

May 23, 1967

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3,321,041

NOISE ATTENUATING STETHOSCOPE

Filed April 22, 1966

2 Sheets-Sheet 1

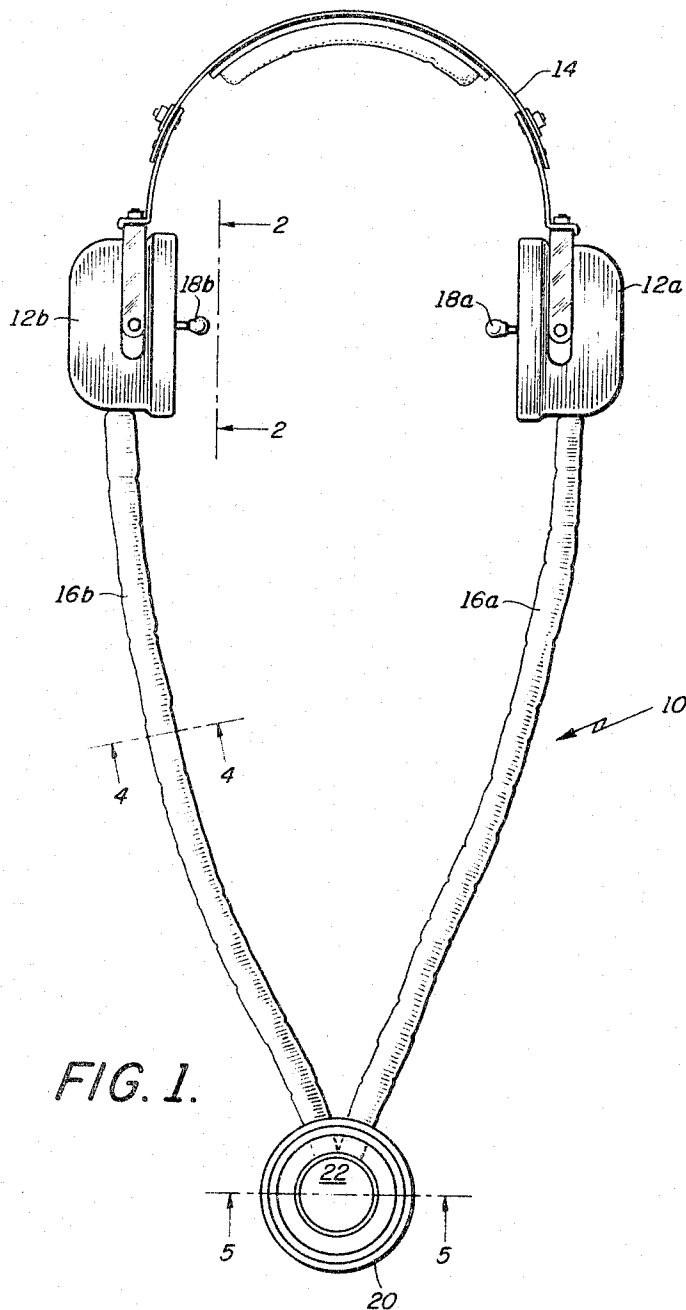


FIG. 1.

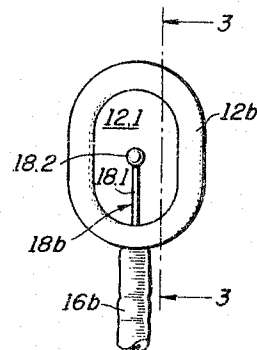


FIG. 2.

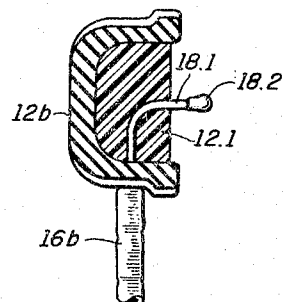


FIG. 3.

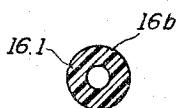


FIG. 4.

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Filed April 22, 1966

2 Sheets-Sheet 2

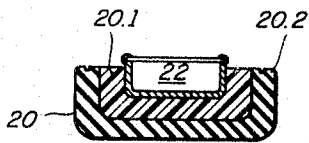


FIG. 5.

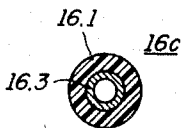


FIG. 7.

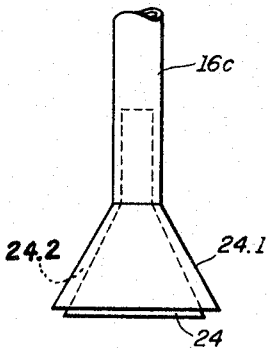


FIG. 8.

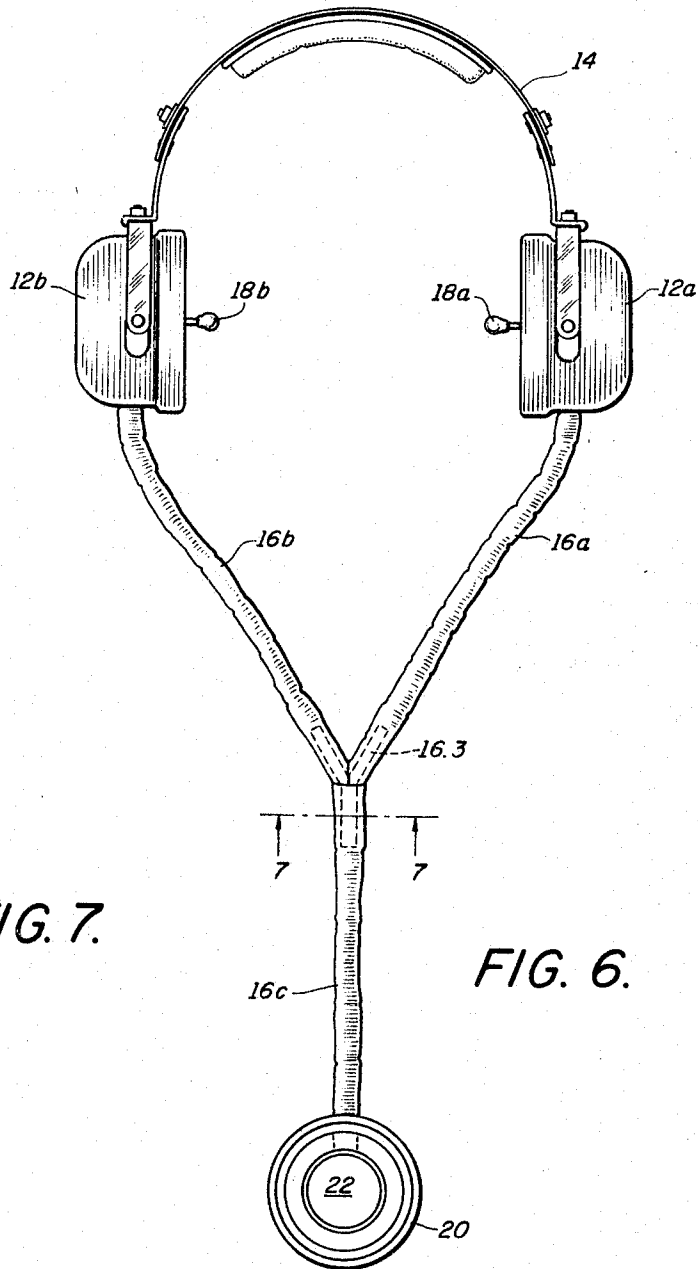


FIG. 6.

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3,321,041

NOISE ATTENUATING STETHOSCOPE

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Filed Apr. 22, 1966, Ser. No. 544,527

4 Claims. (Cl. 181-24)

This invention relates to stethoscopes and, more particularly, to an improved stethoscope for use in high-intensity noise areas.

For the most part, when stethoscopes are being used by a doctor or a medical technician, the person being examined is either in the doctor's office or in some other area where the ambient noise level is at a sufficiently low level so as not to interfere with the sounds picked up by the stethoscope. It should be obvious that, when a doctor is listening for faint heart murmurs or for rales in the chest, the maximum degree of quiet is required as these are the sounds that are easiest to miss. However, there are many instances where the person to be examined is found in an area where the intensity of the noise is of such a high level as to render it impossible for the examiner to accurately diagnose the condition of the patient due to the fact that the aberrant noise interferes with and covers over the sounds being sought by the examiner.

For example, if an accident were to occur in the boiler room or engine room of a ship on the high seas and the patient were on the deck, good medical techniques dictate that the injured person should not be moved before the extent of the injury has been determined by the physician. Under these circumstances, it would be impossible to detect the patient's heart beat in the presence of the extremely high ambient noise level. Thus, in violation of good medical practice, the patient would have to be moved from the area of high noise level before the stethoscope could be effective in noting, for example faint heart beats.

Still another area in which my device finds particular applicability is in the techniques of battle-field medicine. Specifically, for example, when a soldier is wounded in an area of high concentration of military gunfire, it is imperative for the corpsman to determine the condition of the patient's blood pressure to determine whether or not he should be fed fluid intravenously. Without a stethoscope which would allow the soldier to be examined in a high noise level area, the corpsman must wait till the wounded soldier is evacuated to a point where there is less noise before determining the needs of the soldier. In instances where time is of the essence, such as when the soldier has gone into shock, this delay might prove fatal and could otherwise have been prevented if the patient or soldier could have been examined where he was originally wounded.

Yet another circumstance in which my device would prove invaluable is the instance where a wounded soldier is being evacuated from the combat area to a hospital by helicopter. In this latter situation, the vibration of the helicopter, as well as the high noise level associated with such types of military aircraft, would prevent the attending medical corpsman from determining the soldier's blood pressure. It would be invaluable, and in many instances the difference between life or death, if as a result of an examination during the helicopter trip, the medical corpsman could diagnose the patient's condition, determine his needs and supply these needs en route to the hospital instead of having to wait until the patient arrived at the hospital before his condition and needs were determined. For example, if during the trip to the hospital, the corpsman were able to detect a change in the soldier's condition that required immediate attention, the soldier's needs could be filled and his life would be saved.

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My invention overcomes all the difficulties of the prior art stethoscopes which are unusable in high noise level areas by providing means for acoustically insulating the stethoscope from any noises that would ordinarily have interfered with or prevented its use.

It is, therefore, a principal object of the present invention to provide an improved stethoscope.

Another principal object of the present invention is to provide an improved stethoscope capable of use in areas of high noise level.

Still another principal object of the present invention is to provide an improved stethoscope capable of use in areas of high noise level yet noted for its convenience.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may be best understood by reference to the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is one embodiment of my improved stethoscope; FIGS. 2, 3, 4 and 5 are cross-sections of various portions of the embodiment of FIG. 1;

FIG. 6 is another specie of my invention embodying the principles previously set forth; and

FIGS. 7 and 8 are cross-sections of portions of the embodiment of FIG. 6.

Referring now to FIGS. 1-4, there is shown my improved stethoscope noted by the fact that it is capable of attenuating aberrant noise. In this embodiment, stethoscope 10 consists of ear cups 12a and 12b that are held in place by means of head strap 14 which may be made of a resilient, springy metal so that the ear cups 12a and 12b are maintained in their relative positions with respect to each other. Along these lines, it should be here added that the connecting strap 14 may be made adjustable to fit the contour of the head of the user and may be provided with some sort of padding for the comfort of the user if my device is to be used or worn for any extended period.

Ear tubes 18a and 18b are embedded in ear cups 12a and 12b, respectively. Ear tubes 18a and 18b consist of the L-shaped tube portions 18.1, one end of which passes through the lower end of ear cups 12a and 12b to communicate directly with tubing 16a and 16b. The other end of ear tubes 18.1 terminate in plastic ear pieces 18.2 for insertion into the user's ears. The remainder of ear cups 12a and 12b are filled with a foamy, resilient, plastic material so that when ear cups 12a and 12b are placed over the user's ears, ear pieces 18.2 will fit snugly into the auditory canal of each of the user's ears and all the parts of the pinna or auricle of the ears will fit snugly against the foamy material 12.1, thereby excluding aberrant noise.

The lower end of each of the ear tubes 18.1, which passes through ear cups 12 and 12b, is connected directly to one end of tubing 16a and 16b. This tubing is also covered with sound attenuating material 16.1 and may be similar to material 12.1 contained within ear cups 12a and 12b. By the same token, this connecting tubing may also consist of a more conventional solid rubber tubing with sound attenuating material 16.1 wrapped around the outsides thereof.

The other end of tubes 16a and 16b terminates in a pickup unit 22 which is partially embedded in pickup shell or shield 20. This shield is also filled with foamy, resilient, plastic material similar to that contained in ear cups 12a and 12b and is used to shield the diaphragm pickup shown from any aberrant noise. It should be noted, in this embodiment, that the pickup unit 22 extends slightly above surface 20.2 of shell or shield 20. It is particularly desirable to have the pickup unit protrude

in this manner so that when the user presses the diaphragm assembly against the patient, he will have to exert additional pressure to compress material 20.1 and thereby maintain shell or shield 20 flush with the patient's body. By so doing, the user is assured of preventing the aberrant noise from entering into the stethoscope system.

The embodiments as set forth in FIGS. 1-5 utilize a dual tube system wherein both tubes are connected directly to the pickup device. However, there are some individuals who prefer to use a single tube pickup system in which case the ear tubes are joined to the single tube by means of a Y connector.

Reference is now made to FIGS. 6 and 7 which depict a single tube pickup system in accordance with my invention. In this embodiment, the ear cups 12a and 12b are shown joined by the headband 14 as in FIG. 1. However, in this embodiment, tubes 16a and 16b, the ends of which communicate with ear tubes 18a and 18b, respectively, have been foreshortened and, instead of communicating directly with the diaphragm, are now joined with tubing 16c by means of Y connector 16.3. As in the embodiment of FIG. 1, the other end of the tubing terminates at the head of a Bowles or diaphragm type of pickup unit 22 that is embedded in shield 20 in the same manner as described with regard to FIG. 5.

While some users prefer the diaphragm type of pickup, it has been found in the past that many practitioners like, and in certain instances prefer, the conical type of pickup for various diagnoses.

Reference is now made to FIG. 8 which shows a conical or Bell type pickup unit 24 connected to tubing 16c and covered with a plastic, foamy, springy, acoustic, noise attenuating material 24.2. As in the embodiment shown in FIGS. 1-5, the conical pickup unit 24 (and insulating material 24.2) is positioned within and extends slightly beyond the outermost level or lip of hollow shell or shield 24.1. Thus, when my device is in use, the wide or listening opening of the pickup unit is placed against the patient and pressed slightly to compress material 24.2 and exclude aberrant noise.

It should be further noted that a significant attenuation of ambient noise can be accomplished by acoustically insulating only either the pickup unit or the connecting tubing and placing ear pieces 18.2 directly into the user's ears without using ear cups 12a and 12b. However, for

maximum aberrant sound attenuation, the inclusion of ear cups and insulation for both the pickup and tubing is suggested.

While I have described what is presently considered the preferred embodiments of my invention, it will be obvious to those skilled in the art that various other changes and modifications may be made therein without departing from the inventive concept, and it is aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

I claim:

1. A stethoscope comprising sound pick-up means, sound delivery means for engaging the ear and means to transport sound from the pick-up means to the delivery means, said delivery means comprising a cup to cover at least the major portion of the ear, a tube to extend into the cavity of the ear located in said cup and extending through a wall thereof, and a sound attenuating material substantially filling said cup and supporting said tube therein in a position so that the tube extends beyond the edge of the cup and the attenuating material so that when the tube is in the ear cavity the said material will cover the ear and exclude sound thereto.

2. A stethoscope as in claim 1 wherein said sound attenuating material is foamed plastic and compressible and will permit movement of the tube toward the cup.

3. A stethoscope as in claim 1 wherein said pick-up means comprising a pick-up unit having a work engaging surface, a concave shell spaced therefrom and a foamed plastic compressible sound attenuating material between the unit and shell supporting said surface of the unit beyond the edge of the shell.

4. A stethoscope as in claim 3 wherein said shell has an edge and said foamed plastic is compressible so that the said surface of the unit may be moved to substantially the plane of the edge of the shell.

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