Nov. 3, 1925. 1,559,557

H. L. DE ZENG

OPHTHALMOSCOPE

Filed Oct. 19, 1922

Fig. 1.

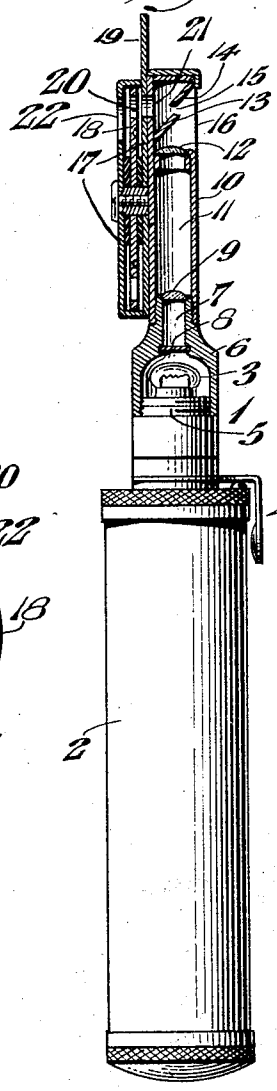


Fig. 2.

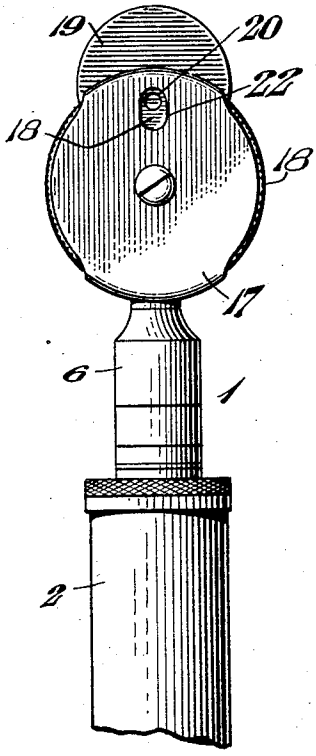


Fig. 3.

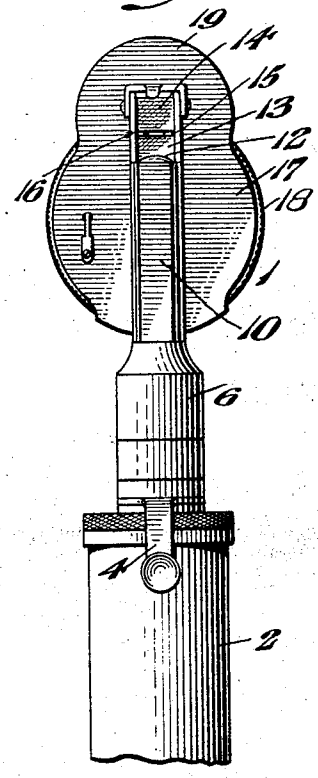


Fig. 4.



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UNITED STATES PATENT OFFICE.

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OPHTHALMOSCOPE.

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To all whom it may concern:

Be it known that I, HENRY L. DE ZENG, a citizen of the United States, residing at Moorestown, in the county of Burlington, State of New Jersey, have invented a new and useful Ophthalmoscope, of which the following is a specification.

The invention relates to a new type of self-luminous ophthalmoscope or other diagnostic instrument, wherein I employ a superior type of illumination.

One object of my invention is to provide an illuminating system, which will give a highly concentrated light projection, of great importance in looking into the eye and orifices of the body.

Another object of my invention is to so diffuse light in its course from the light source to the object that a uniformly illuminated field may be obtained.

Another object of my invention is to so arranged the optical and mechanical parts of the illuminating device that the source of light may be in the most desirable position with respect to the sight opening in the instrument.

Another object of my invention is to employ a multiple light condensing system so arranged as to transmit the maximum amount of light from the source to the object, while at the same time confining it to a passageway of comparatively small diameter.

Another object of my invention is to provide interchangeable members, either with or without optics, whereby the character of the transmitted light may be varied.

Another object of my invention is to provide means whereby the distances between the optics may be altered through adjustment of certain of the parts.

To the above ends my invention consists of the herein described novel ophthalmoscope, comprising a handle, a source of light, a casing, a light diffuser, a lower condensing lens, a second or upper condensing lens and a reflector, said first mentioned condensing lens being located approximately at its length from said light diffuser.

It further consists of a novel multiple lens light condensing system, one of said lenses having a focal length of one half an inch or less and the other lens having a focal length of less than one inch.

It further consists of a novel collocation of a multiple lens light condensing system, a light source and a reflector wherein the lens nearest the mirror is of longer focal length than the lens nearest the light source.

It further consists of a novel construction of handle, a lighting attachment containing a multiple lens system, a detachable member located between one of said lenses and handle, and means for altering the character of the light derived therefrom.

It further consists of other novel features of construction and advantage, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings a form thereof which is at present preferred by me, since it will give in practice satisfactory and reliable results, although it is to be understood that the various intsrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a vertical sectional view of an ophthalmoscope embodying my invention, the lower portion of the instrument being shown in elevation.

Figure 2 represents a rear view of Figure 1.

Figure 3 represents a front view of Figure 1.

Figure 4 represents a vertical sectional view of the detachable or interchangeable member seen at about the middle of the other figures, but showing the translucent member omitted therefrom.

Similar numerals of reference indicate corresponding parts.

1 designates my novel construction of ophthalmoscope, the same comprising a suitable handle 2 which is made hollow to contain a battery (not shown) of any conventional or standard type, from which latter suitable electrical connections extend to the incandescent electric light 3, whose action is controlled by a manually operated switch or finger piece 4, of any suitable or con-

ventional type. The upper portion of the handle member 2 is provided with a head which is exteriorly threaded as indicated at 5, said threads being engaged by the lower portion of the detachable member 6, which has the bore or passage 7 therethrough at the bottom of which bore is the translucent member 8, which acts as a light diffuser, while at the top of the passage 7 is located the aligning condensing lens 9, which is located at approximately its focal length from the light diffuser 8. The upper end of the detachable member 6 is somewhat reduced and is exteriorly threaded and is engaged by the lower interiorly threaded portion of the body portion or casing 10, which has the passage 11 therein, at the upper portion of which is located the condensing lens 12, the elements 8, 9 and 12 being in vertical alignment.

Above the condensing lens 12 I locate an angularly disposed mirror or reflector having the reflecting surfaces 13 and 14 which are disposed in non-aligning planes, and have a sight opening 15 therebetween which is in line with the opening 16, said reflector directing the light at approximately right angles to the optical axis of the lenses.

The upper portion of the casing 10 carries the housing 17 within which is contained the rotatable apertured disc 18 of the conventional type, having ports 20 therein, which can be turned into alignment with the part 21 of the stationary member 19.

The outer wall of the casing 17 has the slot 22 therein, whose function need not be described in greater detail, since the same per se forms no part of my present invention, it being apparent that the opening 15, ports 21, 20 and slot 22 are in horizontal alignment.

It will be noted that the light diffuser or translucent member 8, the lower condensing lens 9 and the upper condensing lens 12 are in vertical alignment and that the lens 12 nearer the mirror 14 is of longer focus than the lens 9 nearer the light source.

In practice, I preferably make the focal length of the lens 9 about one half inch or less, and the focal length of the lens 12 of less than one inch, but it will of course be apparent that these focal lengths may be somewhat varied.

The condensing lens 9 is located approximately at its focal length from the light diffuser 8.

In Figure 4, I have shown the nipple 23 as being of substantially the same construction, as the detachable nipple member 6, already described, said nipple 23 being provided with the lower interiorly threaded portion 24 and the upper exteriorly threaded portion 25, having a passage 26 therethrough, and being provided with the lower condensing lens 9 of the same character as the lens 9 already described, but the light diffuser 8 seen in Figure 1 is omitted. It will be apparent that the nipples 6 and 23 can be readily interchanged according to requirements.

It will thus be seen from the foregoing that I have provided novel means, whereby the illumination in my invention may be altered by changing the nipples 6 and 23, which connect the handle with the instrument proper, since one of them as 6 carries light diffusing material 8, while the other nipple 23, see Figure 4, does not. In practice, it may be found expedient to use direct illumination at times and in that instance the nipple 23, seen in Figure 4, without diffusing material will be employed, whereas for routine work the diffused light or the construction seen in Figure 1 will be employed.

As my invention is here shown in an ophthalmoscope, it will be seen that the lighting system contains a plurality of condensing lenses 9 and 12, so arranged as to concentrate more light upon the reflector 14 of the instrument and at a more highly convergent angle than in any other previous type of ophthalmoscope.

This feature of the illumination is highly desirable in obtaining a wide yet brilliant illumination of the interior of the eye and particularly so when the pupil is small or the eye ground darkly pigmented. The type of highly concentrated, diffused light derived from my invention is very advantageous in practice as compared with the illumination derived from other diagnostic instruments and particularly so in those employed for looking into the eye, ear, nose or throat.

It will now be apparent that I have devised a novel and useful ophthalmoscope, which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will give in practice satisfactory and reliable results, it is to be understood that such embodiment is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patents, is:—

1. In an instrument of the character described, a reflector, a source of light in line therewith, a transluscent member adjacent to the light source, and a light condensing system comprising two condensing lenses mounted in fixed spaced relation to each other, one lens being positioned at approximately its focal length from said translucent member and the second lens posi-

tioned between the first lens and the reflector.

2. In an instrument of the character described, a source of light, a translucent member adjacent to the light source, and a light condensing system comprising two condensing lenses mounted in fixed spaced relation to each other, one lens being positioned at approximately its focal length from said translucent member, a second lens positioned approximately at its focal length from the first lens and a reflector in operative position with respect to said last mentioned condenser.

3. In an instrument of the character described, a multiple lens light condensing system comprising two condensing lenses mounted in fixed spaced relation to each other, one of the lenses having a focal length of one-half inch or less and the other lens having a focal length of approximately one inch.

4. In combination with the light passage way and handle of a diagnostic instrument, a detachable connecting member between the light passage way and the handle, and a condensing lens carried by said connecting member.

5. In combination with the light passage way and handle of a diagnostic instrument, a detachable connecting member between the light passage way and the handle, a condensing lens mounted in said connecting member, and a light diffusing member therein in alinement with the condensing lens.

6. In combination with the light passage way and handle of a diagnostic instrument, a detachable member having a light passageway disposed between the handle and the main light passage way, a condensing lens and a light diffusing member mounted in spaced relation in the detachable member.

7. In a device of the character described, a source of light, a reflector adapted to divert the path of the light rays, a pair of condensing lenses disposed between the light and reflector, and a removable light diffusing member between the light and the lenses.

8. In a device of the character described, a source of light, a reflector adapted to divert the path of the light rays, a pair of condensing lenses in axial alinement with the light and reflector, one of said lenses having a greater focal length than the other, and a light diffusing member detachably mounted between the lenses and light source.

9. In a device of the character described, a source of light, a reflector adapted to divert the path of the light rays, a pair of condensing lenses in fixed spaced relation to each other and in axial alinement with the light and reflector, the lens nearest the reflector having approximately twice the focal length of the one nearest the light source.

10. A diagnostic instrument of the character described, comprising a handle, illuminating means carried thereby, a body portion including a condensing lens and a reflector in line with the illuminating means, and a pair of interchangeable nipples adapted to be used to selectively connect the handle and body portion, one of said nipples containing a light diffusing member.

11. A diagnostic instrument of the character described, comprising a handle, illuminating means carried thereby, a body portion including a condensing lens and a reflector in line with the illuminating means, and a pair of interchangeable nipples adapted to be used to selectively connect the handle and body portion, each of said nipples being provided with supplementary condensing lenses, and one of them containing a light diffusing member.

12. In a diagnostic instrument, a body portion with a sight opening, a handle, a light source, a reflector in operative position with respect to the sight opening, and a coupling connecting the handle with the body portion, said coupling being detachable and carrying a light filter.

13. In a diagnostic instrument, a body portion with a sight opening, a handle, a light source, a reflector in operative position with respect to the sight opening, and a coupling connecting the handle with the body portion, said coupling being detachable and carrying a lens.

14. In a diagnostic instrument, a body portion with a sight opening, a handle, a light source, a reflector in operative position with respect to the sight opening, a casing on said body portion, a condenser in said casing adjacent to said light source, a coupling interposed between the handle and casing, and a light filter carried by the coupling, substantially as set forth.

15. In a device of the character described, a lamp holding socket, a lamp in the socket, a threaded portion on the lamp socket, a light passage way, a threaded portion on the light passage way, and a coupling having threaded portions, one to engage the threaded portion of the light socket and one to engage the threaded portion of the light passage way.

16. In a device of the character described, a lamp holding socket, a lamp in the socket, a threaded portion on the lamp socket, a light passage way, a threaded portion on the light passage way, and a coupling having threaded portions, one to engage the threaded portion of the lamp socket, and one to engage the threaded portion of the light passage way, and a light controlling member in the coupling.

17. In a device of the character described, a light passage way, a source of light por-

tion, and a series of couplers, each adapted to detachably unite the light passage way and the source of light portion.

18. In a device of the character described, a light passage way, a source of light portion, a coupling member detachably connected to the passage way and also detachably connected to the source of light portion, and a light controlling member in the coupling.

19. In a device of the character described, a lamp holding socket, a lamp in the socket, an engaging portion on the lamp socket, a light passage way, an engaging portion on the light passage way, and a coupling having engaging portions, one to engage the engaging portions of the light socket, and one to engage the engaging portion of the light passage way.

HENRY L. DE ZENG.