

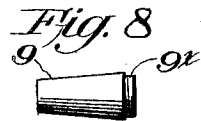
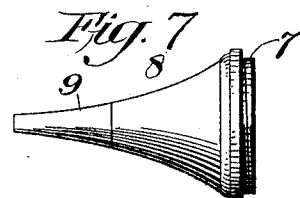
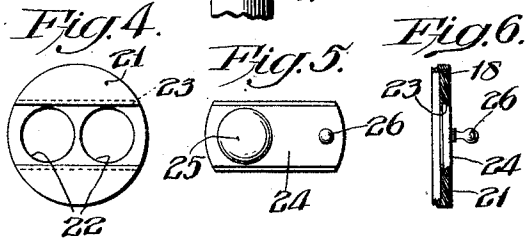
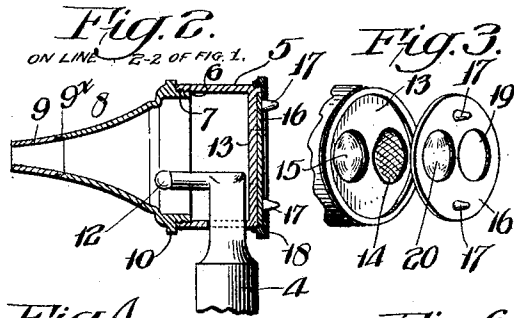
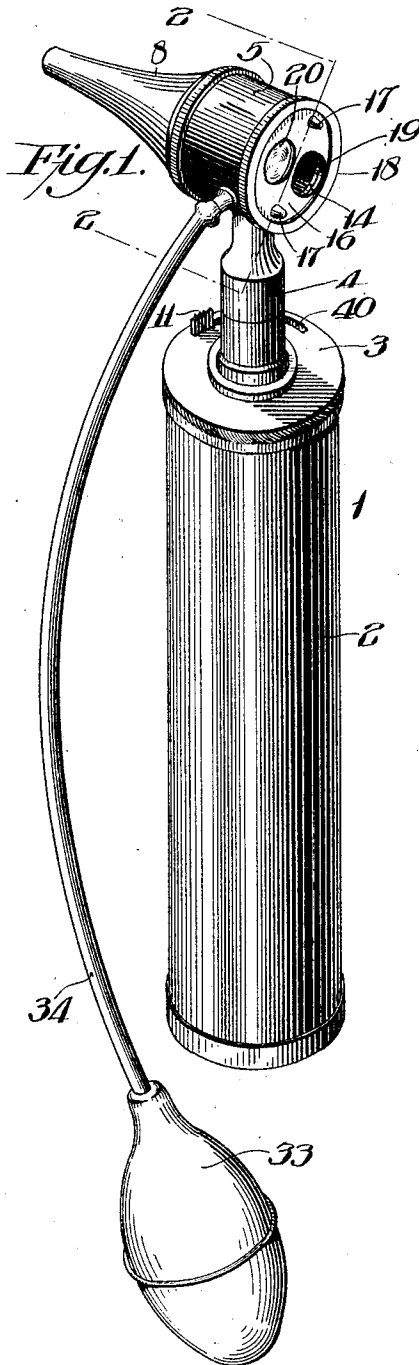
June 15, 1926.

H. L. DE ZENG

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OTOSCOPE

Filed June 17, 1922



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## UNITED STATES PATENT OFFICE.

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## OTOSCOPE.

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My invention consists of a novel otoscope for use in examining the external auditory canal and the drumhead of the ear, said otoscope having a magnifying lens and illuminating means for giving an enlarged and better illuminated picture of the visible portions of the ear. It further consists of a novel otoscope having detachable and interchangeable specula, also a pneumatic attachment for use in effecting certain diagnoses and for massaging the ear, also for aspirating the ear.

It further consists in an otoscope having the aforesaid advantages in addition to means for permitting the introduction of applicators or instruments through the otoscope to reach the ear, while the otoscope is in place, thus enabling the surgeon to treat the ear, operate upon the ear, aspirate the ear, make his diagnosis or massage the ear without removing the instrument from the ear, or making any changes in its component parts other than the adjustment of the head portion of the instrument and possible change of speculum.

To the above ends my invention relates more particularly to a novel form of end cap of the otoscope, or that portion nearest to the operator, wherein I provide an inner and an outer disc or shutter which are held in assembly by a threaded ring, the inner disc being stationary and the shutter being movable. Each of these discs has a plurality of openings with a lens mounted in one of the openings of each disc. When each of the discs has but two holes, as is the case in the preferred form of my invention, and as the discs are adjustable with respect to each other, a rotation of the outer disc or shutter to that position in which both lenses are in practical alignment, a clear and unobstructed view may be had through the lenses while free access may be had with instruments through the other aligning holes, as when treating or operating upon the ear. To close the otoscope against the escape of air, except through the speculum, when the pneumatic attachment is employed, the disc 16 is rotated to bring the lens 20 over the opening in the cap 13, which is not fitted with a lens.

My invention further relates to novel means for holding the speculum in secure relation with the body portion of the otoscope by means of threaded engagement of

said speculum with said body portion, so that said speculum may be quickly detached although firmly held when in operative position.

My invention further consists of a two part speculum wherein the introductory end of the speculum, known as the tip, is detachably connected. This novel feature permits the bell portion of the speculum to remain in assembled position with the otoscope proper, while one tip may be quickly replaced by one of different size when required, thereby effecting easy manipulations and extreme portability also. Then too, the tips may be highly finished internally for the better dissemination of the illuminating rays from the light source without back reflections to the eye of the observer. In addition the tips may be quickly and easily sterilized without detriment to the speculum which may now be internally treated down to the point of engagement of the tips, for the prevention of internal reflexes from the lamp.

The speculum being threadably connected with the otoscope in my invention, it does not become loosened, or, as is the case in many instances, become completely detached from the otoscope upon its introduction into the ear. All of the necessary force and oblique movements required to enter a small or irregular canal may now be safely employed without danger of disconnecting the speculum from the otoscope.

My invention further consists of other novel features of construction and advantage, as will be hereinafter described and pointed out in the claims.

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 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 of these instrumentalities as herein shown and described.

Figure 1 represents a perspective view of an otoscope, embodying my invention.

Figure 2 represents a section on line 2—2 of Figure 1.

Figure 3 represents a perspective view

of the stationary end disc of the otoscope and the movable shutter coacting therewith, the parts being shown in detached position.

5 Figure 4 represents an end view showing a modified form of end disc or shutter support.

Figure 5 represents a plan view of a sliding shutter coacting with the disc seen in 10 Figure 4.

Figure 6 represents a sectional view of the disc and shutter seen in Figures 4 and 5 in assembled position.

Figure 7 represents a side elevation of 15 a speculum in detached position.

Figure 8 represents a side elevation of a detachable tip for said speculum.

Similar numerals of reference indicate corresponding parts.

20 Referring to the drawings,

1 designates my novel construction of otoscope, the same comprising the handle 2 which serves as a container for a battery, not shown, of any conventional type or 25 standard type, the top of said handle having the cover or cap 3 in threaded engagement therewith upon which is mounted the tubular extension 4 upon which latter is supported the head 5 which is in the form of a 30 cylinder internally threaded at its front end, as at 6, to receive the externally threaded extension 7 of the speculum 8, which is provided with a body portion having a removable tip 9 and with the knurled flange 10, so 35 as to facilitate the engagement and disengagement of the speculum with the head 5. The cap 3 is provided with a slot 40 in its top through which passes the switch member 11, whereby the circuit is opened and closed 40 so as to illuminate the electric light 12 positioned within the speculum 8.

In the construction seen in Figure 2, the front end of the otoscope body 5 is shown as being closed by a disc 13 which is provided 45 with the diametrically opposite ports 14, one of said ports as the left hand one seen in Figure 3 being provided with the lens 15.

16 designates a rotatable shutter, which is in the form of a cap closure or disc rotatably 50 mounted against the disc or wall 13 and provided with the pins 17 to enable the shutter to be readily rotated, said shutter being held in assembled position by the flanged ring or annulus 18 which is in threaded engagement 55 with the exterior front end portion of the cylinder 5. The shutter 16 is provided with a pair of ports 19 of substantially the same size as the ports 14 and in one of the ports 19 is secured the lens 20, the construction being such that when the lenses 15 and 20 are 60 in alignment the opposite open ports are also in alignment.

In the construction seen in Figures 4, 5 and 6 I have shown the wall 21 which re- 65 places the wall 13 and the cover 16 of Fig-

ures 2 and 3 at the front of the body 5 as provided with the ports 22 and the parallel ways 23 which are engaged by a laterally movable shutter 24 having a lens 25 therein, said lens being of the same character as the 70 lens seen in Figures 1 and 3.

26 designates a handle of the laterally movable shutter 24 whereby the latter can be readily actuated according to requirements.

In Figures 7 and 8, I have shown in de- 75 tached position the speculum 8 as being provided with the detachable tip 9, which is shown in detail in Figure 8, and is provided with the threaded portion 9\* so that different sized tips can be readily engaged with a 80 speculum body of one standard size.

It will be understood from the foregoing that I provide two openings 19 in the outer rotatable member or shutter 16 and also in 85 the stationary underlying member 13 of the head 5 of the otoscope, and I mount a lens in one of the openings in each member. With the lens 15 mounted in the left hand opening of the under member 13 and the lens 20 in the adjustable shutter member 16 90 positioned in register therewith, an enlarged view of the ear may be had through the left hand opening, while instruments may be introduced through the aligning openings in 95 both the stationary member and the rotatable member, which are then likewise in register on the right hand side, for treating or operating upon the ear. To close the otoscope against the escape of air when employing the pneumatic attachment comprising the 100 compressible bulb 33 and the tube 34, the lens in the shutter is turned to the opposite position wherein all openings in the head are closed and no air can escape.

It will be noticed that in this preferred 105 form of otoscope embodying my invention, the openings in the head are very close together, which novel arrangement admits of both a full view through the speculum and full operative or treatment range likewise 110 through the speculum, since in both instances, the lines of observation and application are closely aligned with the axis of the speculum.

It will further be apparent that I employ 115 a novel means for holding the rotatable shutter 16 in assembly, the support for same in my invention being at the outer periphery and not at the center as in other forms of otoscopes, and that by reason of this novel 120 arrangement I am enabled to bring the inner margins of the visual and operating holes in the head of the otoscope into the closest proximity. This arrangement also provides an opportunity of making both holes of 125 maximum size, thereby giving greater lateral range of both observation and operating than in any other similar form of otoscope.

While I have shown my otoscope in its preferred form, nevertheless the lens in the 130

inner or stationary member of the head may be mounted in the hole to the right hand for the admission of a treatment instrument through the left hand opening and other changes and alterations may be made within the scope of the claims without departing from the spirit of my invention.

In addition to the many advantages contained in my invention as already enumerated, it offers extreme portability by reason of the employment of but one major speculum 8 having the interchangeable tips 9 whereas in all other otoscopes the required sizes of specula can be obtained only in a complete speculum for each size. By this arrangement, it is possible to construct a complete otoscope which will require much less space in the surgeon's kit than would otherwise be possible. The surgeon is also, by reason of my improvement, enabled to make rapid changes in the speculum sizes and to quickly sterilize the parts actually introduced into the ear. He is also enabled to see a great deal more by reason of the better dissemination of the light from the highly polished walls of the detachable tips and this is particularly true of all objects lying to that side of the speculum corresponding with the position of the lamp, or reflector (as the case may be) with respect to the opening in the speculum which, of necessity, is placed lateral to the axis of the speculum or line of direct observation. A lamp being located to one side of the axis of a speculum, the light proceeds from said lamp to that side of the speculum or speculum tube opposite from the lamp. From there it is reflected back to the same side as that on which the lamp is located, hence the side corresponding with the position of the lamp or reflector will have increased illumination.

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

1. In an instrument of the character described, a handle, a source of light, a casing, a speculum at one end of the casing and an end cap at the other end, the end cap having a plurality of openings and an adjustable member also having a plurality of openings, the adjustable member being retained in assembly by peripheral anchorage and a lens mounted in one of the openings of the end cap.

2. In an instrument of the character described, a handle, a source of light, a casing, a speculum at one end of the casing and an end cap at the other end, the end cap having a plurality of openings and an adjustable member also having a plurality of openings and a lens mounted in one of the openings of both the end cap and the rotatable member.

3. In an instrument of the character described, a handle, a source of light, a casing, a speculum at one end of the casing and an end cap at the other end, having a lens and an opening and a cover over the cap having a lens, and means for aligning the lens in the cover with the lens in the cap, or with the opening, as desired.

4. In an instrument of the character described, a handle, a source of light, a casing, a speculum at one end of the casing and a cap at the other end having a lens and an opening diametrically arranged, a cover over the cap having a lens and an opening diametrically arranged, and peripheral means for securing the cover whereby it may be rotated to bring the lens in the cover in alignment with the lens in the cap or with the opening in the cap, as desired.

HENRY L. DE ZENG.