Jan. 13, 1931. L. V. FOSTER 1,788,712

ILLUMINATING MEANS

Filed June 18, 1928

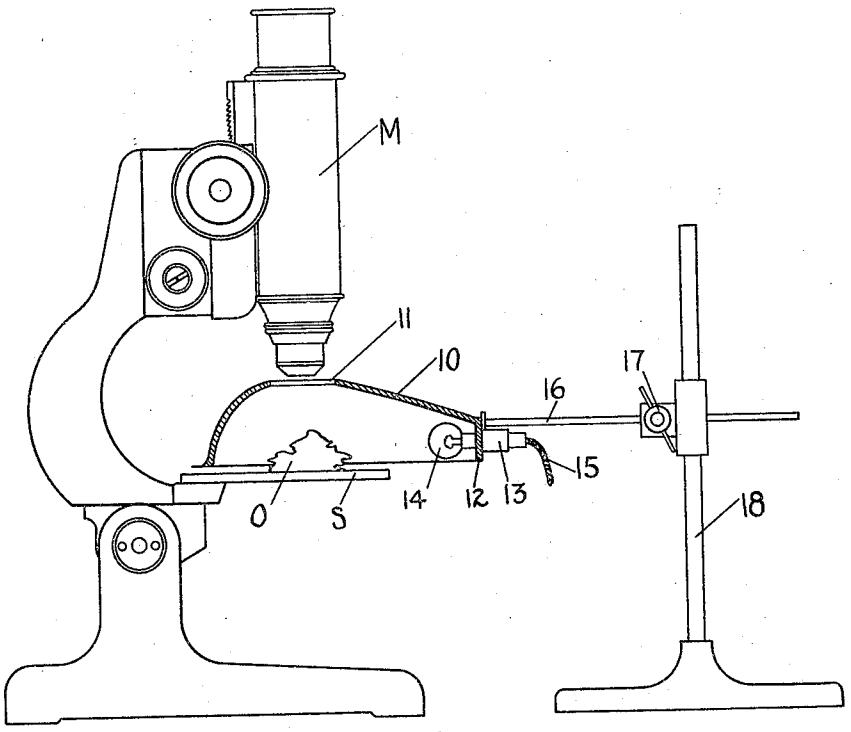


Fig. 1

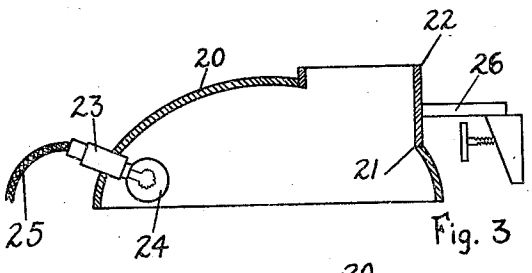


Fig. 3

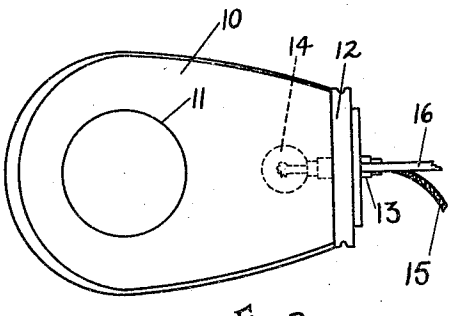


Fig. 2

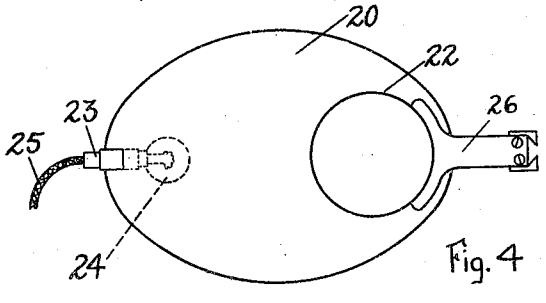


Fig. 4

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UNITED STATES PATENT OFFICE

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ILLUMINATING MEANS

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This invention relates to illuminating means and more particularly it refers to illuminators which are used for providing uniform illumination of objects which are under observation, such as an opaque object on the stage of a microscope, for instance. In illuminating objects of this sort, it is highly desirable that the illumination be uniform and even on all sides of the object so that shadows may be eliminated. Various methods have been used for the purpose of providing illumination of the character described. In one of these methods the opaque object is illuminated by a direct beam of light which is produced by a relatively powerful source of light. This method is not satisfactory as only one side of the object is properly illuminated and objectionable shadows are produced. Another method involves the use of a special, circular shaped light source which is adapted to illuminate the object on all sides. This is open to the objection that it causes an excessive amount of heat, and further, this type of light source is also relatively expensive and since it is of a special design it is not convenient to obtain new parts for replacement.

One of the objects of the present invention is to provide a means for evenly illuminating an object of the character described. Another object is to provide a relatively simple and inexpensive illuminating means which will uniformly illuminate an object under observation. Other objects and advantages reside in certain novel features of construction, arrangement and combination of parts which will be hereinafter more fully described and pointed out in the appended claims.

Referring to the drawings:

Fig. 1 shows a method of using one form of my device, the device being shown in vertical section.

Fig. 2 shows a top plan view of the form of my illuminating device shown in Fig. 1.

Fig. 3 shows a sectional view of a modification.

Fig. 4 shows a top plan view of the device shown in Fig. 3.

Similar reference characters refer to the same parts throughout the several views of the drawing.

One embodiment of my device, shown in Fig. 1, comprises a substantially oval or pear-shaped shell 10 having an observation opening 11 adjacent one end of said shell. A plate 12, secured to shell 10, carries a lamp socket 13 in which is mounted the incandescent lamp 14 which is connected to a current supply by wire 15. A rod 16, secured to plate 12, may be attached to clamp 17 on ring stand 18, for instance, to hold the illuminating device in any adjusted position. The inner surface of shell 10 is suitably prepared, as by applying a dead white paint or lacquer, for example, so as to reflect a uniformly diffused light.

In Fig. 1, I have shown one form of my improved device in use for illuminating an opaque object O positioned on stage S of a well known type of microscope M. Certain light rays from lamp 14 strike portions of the inner reflecting surface of shell 10 and are reflected to the object O, other rays are differently reflected and the combined reflections result in the production of an even, uniform, shadow-free illumination of the object O. Some rays reach the object O direct from the lamp 14 but these rays do not disturb the even illumination of the object. The uniformly illuminated object O can be observed through the observation opening 11, directly by the eye, or by means of an optical instrument as shown in Fig. 1, for example. The illumination produced by my improved device is also highly satisfactory for use in taking photomicrographs of opaque objects or specimens.

In Figs. 3 and 4 I have shown a modified form of my device wherein 20 indicates a shell which comprises, substantially, a half section of an ellipsoid of revolution. An observation opening 21 is provided at one end of the shell 20 and a tubular member 22 is secured in the opening 21. At the other end of the shell 20 there is mounted a lamp socket 23 which carries the incandescent lamp 24 supplied with current by wire 25.

The lamp 24 is mounted so as to be positioned approximately at one focus of the

ellipsoid and the observation opening 21 is substantially in line with the other focus of the ellipsoid. Hence, when an object is placed below the opening 21 it will be positioned approximately at one focus of the ellipsoid and will receive a maximum amount of reflected light since light rays emanating from a light source at one focus of an ellipsoid of revolution are reflected to the other focus of the ellipsoid. The inner surface of shell 20 is also suitably prepared, as by applying a flat white paint or lacquer, for example, so as to reflect and diffuse the light rays. Light rays from lamp 24 will be reflected by the inner surface of shell 20 and will produce uniform illumination on an object placed under the observation opening 21. A clamping device 26 is secured to the tubular member 22 and provides a means whereby the illuminator may be adjustably secured to a microscope.

The form of my device shown in Figs. 1 and 2 approximates, substantially, that of a section of an ellipsoid of revolution. Either type of my illuminating device functions satisfactorily for uniformly illuminating an opaque object or specimen requiring direct illumination on the stage of a microscope. My improved device is especially satisfactory for illuminating specimens on the stage of a relatively low power binocular microscope. Although I have illustrated my device in use with a microscope, it can obviously be used to uniformly illuminate any object which is under direct observation without the aid of a microscope. Both types of my improved device are relatively simple and inexpensive, yet efficient in operation. My device utilizes a well known type of incandescent lamp which can be readily obtained on the market, thereby avoiding the necessity of ordering a special shaped lamp.

From the foregoing it is apparent that I am able to attain the objects of my invention and provide an efficient, yet inexpensive and simple, means for uniformly illuminating an object under observation.

I claim:

1. An illuminator for the field of an optical instrument comprising a shell having an observation opening adjacent one end thereof, and a source of light mounted therein and at the other end of said shell, said shell having substantially the contour of a half section of an ovoid.

2. An illuminator of the class described comprising a member having substantially the contour of a half section of an ellipsoid having one side open for receiving a specimen and having an observation opening therein which is approximately in line with one focus of the ellipsoid and a light source positioned substantially at the other focus of the ellipsoid.

3. An illuminator for the field of an optical instrument comprising a shell having an opening at one side for the object to be illuminated, and opposite thereto an observation opening adapted to be alined with the axis of said instrument, and a source of light mounted within said shell at one side of said observation opening in such position that light from said light source may fall upon the interior surface of the opposite side of said shell from said light source and be reflected therefrom to the object being illuminated.

4. An illuminator for the field of an optical instrument comprising a shell having a light projecting opening at one side thereof, and an observation opening in the opposite side adapted to be alined with the axis of said instrument, said shell having in section substantially the shape of a half oval, and a source of light mounted within said shell at one side of said observation opening.

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