No. 875,795. PATENTED JAN. 7, 1908.

D. O. FOSGATE.

STETHOSCOPE.

APPLICATION FILED SEPT. 28, 1907.

Fig. 2.

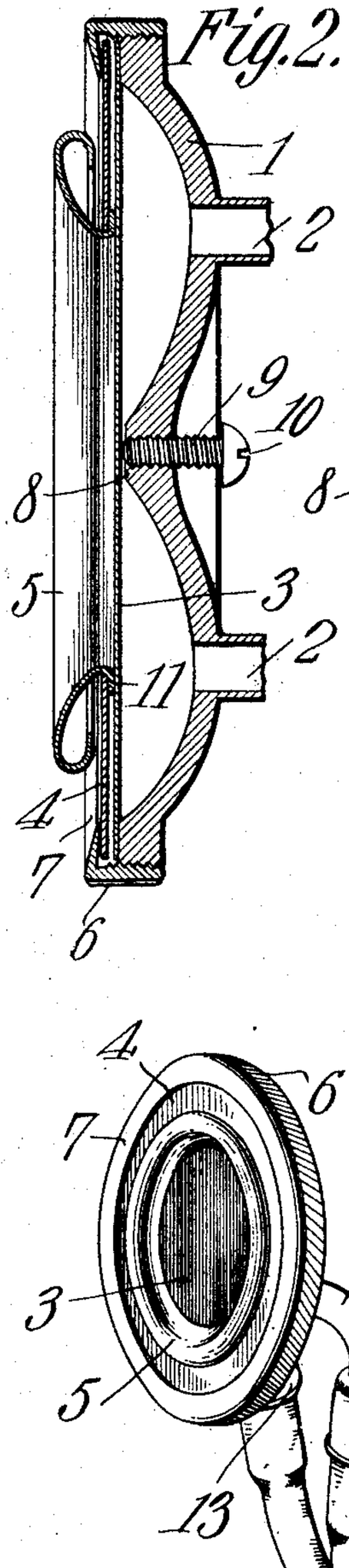

Fig. 3.

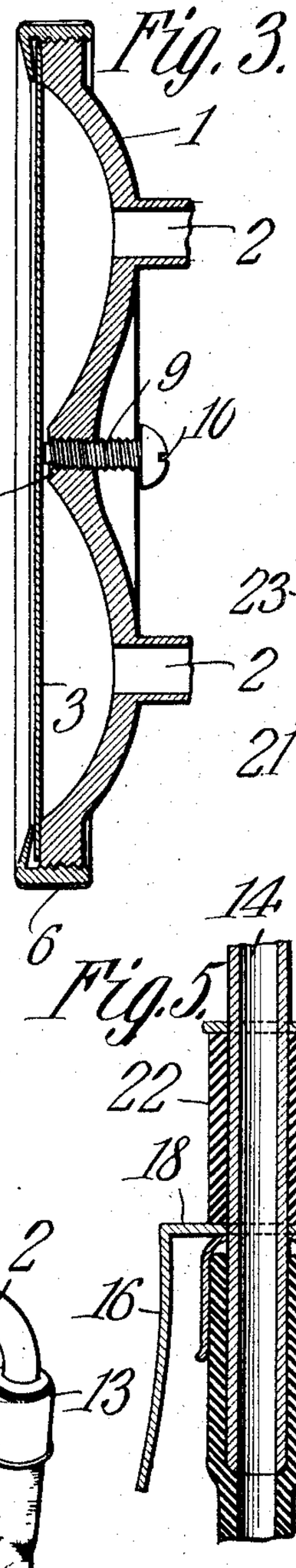

Fig. 1.

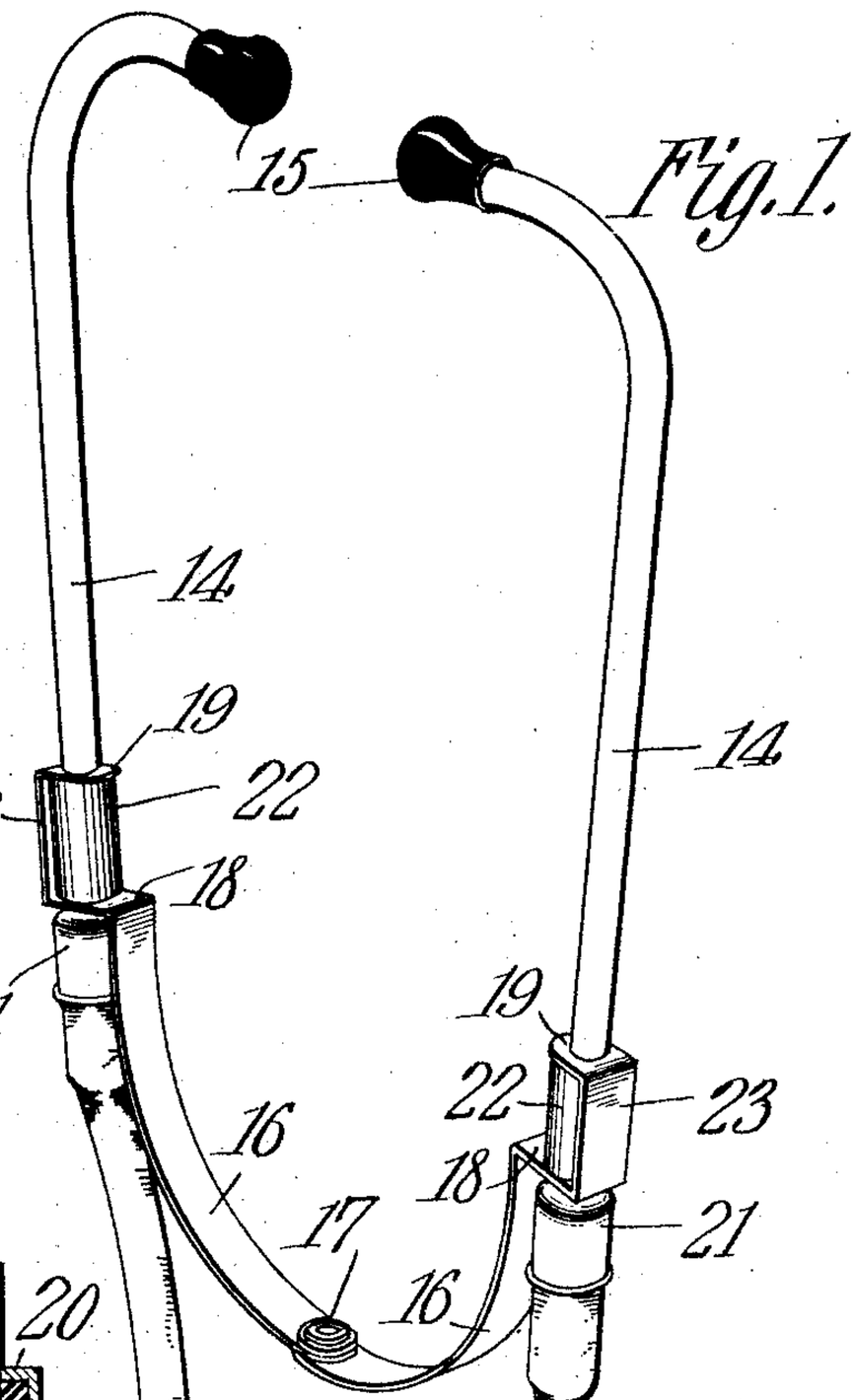

Fig. 5.

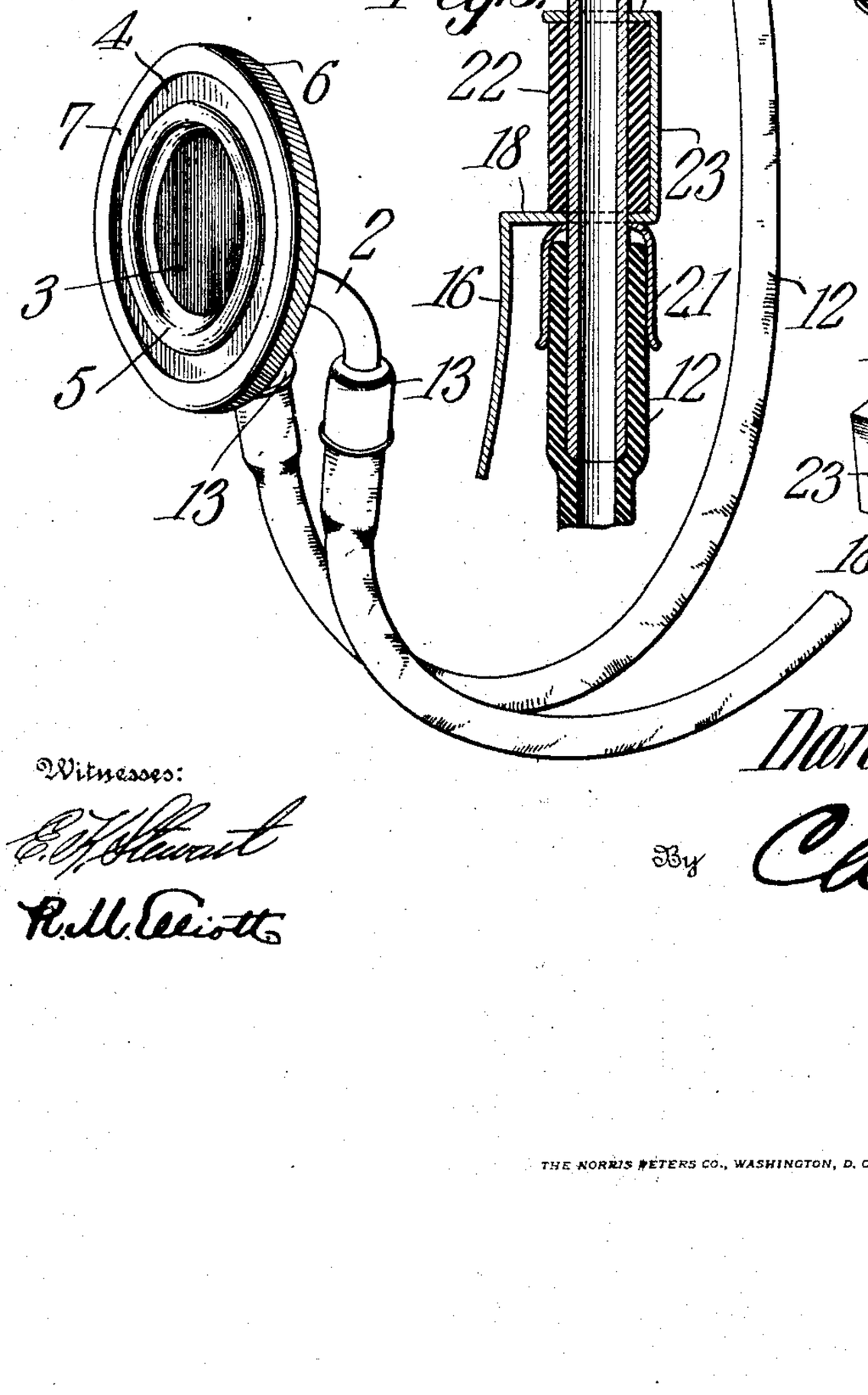

Fig. 4.

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STETHOSCOPE.

No. 875,795. Specification of Letters Patent. Patented Jan. 7, 1908.

Application filed September 28, 1907. Serial No. 394,998.

To all whom it may concern:

Be it known that I, DANIEL O. FOSGATE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Stethoscope, of which the following is a specification.

This invention relates to stethoscopes.

One object of the invention is to improve the sound transmitter in such manner as to make it possible, in a simple and delicate way, to lessen the vibrations of the diaphragm for the purpose of rendering the heart's sounds less audible, whereby to facilitate the making of minute examinations of the lungs, by causing presystolic murmurs, or defects or obstructions in the air cells in the lungs, distinctly to be heard.

A further object is to improve the construction of the transmitter in such manner as, by a slight change in certain of its parts to render it equally well adapted for making minute examinations of the heart as well as of the lungs.

A further object is to improve the construction of the ear tips clamp in such manner as to permit of its members or arms being folded upon themselves, or nested, thus to render the instrument more compact in form, and to adapt it to be carried by the physician in his hip or side pocket.

A final object is to improve the manner of connecting the ear tips clamp with the ear tubes, whereby the use of rivets or solder for the purpose will be dispensed with, and the ear tubes will be held for free adjustments to cause the ear tips properly to seat themselves in the ears of the user.

The object first stated is secured by providing the sound transmitter with inner and outer diaphragms, and with means for modifying the vibrations of one of the diaphragms. The means for securing the latter function consists of a screw that is arranged at the center of the transmitter and is designed to be turned into light or delicate engagement with the inner diaphragm which is co-extensive in diameter with the transmitter body, and is thus delicately responsive to the action of sound waves. The outer transmitter is an annulus, and has assembled with it an ear piece that has its inner end flanged against the inner side of the annulus and bears upon the inner diaphragm. By this arrangement, not only are the vibrations of the main or inner diaphragm checked or modified as desired, but by the employment of the supplemental or outer diaphragm and its attached ear piece, the sound transmitted through the ear tubes will be concentrated, so that any defects or obstructions in the air cells of the lungs will be distinctly heard, as well as any presystolic murmurs.

The object second stated is secured by detachably assembling the outer or ear piece carrying diaphragm with the transmitter body, so that when examinations of the heart are to be made, this diaphragm is removed, and the means for retaining it in position is employed for holding the main diaphragm assembld with the transmitter body. Under these conditions a larger surface is presented to receive sound waves, and the actions of the heart can thus be readily determined.

The object third stated is secured by constructing the ear-tips clamp in two parts and connecting them by a rivet in such manner that the two members may be closed over each other and be nested, thereby decreasing the width of the instrument at its ear-tips carrying end by one-half.

The object fourth stated is secured by providing the free terminal of each of the members of the ear-tips clamp with a three-armed keeper, two arms of each of which are orificed to receive an ear tube, and the third arm being arranged to engage with a brake, in the form of a cylinder of rubber, that is positioned between orificed arms and receives the ear tube. To the terminals of the ear tubes projecting beyond the keepers are secured the transmitter tubes, these being held in place upon the ear tubes by frictional engagement therewith. By the employment of the brakes, the ear-tips are held at the proper adjustment to cause them properly to seat themselves in the ears of the user.

Further and more specific features of novelty will hereinafter be described, and the particular points of novelty set forth in the claims.

In the accompanying drawings, forming a part of the specification, and in which like characters of reference indicate corresponding parts:—Figure 1 is a view in perspective, partly broken away, of a stethoscope constructed in accordance with the present invention. Fig. 2 is a vertical longitudinal section through the transmitter, showing the arrangement of parts thereof when making

examinations of the lungs. Fig. 3 is a similar view showing the arrangement of parts when making examinations of the heart. Fig. 4 is a perspective detail view of the ear tips clamp. Fig. 5 is a sectional detail view on an enlarged scale, through a portion of the ear clips clamp, one of the ear tubes, one of the brakes, and one of the transmitter tubes.

The transmitter embodies a body 1 provided at its rear with two curved tubular transmitter extensions 2, a main diaphragm 3, a supplemental diaphragm 4, and an ear piece 5 carried by the last named diaphragm. The transmitter body is circular in form and has its periphery threaded to be engaged by a collar 6 having a flange 7 that is designed to bear upon either of the diaphragms 3 or 4 to hold one, or both of them assembled with the body, the former arrangement being shown in Fig. 3 and the latter arrangement in Fig. 2.

The body is dished, and at its center is a stud or projection 8 having a threaded orifice to receive a screw 9 which is adapted to be turned into engagement with the inner face of the diaphragm 3 to lessen its vibrations for the purpose of rendering the heart's sounds less audible, thus to facilitate the making of minute examinations of the lungs by causing presystolic murmurs, or defects or obstructions in the air cells of the lungs distinctly to be heard. The inner end of the screw 9 that contacts with the diaphragm 3 may be either flat as shown or pointed, and the screw is adjusted by providing its outer end with a nick 10 to be engaged by a screw driver or any appropriate implement.

Where the lungs are to be examined, the screw will be turned into light engagement with the diaphragm 3, and the supplemental diaphragm will be employed as shown in Fig. 2. This latter diaphragm is in the form of an annulus, and through its opening the ear piece 5 extends, the inner end of which is bent to form a flange 11 that holds the ear piece assembled with the diaphragm, and also bears against the diaphragm 3 and transmits the vibrations of the latter to the diaphragm 4.

When the instrument is to be used for examining the heart, the supplemental diaphragm is removed, and only the main diaphragm 3 is employed, as shown in Fig. 3, the screw 9 being moved out from engagement with the diaphragm under these conditions.

Connected with the transmitter extensions 2 are rubber transmitter tubes 12, which are held in engagement with the extensions by frictional contact therewith, sleeves 13 being provided to reinforce the ends of the tubes 12, and also to impart a finished appearance to the instrument.

The free ends of the transmitter tubes are secured to the ear tubes 14, which, as usual, are of metal, are curved at their upper ends, and carry at their free terminals rubber ear tips 15. The ear tips are held properly seated in the ears of the user by a novel form of novel tips clamp shown in detail in Fig. 4. This clamp comprises two curved resilient members or arms 16, the inner ends of which are connected for pivotal movements by a rivet 17 of any preferred construction. The outer ends of the arms 16 carry three-armed keepers, of which two of the arms 18 and 19 are provided with orifices 20 to receive the ear tubes 14, which latter project any preferred distance beyond the arms 18 and are held frictionally combined with the transmitter tubes, sleeves 21 carried by the latter tubes serving to reinforce the ends that engage with the ear tubes.

Mounted upon the ear tubes between the arms 18 and 19 are brake members 22, in the nature of rubber cylinders that are of a diameter sufficient to bear against the third arms 23 of the keepers, and thus hold the ear tips at the proper positions to cause them to seat themselves within the ears of the user, the ear tips clamp operating to retain the tips *in situ*. These brakes are of importance in as much as by their employment an easier adjustment of the ear tubes can be effected than with the ordinary forms of ear tips clamps in common use.

From the foregoing description the manner of operation of the instrument will be readily understood, it being seen from the above explanation that all the objects stated are secured in a practical and scientific manner. Furthermore, by the double adjustment or arrangement of the transmitter, the range of usefulness of the instrument is enhanced, and its application to various uses is secured. The improved ear tip clamp is also of importance inasmuch as it will permit the instrument to be folded to one-half its width when in use, thereby to adapt it to be carried in the pocket of the physician.

Having thus described the invention what is claimed is:—

1. In a stethoscope, the combination with a transmitter embodying a main diaphragm, of a supplemental diaphragm including an ear piece having a flange to bear against the main diaphragm, and means for holding the diaphragms assembled with the transmitter body.

2. In a stethoscope, the combination with a transmitter body having a threaded periphery, and a main diaphragm, of a supplemental diaphragm having a threaded collar to engage with the body, and an ear piece having a flange to bear against the main diaphragm.

3. In a stethoscope, the combination with

a transmitter embodying a main diaphragm, and means for modifying the vibrations thereof, of a supplemental diaphragm, embodying an ear piece having a flange to bear against the main diaphragm, and means for holding the diaphragms assembled with the transmitter body.

4. In a stethoscope, the combination with a transmitter embodying a main diaphragm and means for modifying the vibrations thereof, of a supplemental diaphragm embodying an ear piece, means for transmitting the vibrations of the main diaphragm to the supplemental diaphragm, and means for holding the two diaphragms detachably assembled with the diaphragm body.

5. In a stethoscope, the combination with the ear tubes, of a flexible clamp therefor, and brake members carried by the tubes and coacting with the clamp.

6. In a stethoscope, the combination with ear tubes, of a two-part flexible clamp, orificed keepers carried by the clamp members through which the tubes project, and brake members carried by the tubes and coacting with the keepers.

7. In a stethoscope, the combination with the ear-tubes, of an ear tip clamp having terminal three-armed keepers, two arms of each of which are orificed to receive the tubes, and brake-members disposed upon the tubes between said arms and bearing against the third arms of the keepers.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

DANIEL O. FOSGATE.

Witnesses:
F. J. SWANSE,
J. B. FULTON.