

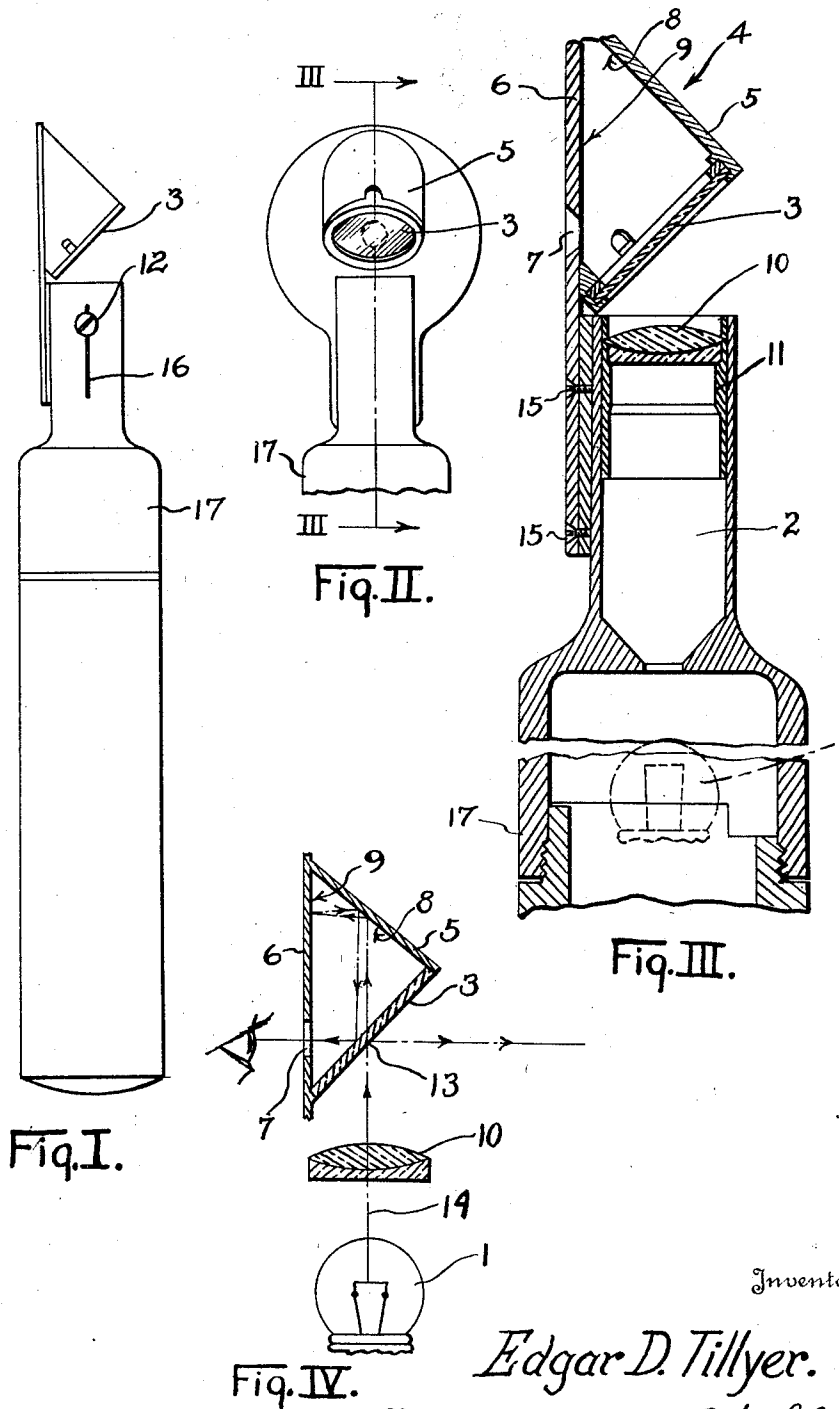
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EYE EXAMINING INSTRUMENT

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Fig. IV.

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EYE EXAMINING INSTRUMENT

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This invention relates to improvements in examining instruments and has particular reference to that type of instrument wherein reflected light is used and to the process of reducing same.

The principal object of the invention is to provide improved means for effectively reducing or eliminating undesirable reflected light entering the eye of the examiner.

Another object of the invention is to provide an improved arrangement wherein a reflective surface is employed to reduce undesirable light reflections.

Another object of the invention is to provide an improved reflector holder casing for an instrument of the character stated.

Another object of the invention is to provide simple, efficient and economical means for absorbing or reducing undesirable reflected light rays.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings, and it will be apparent that many modifications and changes may be made in the details of construction and arrangement of parts and steps of the process without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details shown and described as the preferred form only has been shown by way of illustration.

In prior instruments where reflected light has been used, such as eye examining instruments, it has been customary to use a mirror reflector having an opening through which the operator could view the eye of the patient. This opening was so formed and positioned that no light could pass through and be reflected into the operator's eye.

This type of reflector proved quite successful for this purpose, but was impractical for accurate eye examination. The most undesired result was that the light reflected was too intense and glaring. To overcome this difficulty a plain glass reflector was designed, the intention being to reduce the glare of the reflected light. This proved quite successful in that respect but introduced a new dif-

ficulty in that it allowed a certain portion of the light to pass through and be reflected into the operator's eye and again prevented accurate examination. It, therefore, is the prime object of my invention to provide novel means to reduce or effectively eliminate the light reflected from the reflector into the operator's eye thereby assuring a more accurate eye examination.

Referring to the drawings:

Fig. I is a side elevation of an instrument embodying the invention;

Fig. II is a partial view showing the patient's side of the head of the instrument;

Fig. III is an enlarged cross section on line III—III of Fig. II;

Fig. IV is a diagrammatic view illustrating the invention.

Referring more particularly to the drawings wherein similar reference characters denote corresponding parts throughout, an instrument embodying this invention consists broadly of a light source 1, a light passageway 2, a reflector 3, and a reflector holder casing 4. The reflector 3 is preferably a plain glass mirror and is positioned over the upper end of and held in alignment with the light passageway 2 by the reflector casing 4 which consists of the wall members 5 and 6. The reflector 3 is held in aligned position by the wall member 6 which is secured to the side of the light passageway 2 by screws or like means 15. In the wall member 6 is the opening 7 through which the operator may look.

The inner surface 8 of the wall member 5 is preferably a highly polished black surface, which is obtained by coating the surface with a black enamel, although other methods may be used. The inner surface 9 of the wall member 6 is preferably a dull black surface which may be obtained by any desired method such as a dull paint. In the light passageway 2 is positioned a condensing lens 10 of the usual type. This condensing lens 10 is carried by the slide ring 11 which is vertically adjustable in the light passageway 2 and may be secured in adjusted position by the set screw 12 which is movable in the slot 16 formed in the side of the passage-

way. The light passageway 2 is supported by a handle member 17 which carries the source of illumination 1. The handle 17 may be formed with a plug connection for an electrical circuit or may be designed to contain a battery.

Particular attention is directed to the reflector casing which differs from the prior art in that the side walls are coated with means for absorbing the undesired reflected light rays.

The improvement in the invention over previous types of instruments using light reflective surfaces will be readily apparent from a comparison of the usual prior art type with my device. If the prior art type used the usual dull black surface, often of black velvet, for the inner surface 8, about two per cent. of the light is diffused. Of this two per cent. the eye sees about eight per cent. reflected from the reflector 3. The reflecting and diffusing is completed and is, therefore, a total of about two per cent. of about eight per cent. This makes about 0.16 per cent. of the original light incident upon the surface 8 visible at the eye of the observer. In this invention the surface 8 is a highly polished specularly reflecting surface of preferably black enamel. Of the light passing through the transparent reflector 3 about five per cent. is reflected from surface 8 towards surface 9. This latter surface being a black diffusing surface diffuses about two per cent. as in prior art types incident upon it. A large proportion of this substantially two per cent. will return to surface 8 and be again reflected with a value in the neighborhood of five per cent. This light is then, as in prior art types, reflected from the reflector 3 with a value of substantially eight per cent. The observer's eye sees a total of about five per cent. of about two per cent. of five per cent. of eight per cent. This makes about 0.0004 per cent. of the original light incident upon the surface 8 visible at the eye of the observer. Compared with the substantially 0.16 per cent. of the previous type this gives an improvement of about four hundred to one. This type of reflection, diffusion, reflection back and forth practically eliminates stray light from an instrument whereon it is used and makes possible the use of a great many previously unusable ones by this elimination of stray light.

The invention may be applied to many types of light reflecting instruments and is not confined to the type illustrated and described. The surface 9 may even be an ordinary black enamel as so much light is absorbed by the double reflection at 8 that the diffusing qualities of the surface 9 may be quite small.

From the foregoing description it will be seen that I have provided simple, economical and efficient means for reducing or eliminating the light entering the operator's eye dur-

ing the examination to such an extent as to be negligible.

Having described my invention, I claim:

1. In a device of the character described, a source of light, a transparent reflector positioned in line with the source of light having transparency throughout its area to produce a wide field of vision therethrough and to eliminate false shadows from the test, a polished black reflector positioned at an angle with the transparent reflector, a dull reflector so positioned that light coming through the transparent reflector will strike the polished reflector and a reduced amount of said light be reflected towards said dull reflector to be again reduced upon reflection therefrom, towards the polished reflector and thereby reduced to a negligible degree prior to its reaching the eye of the examiner.

2. In a device of the character described, a light source, a sight opening positioned out of line of direct light from the light source, a transparent reflector before the sight opening having transparency throughout its area for the purpose of producing a wide field of vision and to eliminate false shadows from the test, a polished reflector positioned at an angle with the transparent reflector, a dull reflector so positioned that light from the light source penetrating the transparent reflector will first strike the polished reflector and be reflected towards said dull reflector to be reduced to a negligible degree prior to its reaching the eye of the examiner.

3. In a device of the character described, a light source, a light passageway aligned with the light source, a transparent reflector aligned with the light passageway having transparency throughout its area to produce a wide field of vision and eliminate false shadows from the test, said reflector being adapted to reflect a portion of the light from the light source and allow a portion to pass unreflected, a reflector support having an aperture aligned with the reflector on a line substantially normal to the path of light projected from the light source, a polished black surface aligned with and at an angle to the reflector adapted to receive and reflect the light passing through the reflector, and a dull black surface so positioned that light coming from the polished black surface will be reflected back to said polished black surface and thereby greatly reduced before emergence through the sight opening and into the eye of the examiner.

4. In a device of the character described, a source of light, a transparent reflector aligned with said light source having transparency throughout its area to produce a wide field of vision therethrough for the operator and to eliminate the casting of false shadows, said reflector being adapted to reflect a portion of light from the light source

and allow a portion to pass unreflected, a bright black reflector in the path of the transmitted light and a dull black reflector in the path of said light reflected by the second reflector whereby the amount of said transmitted light entering the operator's eye is a minimum.

5. In an instrument for directing a beam of light into a patient's eye, a source of light, a reflector aligned with the source of light and inclined and adapted to reflect a portion of the light from the light source into the patient's eye and to transmit a portion of the light without reflection and having at least a portion through which the operator may look into the patient's eye, a black reflector having a polished reflecting surface in the path of the transmitted light of the first reflector and a black reflector having a dull reflecting surface in the path of the light reflected by the second reflector whereby the amount of the said transmitted light entering the operator's eye is materially reduced.

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