

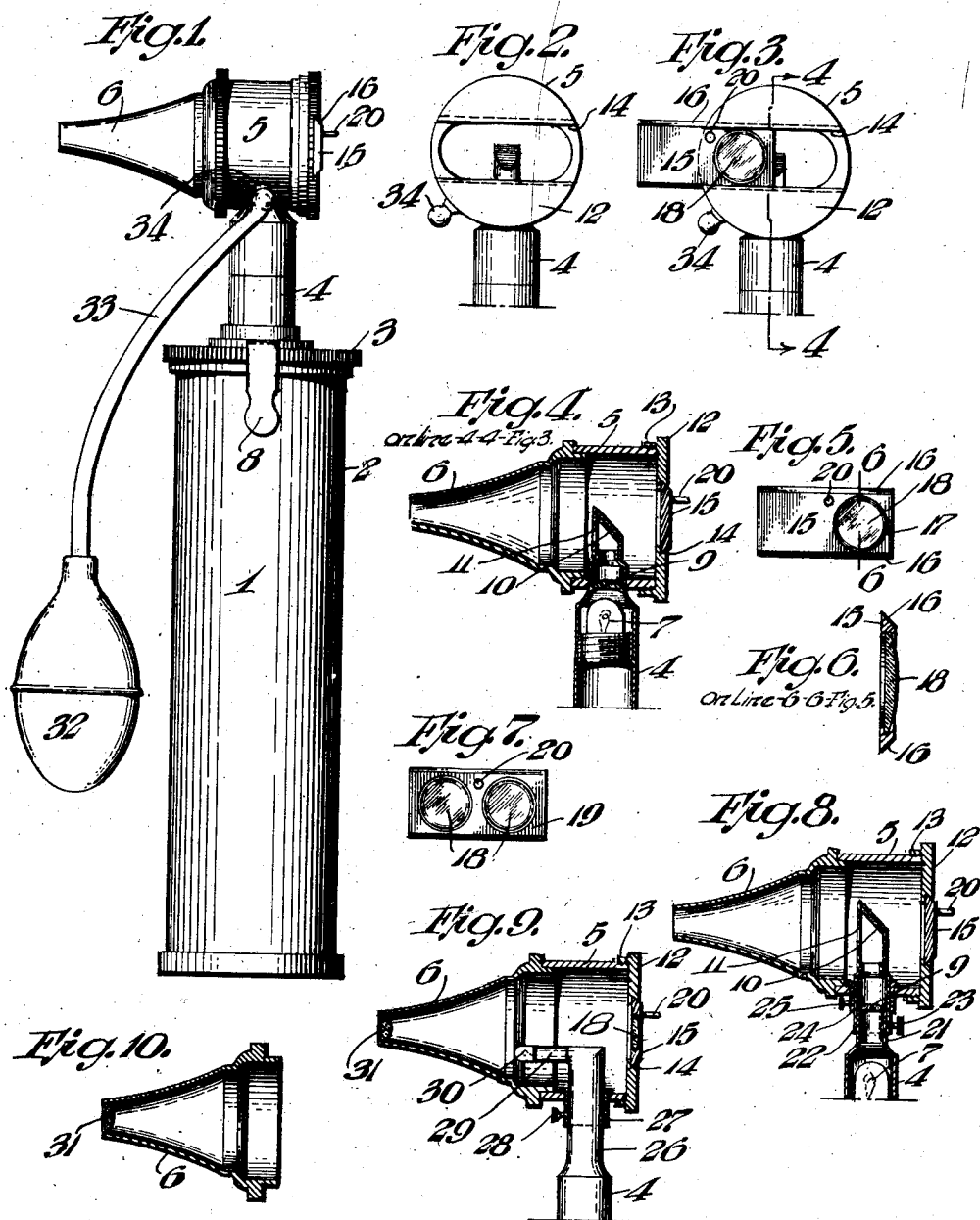
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OTOSCOPE

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OTOSCOPE.

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My invention relates to a new and useful otoscope, or other diagnostic instrument, by which the examination of the ear, or other part of the body, is greatly facilitated.

5 The use and value of instruments of this character has in the past been limited, to a great extent, by their failure to provide both a proper illumination and a sufficient magnification of the drum head of the ear, or
10 other object under examination. In my novel instrument all of these difficulties have been overcome.

One object of the invention is to provide an increased illumination, which is accomplished in part by the use of a suitable
15 condensing lens.

Another object of the invention is to provide a better adaptation of the illumination by adjustment of either the light source
20 or of the reflector or both.

Another object of the invention is to provide means for obtaining a much improved view of the drum head of the ear (or other object) when the instrument is either open
25 to the exit of air or closed as for aspirating.

A further object of my invention is to provide a greatly increased magnification of the object under examination, my novel
30 otoscope being essentially microscopic in character and yet simple enough in design and construction to permit of its being used in the same manner as an ordinary otoscope.

A further object of the invention is to bring into detailed view objects on the drum
35 head of the ear, or elsewhere, which are now invisible, this being the result of the improved illumination and the increased magnification of my instrument. Diseased or other conditions of the drum head may
40 be earlier recognized and more definitely diagnosed by my novel otoscope, and small bodies heretofore invisible may now be seen and removed from the ear.

A further object of the invention is to
45 provide a novel instrument, which is valuable also for locating foreign bodies in the eye by reason of a superior illumination and magnification, my novel instrument being also found to be most useful for examining other parts of the body.

To the above ends, my invention further consists, of the novel features of construction and advantage, hereinafter fully set forth and particularly pointed out in the
55 claims.

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

Figure 1, represents a side elevation of an otoscope, embodying one form of my
70 invention.

Figure 2, represents a front elevation of the otoscope head with the slide removed therefrom.

Figure 3, represents a front elevation similar to Figure 2, showing the slide in position.
75

Figure 4 represents a section on line 4—4, Figure 3.

Figure 5 represents a front elevation of the slide and its lens in detached position.
80

Figure 6 represents on an enlarged scale, a section on line 6—6, Figure 5.

Figure 7 represents a plan view of a modified form of slide provided with two lenses.

Figures 8 and 9 represent vertical sectional views of modifications of the otoscope head, speculum and their adjuncts.
85

Figure 10 represents a longitudinal sectional view of a speculum, showing a lens at the front of the smaller end thereof.
90

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—

1 designates my novel construction of otoscope, the same comprising a handle 2, 95 which serves as a container for a battery (not shown) which may be of any conventional or standard type, the top of said handle having the cover or cap 3 in engagement therewith, upon which is mounted the
100 tubular extension 4, upon which is supported the head 5 which is primarily of the form of an open ended cylinder, the front end having secured therein the speculum 6, said speculum being frictionally held in position, although it will be apparent that the
105 same may be screwed or otherwise secured within said head if desired.

Within the upper reduced portion of the tubular extension 4 is located a small in-
110

candescant electric lamp 7, the circuit controlling which, is opened or closed by the finger piece 8, and above the electric lamp 7 I locate the condensing lens 9 through which the rays of light pass upwardly and are deflected by the mirror or reflector 10 through a port 11 towards the small end of the speculum in parallelism with the axis thereof.

The rear of the cylinder or head 5 is closed by the cap or cover 12 which has an internally threaded flange 13 in engagement with said head. The cover 12 is provided with the transverse ways 14, in which is mounted the slide 15, the latter having the bevelled edges 16 conforming to said ways and being provided with an opening 17 in which is the magnifying lens 18.

It will be apparent that a single magnifying lens 18 may be employed, as seen in Figures 3 and 5, but if desired I may employ a slide 19, such as seen in Figure 7 which is provided with two magnifying lenses 18.

20 designates a finger piece whereby the slide is readily manipulated or manually reciprocated in its ways 14.

In the construction seen in Figure 8, I have shown the tubular extension 4 as provided in its upper portion with an electric light 7 of the character seen in Figure 4, and I have shown the upper end of said extension 4, as terminating in the reduced neck 21 in the upper portion of which is located the condensing lens 9 of the character already referred to in connection with Figure 4.

The extension 21 telescopes within the tubular member 22 and is held in adjusted position with respect thereto by the set screw 23. The tubular member 22 is telescopically mounted within the pendant sleeve 24 and is held in position by the set screw 25.

Above the condensing lens 9 is located a mirror 10 of the character already referred to which reflects the rays of light through the port 11, as already described with respect to Figure 4.

It will be seen that by loosening the screw 23 the position of the condensing lens 9 with respect to the mirror or reflector 10 can be adjusted, and by loosening the set screw 25 the mirror 10 can be adjusted vertically with respect to the longitudinal axis of the speculum.

In the construction seen in Figure 9 the tubular portion 4 is provided with an upward reduced extension 26 which passes through the pendant sleeve 27, which is provided with the set screw 28, the upper end of said extension 26 carrying the lamp base 29 provided with an electric light 30, so that it will be seen that by loosening said screw 28 the position of the source of the light 30 with respect to the longitudinal axis of the speculum 6 can be adjusted according to re-

quirements. In the construction seen in Figure 10, I have shown a speculum 6, as of the same general construction as the speculum seen in Figures 1, 4, 8 and 9 but provided with the magnifying lens 31 in its forward portion or at its smaller or introductory end.

In Figure 1, I have shown a pneumatic attachment comprising the compressible bulb 32 and tube 33 which at its upper end is adapted to engage the nipple 34, so that air can be introduced into the head 5 and speculum 6 when desired.

It will be seen from the foregoing description that my invention provides not only an adjustable illumination, but where the lamp is located outside of the body portion of the instrument, the condensing lens concentrates an unusual amount of light upon the reflector, thereby giving an increased illumination over prior devices.

It will also be seen that I have introduced novel means for greatly magnifying the ear drum by means of the strong lens located at the introductory end of the speculum 31. This lens also acts as a condensor and concentrates more light upon the object than it would receive otherwise.

It will be further noted that I have employed novel means for viewing the ear through the end cap at the operator's side of the instrument through the use of the enlarged opening, which may be closed through the adjustment of the slide 15.

This slide may carry but one lens 8 or two lenses 18, as seen in Figure 7, and by said means an unobstructed view of the drum of the ear may be obtained through the lens while instruments are introduced through the enlarged opening to one side thereof.

When the slide 19 is provided with the two lenses 18, the slide may be adjusted to either the right or left side of the instrument with like results in either case, so that the ear may be reached through the introduction of instruments through the enlarged opening.

In Figure 7, the lenses 18 may be of like or of different power, thereby giving the operator the advantage of additional depth of focus. In mounting the lens 18 in slidable fashion, the lens may be adjusted to any position within the elongated opening, thereby affording a lateral or a direct view through the speculum, the former position being desirable for operating and the latter for diagnosis.

In similar devices now in use, the magnifying lens is confined to the operator's end of the instrument, and, in consequence, a magnification of the ear drum or similar parts is limited to about two diameters. In my invention, wherein I employ a lens at the operator's end and another lens at the introductory end of the instrument, I am able to

obtain a greatly increased magnification, and in consequence, to see a great deal in the ear which has not heretofore been seen or been visible. This feature alone constitutes in practice a very notable advance in efficiency in devices of this character.

Through the adjustable features of my invention, the reflector 10 may be dropped down below the line of observation when an unobstructed view through the speculum is desired.

When the lamp 30 is used in lieu of the lamp 7, it likewise may be adjusted up or down, as will be understood from Figure 9, upon the loosening of the set screw 28.

The lens 31 may be used in an interchangeable speculum in combination with an instrument having a reflector 10 or one having the lamp 30, and in addition, the lens 31 may be made of any desirable size and utilized in specula of different calibre for use in adults' or children's ears with like efficiency.

It will now be apparent that I have invented a new and useful otoscope, 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 preferred embodiments thereof which will give in practice satisfactory and reliable results, it is to be understood that the same 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 Patent is:—

1. In a device of the character described, a handle, a tube extending from the handle, a casing on the tube having a speculum at one end and a cover plate at the other end, a bevelled slide way on the cover plate, a slide in the bevelled slide way having an opening aligned with the opening in the speculum, and a lens in the opening in the slide.

2. In a device of the character described, a casing forming a closed chamber having a sighting orifice in one end thereof, a tapered speculum with an observation opening secured to the other end and an illuminating opening in one side thereof, a lamp, a member having a light passage way extending from the lamp through the opening in the side of the casing, a slide bearing around said light passage way member where it enters the casing, and means for locking said light passage way member in the slide bearing to position it in desired relation to the opening in the tapered speculum.

3. In a device of the character described, a casing forming a closed chamber having a sighting orifice in one end thereof, a ta-

pered speculum having an observation opening secured to the other end and an illuminating opening in one side thereof, a lamp, a member having a light passage way extending from the lamp through the opening in the side of the casing and having a light transmitting opening, a reflector in said light passage way member adapted to reflect light through the opening therein, a slide bearing around said light passage way member where it enters the casing, and means for locking said light passage way member in the slide bearing to bring the opening in the light passage way in desired relation to the opening in the speculum.

4. In a device of the character described, a casing forming a closed chamber having a sighting orifice in one end thereof, a tapered speculum having an observation opening secured to the other end thereof, and an illuminating opening in one side thereof, a lamp, a member having a light passage way extending from the lamp through the opening in the side of the casing and provided with a light transmitting opening, a reflector in said light passage way member adapted to reflect light through the light transmitting opening, a lens in said light passage way member adapted to focus the light from the lamp on the reflector, a slide bearing around said light passage way member where it enters the casing, and means for locking said light passage way member in the slide bearing to bring the light transmitting opening in the light passage way in desired relation to the opening in the speculum.

5. In a device of the character described, a casing forming a closed chamber having a sighting orifice in one end thereof, a tapered speculum having an observation opening secured to the other end thereof, and an illuminating opening in one side thereof, a lamp, a member having a light passage way extending from the lamp through the opening in the side of the casing, a reflector in said light passage way adapted to reflect light through the opening in the speculum, a lens in said light passage way adapted to focus the light on the reflector, a slide bearing around said light passage way member where it enters the casing, means for locking said light passage way member in the slide bearing to bring the reflector in desired relation to the opening in the speculum, a second slide bearing, and means to adjust the lens in the second slide bearing to focus the light on the reflector.

6. In a device of the character described, a casing forming a closed chamber having a sighting orifice in one end thereof, a tapered speculum having an observation opening secured to the other end thereof, and an illuminating opening in one side thereof, a lamp, a member having a light passage way extending from the lamp, a lens in said

light passage way, a slide bearing around said light passage way, means for locking said light passage way in the slide bearing, a second slide bearing around the opening in the casing and around the first slide bearing, means to lock the first slide bearing in the second slide bearing, and a reflector aligned with said light passage way and adapted to reflect the light through the opening in the speculum, said reflector being adapted to be positioned with respect to the opening in the speculum by adjustment of the second slide bearing in the first, and the lens being adapted to be adjusted with respect to the reflector by movement of said light passage way member in the second slide bearing.

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