Feb. 7, 1928. 1,658,523

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MICROSCOPE ILLUMINATING DEVICE

Filed Nov. 22. 1926

Fig. 1.

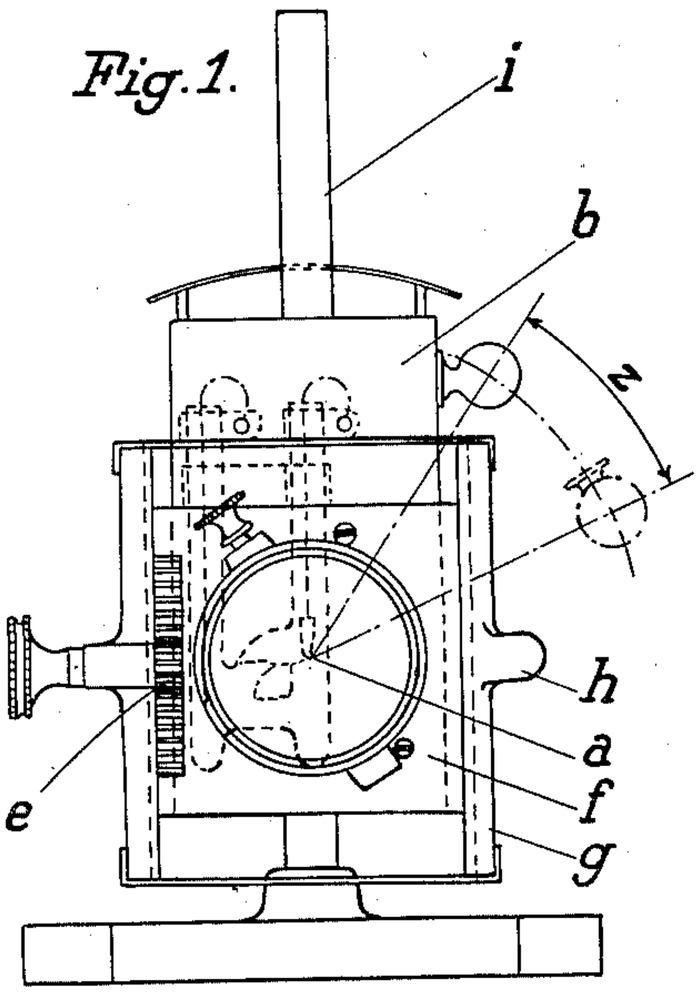


Fig. 3.

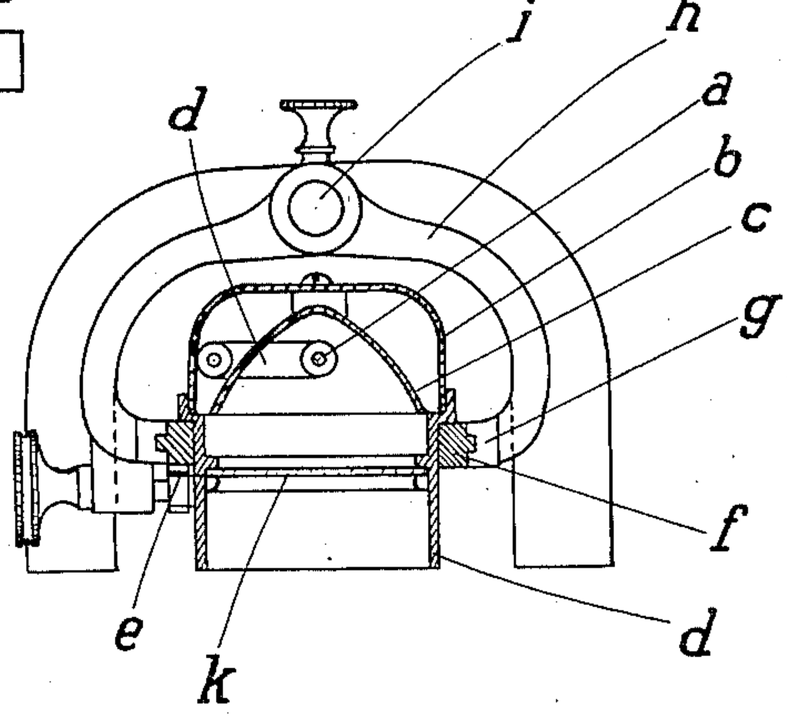
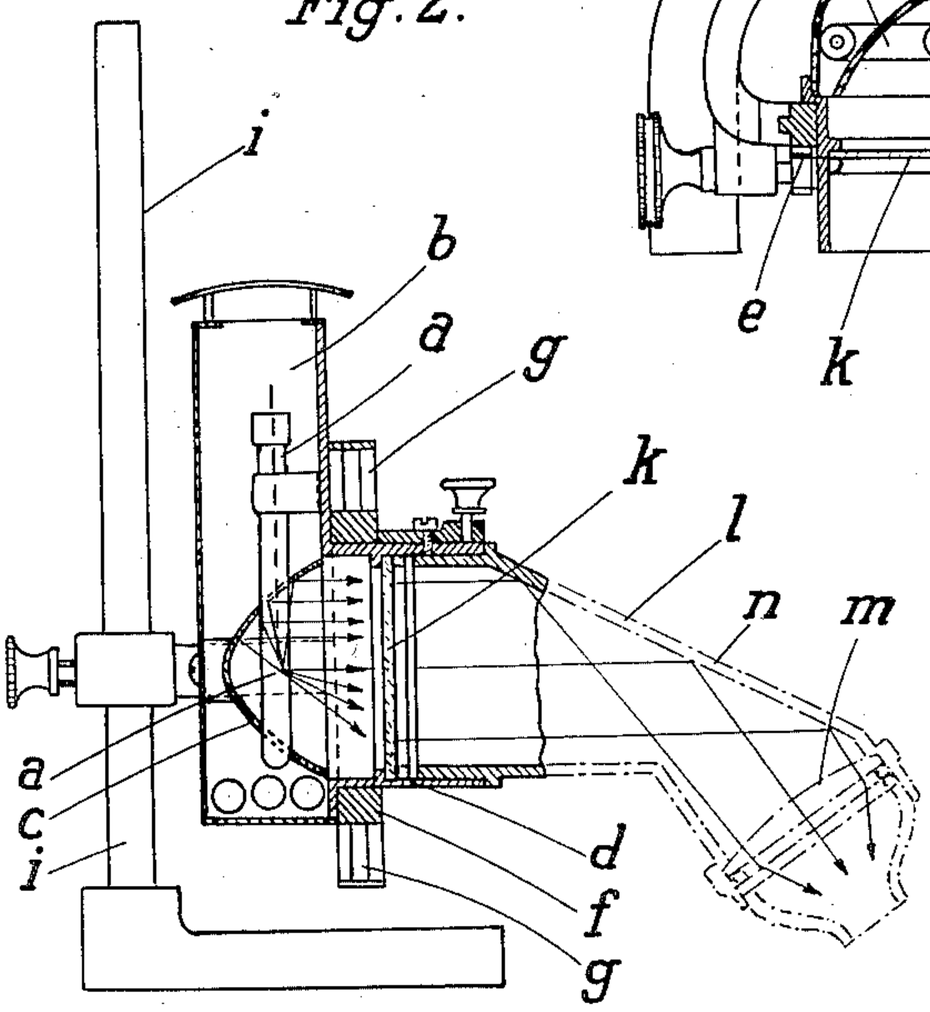


Fig. 2.



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UNITED STATES PATENT OFFICE.

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MICROSCOPE-ILLUMINATING DEVICE.

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My invention refers to an illuminating device for use in connection with microscopes and similar apparatus and more especially to a particular form of mercury vapour lamp which is quite especially adapted for this purpose. It is an object of my invention to render such mercury vapour lamps adapted to be connected with microscopes and the like and to be handled, when so connected, in a particularly simple and efficient manner, it being a further object to so design the lamp itself and the parts connected therewith that the greatest efficiency is obtained both in mechanical and in optical respect.

Mercury vapour lamps are known to have a comparatively great light intensity, the light emitted by them being particularly rich in rays of short wave length. Besides the well known mercury vapour lamps in which a long thread-like arc is formed, there has become known a form of lamp in which an arc is formed between a mercury surface having only a few millimetres in diameter and acting as cathode, and a solid anode closely adjoining the cathode, this arc forming a substantially point-shaped source of light having a great specific intensity. An arc such as formed in this type of lamps may for instance have a length of not more than 2 mms., its diameter being substantially the same.

A lamp of this particular type is combined according to the present invention with means whereby it is rendered particularly suitable for microscopic purposes. Such lamp appears especially suitable in this case not only in view of the smallness of its source of light, but also in view of the particularly great quantity of rays of short wave length emitted by it. In consequence of the higher vapour pressure such lamp emits ultraviolet rays in the range of about 366 $\mu\mu$, which is much more than the quantity of ultraviolet light emitted by the ordinary mercury vapour lamp. In consequence of the powerful emission of rays of short wave length of a predetermined kind a sufficient intensity of light is still obtained even if all other rays are screened off by means of a suitable filter such as can be produced nowadays from special kinds of glass to screen off all rays with the only exception of the particular waves required. In this manner a monochrome light of very short wave length is obtained, which is emitted from a point-shaped source of light and has the particular property of optically decomposing even the most minute elements of microscopic objects so as to render them visible to the eye. In a lamp designed as above described a mercury vapour lamp comprising a point-shaped source of light is arranged within a shell or casing which is combined with a reflector designed to direct all the rays emitted from the source of light in one direction, a filter allowing to pass only rays belonging to a predetermined range of waves and, in front of the filter, an angular ray guiding tube provided with optical means, such as collector lenses which according to its position allows to irradiate the object to be investigated either from above or from below, i. e. with incident or transversing light.

In the drawings affixed to this specification and forming part thereof an illuminating device embodying my invention is illustrated diagrammatically by way of example.

In the drawings,

Fig. 1 is a front elevation,

Fig. 2 is a side elevation, partly in axial section, and

Fig. 3 is a plan view, partly in horizontal section.

Referring to the drawings, a^0 is the short arc of a mercury vapour lamp a of the type aforesaid and b is the shell or casing surrounding the lamp, this casing being substantially of prismatic shape to fit the lamp and having apertures both at the upper and the lower ends so that a natural cooling air current will traverse the lamp from below. On one side of the casing is arranged a short tubular extension d in which is mounted a parabolic reflector c surrounding the point-shaped source of light in such manner that all the rays emitted from this source are directed into the extension d. This extension also forms the pivot for the casing b and the lamp mounted therein so that by tilting the casing through the angle z (Fig. 1) the lamp can be ignited. f is an annular bearing for the extension d, this bearing being supported by a frame g and being adjustable therein in vertical direction. The adjusting of the bearing and the parts connected with it is effected by means of a rack e mounted on the bearing and a pinion meshing with the rack. The frame g is carried

by curved arms *h* (Fig. 3), which embrace the rear side of the casing and a standard *i*, on which they can be adjusted in vertical direction.

In the extension *d* is mounted in front of the reflector *c* a filter *k* of the kind aforementioned, which allows only rays of a predetermined range of short wave length to pass through. In front of the filter *k* is inserted in the extension *d* an angular tube *l* serving to deflect the rays, this tube being provided with the necessary optical means for effecting such deflection and also the direction of the rays. In the simple form shown in the drawings this tube comprises a deflecting mirror *n* and a collector lens *m*. The tube *l* is mounted in the extension *d* for rotation about its axis and for fixation in any desired position.

Owing to the deflection of the bundle of rays from the horizontal direction and to the possibility of rotating the optical outfit the object to be observed in the microscope can be irradiated from above or from below, the lamp being adjustable on the standard *i* as well as in the frame *g*.

As shown in the drawings, the illuminating device described occupies very little space and can be easily handled in practical use.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:—

1. Microscope illuminating device comprising a mercury vapour lamp arranged to form a point-shaped source of light, a reflector to the rear of and partly surrounding such source of light for projecting all the rays emitted therefrom in one direction and ray conducting means in front of said source of light.

2. Microscope illuminating device comprising a mercury vapour lamp arranged to form a point-shaped source of light, a reflector to the rear of and partly surrounding such source of light for projecting all the rays emitted therefrom in one direction, a filter in front of said source of light adapted to allow only rays belonging to a limited range of wave lengths to pass through and an adjustable angular ray conducting tube in front of said filter.

3. Microscope illuminating device comprising a mercury vapour lamp arranged to form a point-shaped source of light, a reflector to the rear of and partly surrounding such source of light for projecting all the rays emitted therefrom in one direction, a filter in front of said source of light adapted to allow only rays belonging to a limited range of wave lengths to pass through, an adjustable angular ray conducting tube in front of said filter, a casing surrounding said lamp and reflector, a tubular extension on said casing holding said ray conducting means, an annular bearing frictionally embracing said extension and serving as a pivot therefor and means for supporting said bearing.

4. Microscope illuminating device comprising a mercury vapour lamp arranged to form a point-shaped source of light, a reflector to the rear of and partly surrounding such source of light for projecting all the rays emitted therefrom in one direction, a filter in front of said source of light adapted to allow only rays belonging to a limited range of wave lengths to pass through, an adjustable angular ray conducting tube in front of said filter, a casing surrounding said lamp and reflector, a tubular extension on said casing holding said ray conducting means, an annular bearing frictionally embracing said extension and serving as a pivot therefor, a standard and means for adjustably mounting said bearing on said standard.

5. Microscope illuminating device comprising a mercury vapour lamp arranged to form a point-shaped source of light, a reflector to the rear of and partly surrounding such source of light for projecting all the rays emitted therefrom in one direction, a filter in front of said source of light adapted to allow only rays belonging to a limited range of wave lengths to pass through, an adjustable angular ray conducting tube in front of said filter, a casing surrounding said lamp and reflector, a tubular extension on said casing holding said ray conducting means, an annular bearing frictionally embracing said extension and serving as a pivot therefor, a frame, means comprising a rack and pinion for adjustably supporting said extension on said frame and a standard adjustably supporting said frame.

6. Microscope illuminating device comprising a mercury vapor lamp arranged to form a point-shaped source of light and a filter in front of said source of light adapted to allow only rays belonging to a limited range of wave lengths to pass through.

7. Microscope illuminating device comprising a mercury vapor lamp arranged to form a point-shaped source of light, a filter in front of said source of light adapted to allow only rays belonging to a limited range of wave lengths to pass through, and an adjustable angular ray conducting tube in front of said filter.

In testimony whereof I affix my signature.

FRITZ GIRARD.