Sept. 27, 1966 I. A. SPEELMAN 3,275,099

STETHOSCOPE EAR TUBE MOUNTING

Filed Oct. 22, 1965

FIG. 1

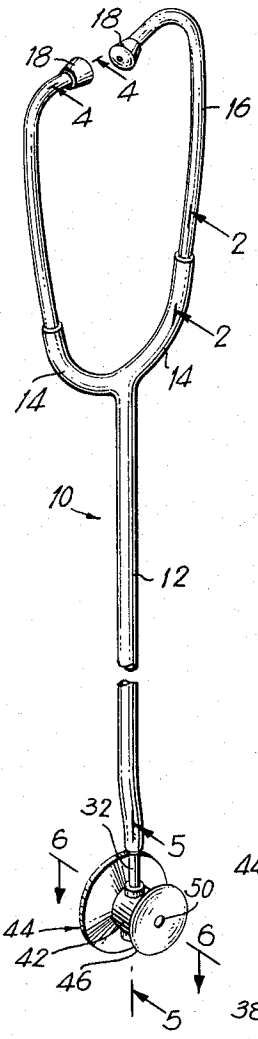


FIG. 2

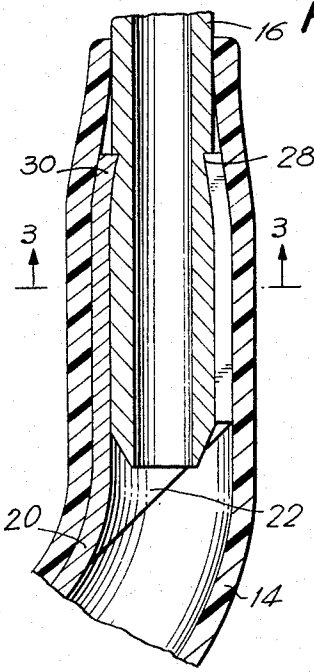


FIG. 3

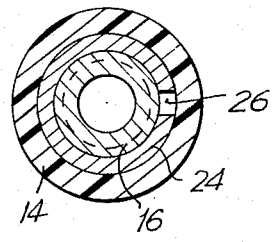


FIG. 4

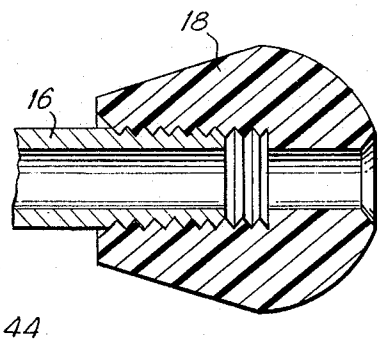
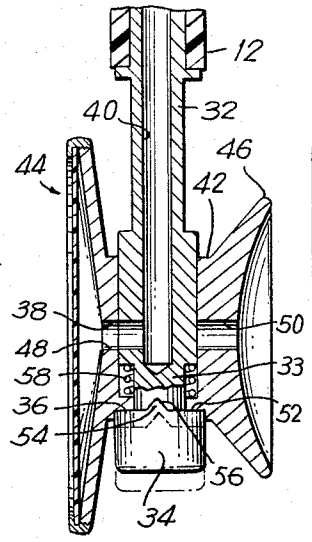


FIG. 5



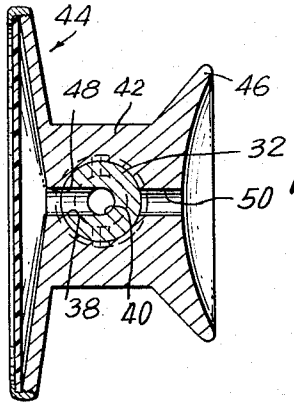


FIG. 6

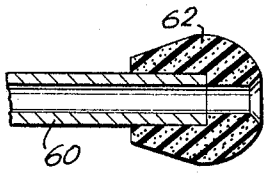


FIG. 7

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STETHOSCOPE EAR TUBE MOUNTING

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The present invention relates to stethoscopes.

As is well known, it is required that stethoscopes be constructed so that they are capable of comfortably adapting themselves to the person who uses the stethoscope. Inasmuch as a stethoscope is not manufactured with any particular person in mind, it is clear that each stethoscope must have the capability of adapting itself to people who differ quite widely in their physical characteristics. At the present time, stethoscopes do not fulfill this requirement and many stethoscopes are used which are relatively uncomfortable because they cannot adapt themselves to the particular person who uses the stethoscope.

Furthermore, it is well known to provide a stethoscope with a number of different types of microphones any one of which can be respectively used, and in order to place a selected microphone in an operating position it is essential to releasably retain the microphone assembly in a given position on the stethoscope. At the present time, the known structure for accomplishing this last result is not satisfactory in that it is expensive to manufacture and assemble and at the same time does not reliably fulfill its intended function.

It is therefore a primary object of the present invention to provide a stethoscope which will avoid the above drawbacks.

In particular, it is an object of the present invention to provide a stethoscope which is capable of adapting itself to the peculiarities of the person who uses the stethoscope and to an extent which heretofore was not possible with known stethoscopes.

In particular, it is an object of the present invention to provide a stethoscope with ear tubes which are capable of orienting themselves to the head of the operator in a manner and to an extent which heretofore could not be achieved.

Also, it is an object of the invention to provide a stethoscope with a structure which will enable it to adapt itself to the particular configuration of the ears of the user of the stethoscope.

In addition, it is an object of the present invention to provide an exceedingly simple and inexpensive structure for releasably maintaining a microphone assembly, which includes a plurality of microphones, in any selected one of a number of different angular positions to reliably render a selected type of microphone operative without any danger of displacing the selected microphone from its operative position while at the same time making it very easy for the operator to change from one type of microphone to another whenever desired.

Primarily, the above objects are achieved with the stethoscope of the invention by providing a structure where the ear tubes are capable of being independently swiveled while positively restrained against disengagement from the Y-shaped sound tubes. In one embodiment, the ear tubes respectively carry ear plugs capable of adapting themselves and conforming to the ears of the user.

The microphone assembly is mounted in such a way that it can easily be turned on the hollow shaft of the stethoscope to any one of a number of selected angular positions while a releasable structure yieldably maintains the microphone assembly in the selected position in a fully reliable manner and yet can be easily manipulated to displace one microphone away from its operative position and another microphone into the operative position.

The invention is illustrated by way of example in the accompanying drawings which form part of the application and in which FIG. 1 is a perspective illustration of one embodiment of a stethoscope according to the present invention;

FIG. 2 is a fragmentary sectional view, on an enlarged scale, as compared to FIG. 1, taken along line 2—2 of FIG. 1 in the direction of the arrows and showing the manner in which the ear tubes are mounted for swiveling movement and urging toward each other;

FIG. 3 is a transverse section of the structure of FIG. 2 taken along line 3—3 of FIG. 2 in the direction of the arrows;

FIG. 4 shows the manner in which the ear plugs are mounted on the ear tubes, FIG. 4 being taken along line 4—4 of FIG. 1 on an enlarged scale, in the direction of the arrows;

FIG. 5 is a longitudinal sectional illustration, also on an enlarged scale, as compared to FIG. 1, showing the manner in which the microphone assembly is mounted on the hollow shaft of the stethoscope;

FIG. 6 is a sectional plan view taken along line 6—6 of FIG. 1 in the direction of the arrows and also showing the manner in which the microphone assembly is mounted on the hollow shaft of the stethoscope, FIG. 6 also being enlarged with respect to the scale of FIG. 1; and

FIG. 7 is a fragmentary longitudinal sectional illustration of the upper end of an ear tube carrying another embodiment of an ear plug according to the present invention.

Referring to the drawings and to FIG. 1 in particular, the stethoscope **10** illustrated therein includes a hollow flexible Y-tube assembly **12** made of any suitable plastic as is well known in the art, and at its upper end the assembly **12** has a pair of tubular branching portions **14**. These branching portions **14** respectively receive the ear tubes **16** which, as is well known, carry at their upper free ends a pair of ear plugs **18** adapted to receive the ears of the operator. As may be seen from FIG. 4 the ear plugs **18** are tubular and threaded onto the ear tubes **16**.

Within the branching portions **14** of the Y-tube **12** which together provide the stethoscope **10** with the substantially U-shaped configuration shown in FIG. 1 at the upper end of the assembly **12**, is positioned spring means **20** operatively connected to the ear tubes **16** for urging them toward each other as well as mounting each ear tube **16** for swiveling turning movement independently of the other ear tube, as will be apparent from the description which follows.

Thus, as is shown most clearly in FIGS. 2 and 3, the spring means **20** is in the form of an elongated leaf spring of U-shaped configuration positioned within the branches **14** of the Y-tube and having at each end an integral ear or enlarged flaring portion **22** which is bent to a tubular or substantially tubular configuration thus providing each flaring portion **22** with a pair of substantially semicircular channel portions **24** separated from each other by the slot **26** which is formed between the free edges of the channel portions **24**. Each tubular portion **22** slidably engages a companion ear tube **16** at its lower free end portion which extends into the branch **14** in the manner illustrated in FIG. 2.

However, the substantially tubular formation formed by the channels **24** at each end of the spring **20** is not of a constant diameter. As is apparent from FIG. 2, the free end portion of each ear tube **16** is formed with an annular groove **28** and the tubular formation at each end of the spring **20** provided by the channel **24** tapers so as to have a reduced end **30** received and clamped in the groove **28**, so that with this construction while each ear tube **16** cannot be removed or withdrawn from the

spring 20 at the same time it is capable of freely swiveling about the axis of the tube 16 at its lower free end shown in FIG. 2 where deliberate force is applied to overcome the requisite friction at such connection.

Therefore, with this construction the ear tubes 16 are securely connected to the spring 20 disposed internally of the Y-tube without requiring the use of cement, or the like, and at the same time each ear tube 16 is capable of being independently swiveled so that the orientation of the upper ends of the tubes 16, where the plugs 18 are situated, can be adapted to the particular user of the stethoscope, thus providing a very comfortable support for the stethoscope on the head of the user. The ear tubes are positively restrained against disengagement from the spring 20 by the aforementioned connection. Referring now to FIG. 5, it will be seen that the lower end of the Y-tube assembly 12 receives in its interior the upper end of a hollow shaft 32 which terminates distant from the flexible assembly 12 in an enlarged closed end 34 which is secured to said shaft in any conventional manner. This enlarged closed end 34 defines with the exterior of the hollow shaft 32 a shoulder having an upwardly directed annular surface 36, as viewed in FIG. 5. The shaft 32 is formed with an opening 38 providing communication between the exterior of the tube 32 and its hollow interior 40.

A body 42 is formed with an elongated bore through which the shaft 32 slidably extends, and this body 42 carries a plurality of microphones. In the illustrated example the body 42 carries a diaphragm microphone 44 of known construction and an open microphone 46 diametrically opposed to the microphone 44. The microphone 44 has at the crest of its inner recess an aperture 48 while the microphone 46 has at the crest of its inner recess an aperture 50 coaxial with the aperture 48, and it will be noted that in the angular position of the body 42 which is illustrated in FIGS. 5 and 6 the common axis of the apertures 48 and 50 coincides with the axis of the opening 38. Thus, in the position shown the diaphragm microphone 44 communicates through the opening 38 with the interior of the tube 32 and the ear tubes so that it is microphone 44 which is operative, while if the body 42 is turned by 180° from the illustrated position about the shaft 32 it will be the microphone 46 which will communicate through its aperture 50 with the hollow interior 40 of the shaft 32 and the ear tubes so that now the microphone 46 will be operative.

The body 42 is provided with an annular surface 52 directed toward and located next to the annular surface 36 of the enlarged end 34 of the shaft 32, and in the illustrated example the annular surface 36 is provided with a pair of diametrically opposed projections 54 of knife-shape configuration extending along a common straight line which is normal to the axis of the shaft 32, so that the knife-edge projections 54 extend radially with respect to the axis of the shaft 32. The annular surface 52 of the body 42 is formed with a pair of diametrically opposed V-grooves 56 which respectively receive the projections 54 in the two positions of the body 42 where the microphones 44 and 46 are respectively in communication with the opening 38 and the ear tubes.

In order to releasably maintain the body 42 in a selected angular position where one or the other of the microphones is operative, a spring means 58 is provided for yieldably urging the projections 54 respectively into the recesses 56, so that in this way a releasable detent arrangement is provided. The spring means 58 takes the form of a coil spring coiled about a portion 33 of the shaft 32 which is of reduced diameter and situated within the bore of the body 42 engaging a shoulder of the shaft 32 and the body 42 so as to urge the surface 52 against the surface 36 and thus bias the projections 54 respectively in the recesses 56.

Although the shaft 32 is shown in dot-dash lines at the lower portion of FIG. 5 displaced downwardly with respect to the body 42 so as to illustrate the manner in which the parts cooperate when the spring 58 is compressed during a change in the position of the body 42, it will be understood that in order to change from one microphone to the other the operator need only grasp one of the microphones and turn it to a selected orientation, and the projections of V-shaped cross-section together with the V-shaped grooves 56 will enable the body 42 to be cammed out of one position and snapped into the next position, so that the structure is extremely convenient to operate while at the same time reliably maintaining a selected microphone in the operating position.

In the embodiment of the invention which is illustrated in FIG. 7 an ear tube 60 which corresponds to either of the ear tubes 16 and which forms one of a pair of ear tubes 60 of a stethoscope is illustrated carrying a tubular ear plug 62. This ear plug 62 performs the same function as the ear plug 18 shown in FIG. 4, but in the case of FIG. 7 the ear plug 62 is made of a yieldably resilient material such as a suitable formed plastic which may be foam rubber, for example, and thus by choosing a proper degree of resiliency or yieldability for the plug 62 it is capable of easily adapting itself with a light pressure to the ear of the operator sealing out exterior noises so as to provide a higher degree of efficiency of sound transmission.

It is apparent, therefore, that the ear tubes of the stethoscope of the invention because of their capability of swiveling with respect to each other, as well as the yieldable ear plugs 62 of FIG. 7, enable the stethoscope to adapt itself to a particular user to an extent which could not be achieved heretofore, and in addition providing this particular highly flexible and adaptable structure with the adjustable microphone assembly of FIGS. 5 and 6 enables further adaptation of the stethoscope to the particular operator providing an efficiency of operation and a degree of comfort which has not heretofore been obtainable.

What is claimed is:

1. A stethoscope comprising an elongated flexible tube having at one end a pair of branching tube portions, a pair of rigid elongated ear tubes having lower ends received in said branching portions in fluid communication therewith, and a U-shaped elongated leaf spring extending in said branching portions and having end portions interconnecting said ear tubes at said lower ends for biasing the ear tubes towards each other, said ear tube ends and said spring end portions having interengaged complementary fittings, one of said complementary fittings having external groove means with the other complementary fitting having a portion interengaged with said groove means to provide for the independent swiveling of said ear tubes about the axes thereof for adjusting the ear tubes to the user while positively restraining the disengagement thereof from said spring and branching portions.

2. In the stethoscope as recited in claim 1, said one complementary fitting comprising a tubular portion having an annular external groove with said other fitting comprising a tubular portion overfitted on said first mentioned tubular portion and having a reduced diameter neck portion frictionally seated in said external groove.

References Cited by the Examiner

UNITED STATES PATENTS

874,092	12/1907	Liverpool	181—24
1,585,407	5/1926	Morin	181—24
1,841,078	1/1932	Baird et al.	181—24
2,722,989	11/1955	Tynan	181—24
3,000,463	9/1961	Collins	181—24
3,035,656	5/1962	Kebel	181—24
3,169,600	2/1965	Thomas	181—24

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