Oct. 24, 1933. C. J. PILLING ET AL 1,932,227

STETHOSCOPE

Filed April 11, 1933

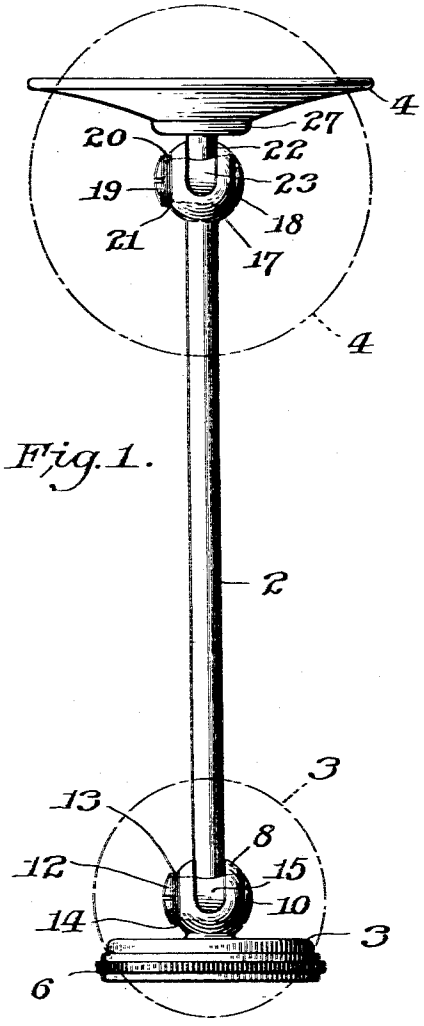


Fig. 1.

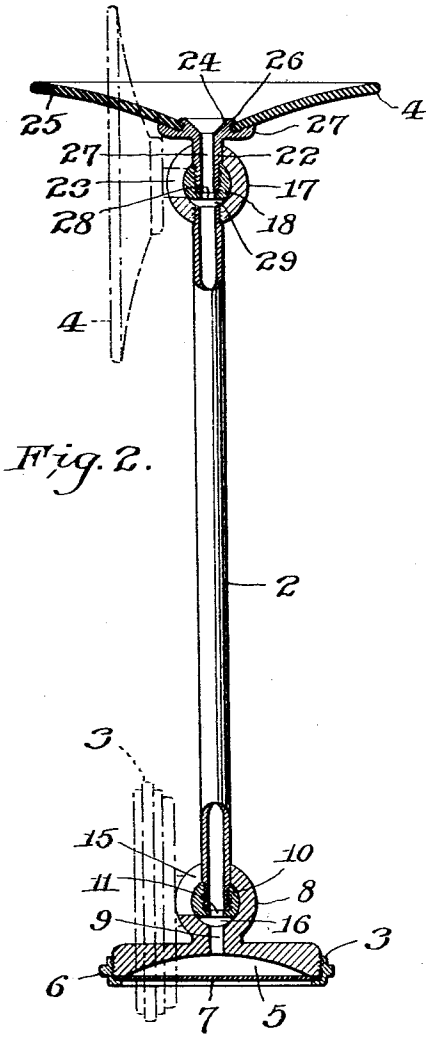


Fig. 2.

Fig. 3.

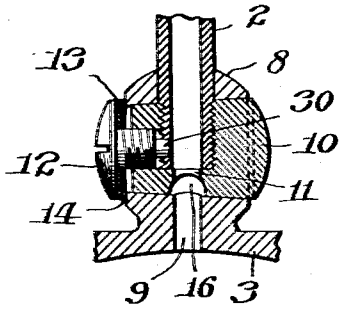


Fig. 4.

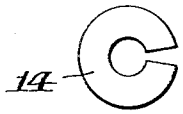
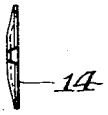


Fig. 5.



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Patented Oct. 24, 1933 1,932,227

UNITED STATES PATENT OFFICE

1,932,227

STETHOSCOPE

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Application April 11, 1933. Serial No. 665,518

6 Claims. (Cl. 181—24)

This invention relates to improvements in stethoscopes of the general type wherein a rigid tube is provided having at one end thereof a head or body piece for collecting and transmitting sounds, and having, at the other end thereof, a head or ear piece for application to a physician's ear for receiving sounds transmitted from the body piece through the tube to and through the receiving head or ear piece.

The invention aims to improve stethoscopes of this type by providing a novel, simple and efficient construction and arrangement of parts whereby the body piece and the ear piece may be adjusted to different positions with respect to the tube and to each other for the more convenient application of the parts to the body of the patient and to the ear of the physician, and whereby the body piece and ear piece may be folded into close relation to one side of the tube and into or near edgewise alinement to flatten the instrument to permit it easily to be carried in the vest or other pocket of the physician.

The invention resides in the novel construction, combination and arrangement of parts hereinafter described and claimed.

In the accompanying drawing, illustrating the invention,

Figure 1 is a side view of a stethoscope embodying our invention, showing the parts in the open position for use, by full lines, and showing the body piece and ear piece in the folded position, by dot-and-dash lines.

Figure 2 is a longitudinal section thereof, showing by dot-and-dash lines the body piece and the ear piece, folded substantially into edgewise alinement adjacent to one side of the tube for flattening the instrument.

Figure 3 is a sectional view, enlarged, showing the connection between the body piece and the tube.

Figure 4 is a front view of the spring washer.

Figure 5 is an edge view of the spring washer.

Referring to the drawing, 2 designates a straight, rigid tube, 3 a head at one end thereof constituting the body piece of the instrument, and 4 a head at the other end thereof constituting the ear piece of the instrument.

The head or body piece 3 is made round and flat and of disc-like formation, having a shallow, tapered sound collecting and transmitting chamber 5 formed therein. Screwed onto the body of the head 3 is an annulus 6 surrounding a sound transmitting diaphragm 7 which closes the outer side of the chamber 5. The diaphragm 7 is held in place by and between an inturned annular flange on the annulus 6 and the adjacent annular edge portion of the body of the head 3. This annulus is adapted to make contact in the usual manner with the body of the person or patient on whom the instrument is used.

Formed on or suitably secured to the central portion of the inner side of the body of the head 3 is an outer member 8 which projects axially from the head, and extending through the inner wall of the head 3 and the adjacent portion of the member 8 is an axial sound passage 9 which opens into the chamber 5.

The member 8 has a tapered bore which extends therethrough at right angles to the axis of the head 3, the bore 9 and the tube 2, and located within this bore and fitted thereto for partial rotation therein is an inner tapered member 10 which is carried by the adjacent end of the tube 2. The tube 2 is threaded and screwed into the member 10, and the member 10 has a sound passage 11 extending therethrough at right angles to its axis and in alinement with and forming a continuation of the opening in the tube 2.

The inner member 10 is retained within the outer member 8 by a screw 12 which is screwed into the small end of the member 10, and by washers 13 and 14 interposed between a head on the screw and the adjacent side of the outer member 8. The washer 14 is a split spring washer constructed to press against the member 8 in opposition to the head of the screw 12 and thereby yieldably retain the tapered member 10 in close working engagement with the wall of the tapered bore in the member, and thus provide sufficient friction to hold the members 8 and 10 in place against accidental displacement from different positions of adjustment about the axis of the inner member 10.

The outer member 8 is provided with a slot 15 through which the tube 2 extends, and the end walls of the slot form stops constructed to engage the tube to limit the turning movement of the member 10 within the member 8, one end of the slot 15 being engaged by the tube 2, when the head or body piece 3 is adjusted or turned on the axis of the member to a position in which the head is in axial alinement with the tube 2, as shown by full lines in Fig. 2, and the other end of the slot 15 being engaged by the tube 2, when the head or body piece is adjusted or turned to a position in which the axis of the head extends at right angles to the axis of the tube 2, as shown by dot-and-dash lines in Fig. 2.

The sound passage 11 within the inner mem-

ber 10 has a lateral extension 16 which causes it to be in communication with the axial passage 9 in the head 3 when the head is in and near the position in which it is axially alined with the tube 2, the extension 16 permitting the head to be adjusted some distance from the full line position toward the dot-and-dash line position without breaking communication between the tube and the head.

The end of the tube 2 adjacent to the head or ear piece 4 has an outer member 17 secured thereon which is constructed like the member 8 and which has a sound passage therein forming a continuation of the passage in the tube 2. The member 17 has a tapered, inner member 18 fitted to a correspondingly tapered bore in the member 17 for partial rotation therein, the member 18 being constructed like the member 10. The member 18 bears the same relation to the member 17 as the member 10 bears to the member 8, and the member 18 is held in place within the member 17 by a screw 19 and washers 20 and 21 which correspond with the screw 12 and washers 13 and 14, respectively, which hold the member 10 in place.

Screwed into the inner member 18 is one end portion of a short tube 22 which extends from the member 18 at right angles to the axis thereof and which extends out through a slot 23 in the outer member 17. The outer end of the tube 22 carries the head or ear piece 4 which is set in axial alinement therewith. The head 4 comprises a round, shallow, tapered and flared body member 25 preferably formed of hard rubber, and a central, metallic connecting part 24 which is formed on or suitably secured to the outer end of the tube 22. The connecting part 24 extends through a central opening in body member 25, and the member 25 is secured thereto between the large flange-like body 27 of the part 24 which engages the outer surface of the member 25, and a small outwardly turned flange 26 which engages the inner surface of the member 25. The interior of the shallow head 4 provides a sound collecting and transmitting chamber and the flared form of the hard rubber body member 25 provides an ear piece which will fit closely over any desired portion of the ear of the user of the instrument.

The connecting part 24 has an axial passage 27 therein which opens into the ear piece 4 and forms a continuation of one end of the passage in the tube 2, and the member 18 has a passage 28 therein which forms a continuation of the other end of the tube 22 and which is alined with the tube 2 and forms a continuation of the passage therein when the head or ear piece 4 is in alinement with the tube 2, as shown by full lines in Fig. 2.

The short tube 22 extends through the slot 23 in the member 17 similarly to the extension of the tube 2 through the slot 15 in the member 8, and the head or ear piece 4 is adapted to be adjusted on the turning axis of the member 18 from the position shown by full lines in Fig. 2 to the position shown by dot-and-dash lines therein and back again. When the ear piece 4 is moved to the full line position, the tube 22 engages one end of the slot 23 and stops further movement thereof, and when the ear piece is moved to the dot-and-dash line position, the tube 22 engages the other end of the slot 23 and stops further movement thereof.

The end of the sound passage 28 in the member 18 adjacent to the tube 2 has a lateral extension 29 by means of which it is in communication with the tube 2 when the ear piece 4 is in and near the full line position shown in Fig. 2. The relationship of the passages is such as to permit the ear piece to be adjusted some distance from the full line position toward the dot-and-dash line position without breaking communication between the tube 2 and the ear piece 4.

It will be observed that the turning axis of the two inner members 10 and 18 are in parallel relation. This relationship causes the relatively flat heads 3 and 4, forming the body piece and ear piece, respectively, to be moved toward and from the same side of the tube 2 when they are adjusted.

The inner end of the screw 12 has a central projection 30 which enters a hole in one side of the tube 2 and thus prevents the unscrewing of the tube from the member 10. This construction permits the tube 2 easily to be removed from the member 10 after the screw 12 has been loosened, and it prevents the accidental turning of the member 8 on the axis of the tube and thereby preserves the parallel relationship of the axes of the members 10 and 18 when the parts are assembled.

It will now be understood that, when the stethoscope is in use, the body piece 3 and ear piece 4 may be adjusted to the complete open position, as shown by full lines in Figs. 1 and 2, in which a continuous sound passage is provided between the interiors of two heads or pieces 3 and 4; and it will also be understood that either the body piece 3 or the ear piece 4, or both, may be adjusted to extend at an angle or angles with relation to the tube 2 within the limits allowed by the lateral extensions 16 and 29 of the sound passages without breaking the continuous sound passage between the two heads or pieces 3 and 4. The lateral extensions 16 and 29 of the sound passages permit a range of adjustment of either or both of the two heads or pieces 3 and 4 to or within an angle of about thirty degrees to the axis of the tube 2 without breaking the continuity of the sound passage. Thus it will be seen that the heads 3 and 4 may be set in different positions relatively to each other and to the tube 2 for the convenient application of the instrument to various parts of the body of the patient and to the ear of the examining physician, permitting the easy application of the instrument to the patient in different positions, and permitting the face of the physician to be directed away from the patient during the examination.

Also, it will be understood that the body and ear pieces 3 and 4, respectively, may be folded down into close relationship with one side of the connecting tube to flatten the entire instrument and thereby permit it to be carried in the physician's vest or other pocket with ease and comfort when it is not in use.

The frictional engagement of the inner members 10 and 18 with their outer members 8 and 17, respectively, caused by the action of the spring washers 14 and 20, not only holds the body and ear pieces firmly in the positions to which they are adjusted but it also holds the parts in firm contact for the elimination of foreign noises when the instrument is in use.

We claim:

1. In a stethoscope and in combination, a head having a sound collecting chamber therein and having a central sound passage opening into the

chamber and extending axially therefrom, a rigid sound conducting tube pivotally connected to said head on an axis which extends at right angles to its axis and to the axis of said passage, said head and said tube being relatively adjustable on said pivot to and from a position in which the head, its passage and the tube are in axial alinement, and said tube being in communication with said passage when the head and the tube are in and near said position.

2. In a stethoscope and in combination, a head having a sound collecting chamber therein and having a connecting member projecting therefrom and having a central sound passage opening into the chamber and extending axially therefrom, and a rigid sound conducting tube having a connecting member on one end portion thereof, one of said members being pivotally mounted within the other of said members to turn on an axis which extends at right angles to the axes of said tube and said passage, and said head and said tube being relatively adjustable on said pivot from one to the other of a position in which said tube is substantially in axial alinement with said head and a position in which said tube extends substantially at right angles to the axis of said head, said tube being in communication with said passage when the tube is in and near its position in axial alinement with the head.

3. In a stethoscope and in combination, a rigid sound conducting tube, a head pivotally mounted on one end portion of said tube and provided with a sound collecting chamber and having a central sound passage opening into the chamber and extending axially therefrom, and a second head pivotally mounted on the other end portion of said tube and provided with a sound collecting chamber and having a central sound passage opening into the chamber and extending axially therefrom, each of said heads being adjustable on its pivot relatively to the tube to and from a position in axial alinement therewith and having its sound passage in communication with the tube when in and near said position.

4. In a stethoscope and in combination, a rigid sound conducting tube, a head pivotally mounted on one end portion of said tube and provided with a sound collecting chamber and having a central sound passage opening into the chamber and extending axially therefrom, and a second head pivotally mounted on the other end portion of said tube and provided with a sound collecting chamber and having a central sound passage opening into the chamber and extending axially therefrom, the axes of said pivots being in parallel relation and extending at right angles to the axis of the tube, and each of said heads being adjustable on its pivot relatively to the tube and toward the same side thereof from a position in which its axis is alined with the tube to a position in which its axis extends substantially at right angles to the tube, and the passages of said heads being in communication with the tube when the head is at and near the position in which its axis is alined with the tube.

5. In a stethoscope and in combination, an outer member and an inner member fitted for partial rotation in the outer member for relative adjustment of the members on the turning axis of the inner member, the inner member having a tubular extension and a straight sound passage extending through the member and its extension on an axis at right angles to its turning axis, and the outer member having a sound passage adapted to be moved into and out of alinement with the passage in the inner member when the members are relatively adjusted.

6. In a stethoscope and in combination, an outer member, an inner member fitted for partial rotation in the outer member for relative adjustment of the members on the turning axis of the inner member, the inner member having a tubular extension and a straight sound passage extending through the member and its extension on an axis at right angles to its turning axis, and the outer member having a sound passage adapted to be moved into and out of alinement with the passage in the inner member when the members are relatively adjusted, and friction producing means for retaining the members in relative position of adjustment.

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