* in Fig. 2. The portion of the base E′ above the screw-threads is reduced to leave between the base and the collar H an annular space or socket *h*′ of sufficient width to admit the dust-cap G, as shown in Fig. 2. The collar H preferably extends a short distance above the base of the pillar. By this construction the dust-cap G overlaps the base of the pillar and the collar H in turn overlaps the dust-cap, thus forming a reliable dust-proof joint between the lower end of the sleeve and the pillar, insuring a smooth action of the fine adjustment and preserving its accuracy.

I is the main stage, and *i i*′ are upper and lower rings which form the casing or shell of the upper iris-diaphragm and which are secured together by a set-screw or other suitable means.

i^3 represents the pivoted leaves of the diaphragm, which are supported on the upper ring *i*, and *j* is the rotary operating-ring of the leaves, having the handle *j*′. The leaves of this operating-ring may be constructed in any suitable or well-known manner. In the construction shown in the drawings the leaves are pivoted at one end to the supporting-ring *i*, as shown at i^4, and are provided at their opposite ends with shifting-pins i^5, which engage in radial notches j^2, formed in the rotary operating-ring, and the latter is provided at its upper end with an outwardly-extending flange j^3, which rests upon a flange *k* projecting inwardly from the upper end of the lower ring *i*′ of the diaphragm-casing. This lower ring and the lower portion of the operating-ring *j* are preferably conical and taper upwardly, and the opening or recess in the main stage I, which receives the upper diaphragm-casing, is made of corresponding form, as shown in Figs. 5 and 6.

L is the usual substage arm or support which carries the upper iris-diaphragm and which is made adjustable toward and from the main stage by any suitable or well-known adjusting device. In the construction shown in the drawings this arm is operated by the well-known quick-screw adjustment L′. The lower ring *i*′ of the diaphragm-casing is secured to the upper side of this arm by screws *m*. The lower iris-diaphragm, which is arranged, as usual, in the lower portion of the condenser, is not shown in the drawings.

N is the removable condenser, and N′ the upright ring or holder which receives the condenser and which is carried by the substage arm L. The upper portion of this holder is seated in an opening of said arm and provided with an outwardly-projecting flange *n*, which bears against the under side of the arm and is secured thereto by screws *n*′.

o is a guide pin or projection arranged on the lower portion of the condenser and interlocking with a notch *o*′, formed in the lower edge of the holder N′, when the condenser is properly inserted therein, as shown in Fig. 5.

p is a stop-pin or projection arranged on the upper or conical portion of the condenser and adapted to enter an opening or recess *p*′, formed in the operating-ring *j* of the upper iris-diaphragm. When this ring is turned so as to bring said opening into register with said pin, as shown in Fig. 5, the condenser can be fully inserted in the holder; but when said opening is out of register with the stop-pin the latter prevents the complete insertion of the condenser by striking the solid portion of the operating-ring. The opening of the operating-ring is so arranged relatively to the stop-pin *p* of the condenser that when the diaphragm is open and the condenser is inserted in its holder with its lower guide-pin *o* in line with the notch *o*′ of the holder the opening of the operating-ring coincides with the stop-pin of the condenser and permits the latter to be slid upward into its normal position without restraint, while when the diaphragm is closed the opening of the operating-ring breaks register with the stop-pin of the condenser, so that said pin arrests the upward movement of the condenser before the same comes in contact with the closed diaphragm, as shown in Fig. 6. By providing this safeguard it is impossible to properly insert the condenser in its holder without first opening the upper diaphragm in case the same is closed, and it is also impossible to close the diaphragm before removing the condenser, because when the condenser is in place its stop-pin *p* projects into the opening of the operating-ring and locks the latter against turning. Buckling or other injury to the diaphragm-leaves by a careless or improper handling of the accessories is therefore effectually prevented.

As shown in Figs. 5, 6, and 7, the lower ring *i*′ of the diaphragm-casing is separated from the operating-ring *j* to permit the complete insertion of the condenser before its stop-pin *p* comes in contact with said ring.

I claim as my invention—

1. In a microscope or similar instrument, the combination with the pillar, its base, and the adjustable sleeve sliding on the pillar and carrying the lens-tube, of a collar surrounding said base and secured at its lower end to the same and having its remaining portion separated therefrom by an intervening space forming a socket, and a dust-cap secured to the lower end of the sleeve and fitting into the space or socket between the pillar-base and said collar, substantially as set forth.

2. The combination with an iris-diaphragm, its support, its rotary operating-ring, a condenser-holder arranged below said diaphragm, and a condenser adapted to be inserted into said holder from below, of guide devices on the condenser and its holder which control the position of the condenser in its holder circumferentially, and stop devices on the condenser and the rotary ring of the iris-diaphragm which permit the full insertion of

the condenser into its holder only when the diaphragm is open, substantially as set forth.

3. The combination with an iris-diaphragm, its support, its rotary operating-ring provided with an opening or recess, a condenser-holder arranged below said diaphragm, and a condenser adapted to be inserted into said holder from below, of guide devices on the condenser and its holder which control the position of the condenser in its holder circumferentially and a stop on the condenser which strikes the operating-ring of the diaphragm and prevents the insertion of the condenser into the holder when the diaphragm is closed and which enters the opening or recess in said ring and permits the insertion of the condenser when the diaphragm is open, substantially as set forth.

4. The combination with an iris-diaphragm and its support, of a rotary operating-ring for the diaphragm-leaves provided with an opening or recess, a condenser-holder supported below said diaphragm and provided in its lower edge with a guide-notch, and a condenser provided with a guide-pin adapted to enter said notch and a stop-pin adapted to enter the opening of said operating-ring, said opening and stop-pin being so arranged relatively to each other that when the diaphragm is open, the stop-pin registers with said opening, substantially as set forth.

Witness my hand this 24th day of May, 1900.

HERMANN ZIRNGIBL.

Witnesses:
CARL F. GEYER,
CLAUDIA M. BENTLEY.