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MICROSCOPE.

1,129,502.

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To all whom it may concern:

Be it known that I, HARVEY N. OTT, a citizen of the United States, residing at 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 that type of illuminating apparatus for microscopes in which the upper iris diaphragm is mounted in fixed position at the top of the condenser on a holder in which the condenser is removably retained. This construction requires the diaphragm to be opened to its fullest extent when the condenser is in place, in order that the condenser may not be obstructed. Ordinarily the upper end of the condenser projects up into the opening of the diaphragm, so that if the diaphragm is inadvertently closed when the condenser is in place, the leaves of the diaphragm will strike the condenser, resulting in the marring of the condenser and frequently in injury to the diaphragm.

The object of this invention is to provide an efficient and practical safety device of simple and inexpensive construction for illuminating apparatus of this sort, which will positively prevent the diaphragm from being closed and injured when the condenser is in place, while not interfering with the usual operation of the diaphragm when the condenser is removed. This is accomplished by furnishing the apparatus with a movable stop which does not interfere with the operation of the iris diaphragm when the condenser is out of its holder, but which is moved to a position to obstruct the movement of the diaphragm operating handle or device by the placing of the condenser in the condenser holder.

In the accompanying drawings: Figure 1 is a side elevation on a reduced scale of a microscope provided with a safety device embodying the invention. Fig. 2 is a plan view of the illuminating apparatus. Fig. 3 is a sectional elevation thereof. Fig. 4 is a bottom plan view thereof omitting the condenser. Fig. 5 is a side elevation partly in section of the condenser holder and condenser separated. Fig. 6 is an enlarged sectional elevation of the safety stop device, in line 6—6, Fig. 2. Fig. 7 is a detail section of one of the fastenings for the

condenser holding ring and upper diaphragm.

Like reference characters refer to like parts in the several figures.

A, Fig. 1, represents a microscope stand of ordinary construction provided with a condenser holder B which supports the condenser C and the upper iris diaphragm D. In the construction shown in the drawings the holder B is mounted on a pin *b* depending from the stage, so as to be capable of being adjusted vertically toward and from the stage and swung laterally from beneath the stage. The holder B is provided with the usual opening *c* in which the condenser C is removably retained by a split holding ring *c'* into which the condenser is adapted to be slipped and in which it is held by friction. The upper iris diaphragm D is mounted on the holder B over the opening *c* thereof and as usual comprises an outer shell *d* stationarily secured on the holder B, a rotatable inner shell *d'* and diaphragm leaves *d²* arranged between the shells so as to be adjusted to regulate the size of the diaphragm opening by turning the inner shell *d'* by means of the handle *d³* projecting outwardly therefrom. The outer shell of the upper diaphragm and the holding ring for the condenser are secured on the condenser holder B by screws *e* passing through holes *e'* in flanges on said shell and ring, the holes *e'*, as shown in Fig. 7, being made enough larger than the shanks of the screws to enable the slight lateral adjustment of the diaphragm and condenser which may be necessary in order to aline them accurately with the optical axis.

F represents the usual lower iris diaphragm which is carried by the lower end of the condenser and is removable with the condenser from the holder B. The enlarged lower end of the containing sleeve *f* of the condenser, which forms the shell or casing of this diaphragm, is adapted to strike against the end of the holding ring *c'* and prevent further movement of the condenser when it has been shoved up to the proper position in the holding ring.

As thus far described the illuminating apparatus is of known construction, and the construction illustrated in the drawings, or any other suitable construction, can be employed.

G represents the safety device or stop for the upper diaphragm. This device, in the construction shown, consists of a vertically movable plunger extending through the rim of the condenser holder in position to be engaged and shoved upwardly by the projecting lower end of the condenser sleeve *f* when the condenser is placed in the holder, so that its upper end will project upwardly in front of the operating handle *d*³ for the upper diaphragm and prevent the same from being moved. The plunger *g* is normally held down so as not to obstruct the movement of the diaphragm handle *d*³ by a spring *g*¹, Fig. 6, which bears against a collar on the plunger. Preferably the plunger and its spring are contained in a spring barrel *g*² which is supported in a hole *g*³ in the condenser holder B by a flange at the upper end of the barrel seated in a counter bore at the upper end of the hole *g*³. The spring barrel *g*² and a washer *g*⁴ resting thereon in the counter bored upper end of the hole *g*³, are retained in place by the overhanging securing flange of the holding ring *c*¹. The stop device, constructed in this way, can be quickly and easily placed in position and removed and no special securing means therefor are necessary. The washer *g*⁴ affords a bearing for the upper end of the plunger spring and also serves as a guide for the upper end of the plunger, thus permitting the hole *g*⁵ provided in the flange of the holding ring *c*¹ for the passage of the plunger to be made large enough to allow the lateral adjustment of the condenser holding ring, above described.

While the construction above described is preferred, the invention is not restricted thereto, since stop devices of other construction, arranged to be moved to obstruct the operation of the upper diaphragm by placing the condenser in position, could be employed.

There are no interlocking parts between the condenser and holder which require the condenser to be turned to any one particular position about its longitudinal axis before it can be inserted into the holder, nor which lock the condenser against rotary movement in the holder. The condenser can therefore be easily slipped into the slip holding ring of the holder regardless of its position about its longitudinal axis and, if desired, can be turned or rotated in the holder, and in whatever position the condenser may be in the holder it will engage and actuate the stop device when moved into operative position.

I claim as my invention:

1. The combination with a condenser holder, a condenser which is movable to and from operative position in said holder, and an upper diaphragm, of a stop device which is movably supported independently of said condenser and is movable to a position in

which it obstructs the adjustment of said diaphragm, said stop device being so arranged that it is moved to its obstructing position by the movement of said condenser to its operative position, substantially as set forth.

2. The combination with a condenser holder, a condenser which is removably retained in said holder, and an upper diaphragm, of a stop device which is movably mounted on said holder independently of the condenser in position to be moved by the movement of the condenser into position in said holder, said stop when so moved forming an obstruction to the adjustment of said diaphragm, substantially as set forth.

3. The combination with a condenser holder, a condenser which is removably retained in said holder, and an upper diaphragm, of a stop device which is movably mounted on said condenser holder independently of the condenser in position to be engaged and moved by the condenser when the latter is being placed in the condenser holder, said stop being moved by the condenser into a position in which it obstructs the movement of the operating part of the diaphragm, substantially as set forth.

4. The combination with a condenser holder, a condenser which is removably retained in said holder, and an upper diaphragm having a movable operating device, of a stop plunger movably mounted on said condenser holder independently of the condenser in position to be raised by the condenser when the condenser is being placed in the holder, said stop plunger when raised projecting into the path of movement of and obstructing said operating device of the diaphragm, substantially as set forth.

5. The combination with a condenser holder, a condenser adapted to be slipped into said holder from beneath, and an upper diaphragm having a horizontally movable operating handle, of a stop plunger extending through said condenser holder and movably mounted therein with its upper end normally below the plane of movement of said diaphragm handle and its lower end in position to be engaged by the condenser, said plunger being raised to place its upper end in front of said diaphragm handle by the condenser when the condenser is being placed in the condenser holder, substantially as set forth.

6. The combination with a condenser holder, a condenser adapted to be slipped into said holder from beneath, and an upper diaphragm having a horizontally movable operating handle, of a vertically movable stop plunger, a spring barrel supported by said condenser holder and containing said plunger, and a spring in said barrel which normally holds said plunger down, said plunger being located so as to be engaged

and raised to obstruct the movement of said diaphragm handle by the condenser when placing the condenser in the condenser holder, substantially as set forth.

5 7. The combination with a condenser holder, a condenser adapted to be slipped into said holder from beneath, and an upper diaphragm having a horizontally movable operating handle, of a spring barrel supported in a hole in said condenser holder, a
10 vertically movable spring operated plunger contained in and guided by said barrel, and a laterally adjustable part on said condenser holder by which said spring barrel is re-

tained in its supporting hole and which has 15 a hole through which said plunger passes, said plunger being located so as to be raised against the action of said spring to obstruct the movement of said diaphragm handle by the placing of the condenser in said con- 20 denser holder, substantially as set forth.

Witness my hand, this 27th day of August, 1912.

HARVEY N. OTT.

Witnesses:

JOHN O. KRAEBEL,
CORA FACKLAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."