

[54] **STETHOSCOPE WITH DISPLAY**

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[51] **Int. Cl.** **A61b 7/02**

[58] **Field of Search** **179/1 ST; 128/2.05 S**

[56] **References Cited**

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[57]

ABSTRACT

An improved stethoscope incorporating in addition to conventional cardiac vibration pick up and transmission, miniaturized electronic pick up and display on a cathode ray tube mounted on the back of a chest piece, or attached to the tubing of the stethoscope.

1 Claim, 5 Drawing Figures

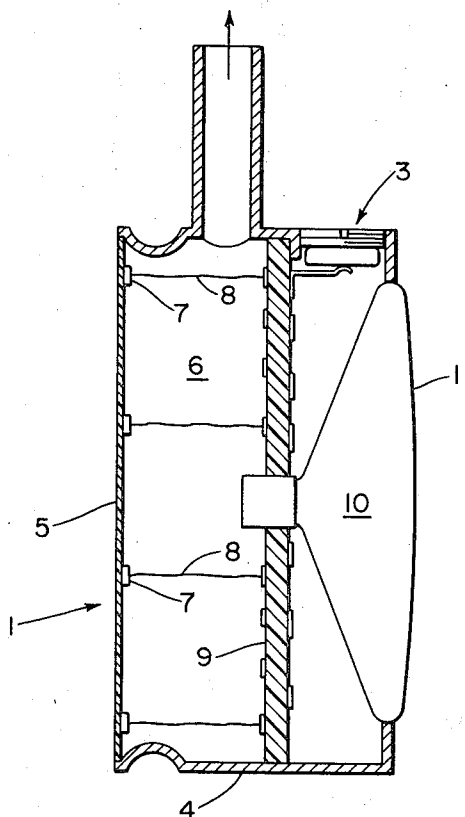


FIG. 1

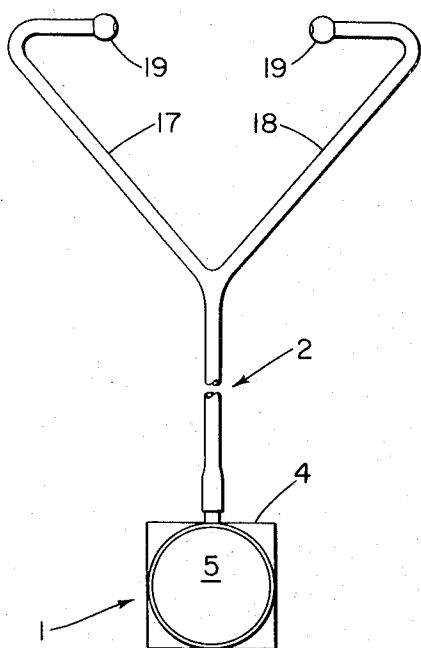


FIG. 2

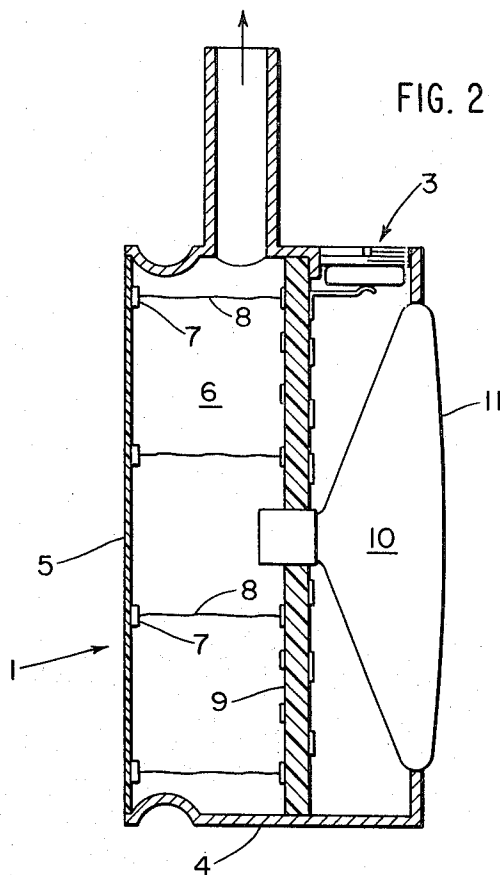


FIG. 3

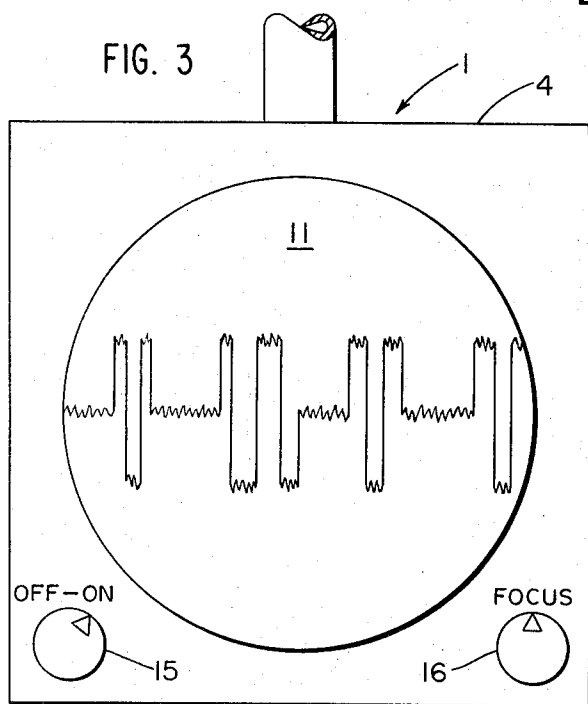


FIG. 5

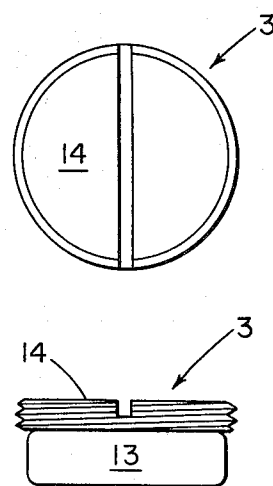


FIG. 4

STETHOSCOPE WITH DISPLAY

BACKGROUND OF THE INVENTION

This invention relates to stethoscopes and particularly to a stethoscope having electronic display capability as well as conventional listening capability. The stethoscope is an old and well known instrument used by physicians for listening to the heart and other areas of the body. It generally serves as a pick up and transmittance means, through air, of the sounds from the subject's body to the physician's ears. The pick up is accomplished usually by a diaphragm or a bell which picks up vibrations and itself vibrates, which vibrations are transmitted through tubes to the ears of the listener. The interpretation of the sounds is sometimes difficult, takes a great deal of skill, and may be debatable among various physicians.

Therefore, some electronic means have been devised to detect and record cardiac sounds in a more objective manner. However, none has enabled the use of a small, portable device like the conventional stethoscope. Such electronic means, called phonocardiograph machines, are usually very large, requiring the patient to be brought to a special location. Others utilize special pick up means which are attached to the patient's body and are adapted to the recording device. The audible output, if available, is always electronically amplified and not neutral.

The present invention is an improvement on the conventional stethoscope retaining its portability and conventional, manual use while providing an electronic display capability so as to be able to see simultaneously the oscilloscopic representations of the unamplified sounds one is hearing.

SUMMARY OF THE INVENTION

The invention is an improved stethoscope having a diaphragm or bell pick up, communicating with a divided tubing for transmitting heart sounds to a listener's ears and also including means to pick up and convert heart or other bodily sounds to an electrical signal; a miniaturized amplifier mounted to receive the signal and a small cathode ray tube receiving the output of the amplifier to display for example, the heart sounds, as in a phonocardiograph.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of a preferred embodiment of the stethoscope of the invention, partially broken away.

FIG. 2 is a cross sectional side view of the chest piece of this invention.

FIG. 3 is a rear view of the chest piece.

FIG. 4 is a side view of the power supply section.

FIG. 5 is a top view of the power supply.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The improved stethoscope is seen in FIGS. 1 and 2 as having a chest piece 1 and a tube assembly 2 and a power source 3.

The chest piece as shown in further detail in FIGS. 2 and 3 has a pick up section comprising a housing 4a diaphragm or bell 5 and a transmission space 6. Mounted on the diaphragm or bell are crystal sound pick ups 7

in this preferred embodiment. A carbon particle-type microphone might also be used.

The pick ups 7 are present in such number and at such points on the diaphragm as may be determined by conventional experimentation to provide the best results. From the crystal pick ups 7, three being shown, wires 8 lead to a miniaturized amplifier 9 diagrammatically shown as being mounted on a printed circuit board. The amplifier is connected to a miniaturized cathode ray tube 10 diagrammatically illustrated, having its tube face 11 facing outwardly at the rear of the chest piece 1; that is, opposite the diaphragm 5.

The amplifier 9 and cathode ray tube 10 are powered by a power supply 13, comprising, in this preferred embodiment, a mercury battery 13 mounted on a cap 14 which sets into the housing 4 and connects operably to the components to which it supplies power.

In FIG. 4 the cathode ray tube face 11 is represented with exemplary controls such as on/off contrast 15, and focus 16. Other desirable controls such as freeze and repeat may be provided.

The transmission space 6 usually containing air communicates with air in the hollow tube assembly 2 which divides to forks 17 and 18 and which terminate in ear pieces 19.

In use, the stethoscope is applied in a manner known to physicians and others similarly skilled, to a patient's body. Cardiac vibrations, for example, are picked up by the diaphragm or bell 5 and transmitted through the air in the transmission space 6 and the tube assembly 2 to the listener's ear without electrical amplification in this preferred embodiment.

Simultaneously, the vibrations are converted by the crystal pick ups 7, for example, to electrical signals and transmitted via the wires 8 to the amplifier 9 where they are processed and fed to the cathode ray tube 10. The vibrations thus picked up from the patient's body are displayed as a signal or oscilloscopic pattern directly on the stethoscope for instant interpretation.

The cathode ray tube display would usually be used in conjunction with the manual use of the stethoscope, one complimenting the other.

We claim:

1. An improved stethoscope comprising:
 - a. a chest piece having a body containing:
 1. a pick up section;
 2. an amplifier section; and
 3. a display section;

in which the pick up section comprises a diaphragm or bell mounted on the body and adapted to pick up the vibration of heart or other bodily sounds and a transmission space containing a vibration transmitting medium and means to pick up the vibration of heart sounds and convert them to an electrical signal and transmit them to the amplifier section; and

in which the amplifier section is spaced from the diaphragm or bell and comprises miniaturized circuitry adapted to receive the transmissions from the pick up section, amplify and transmit signals to the display section; and

in which the display section comprises a miniaturized cathode ray tube for receiving and displaying a signal from the amplifier section, the display section being located on the stethoscope proximate to the body;

- b. a tube assembly comprising a hollow tube communicating with the transmission space and dividing to form a pair of tubes adapted to reach the ears of the stethoscope user and to transmit the vibration of heart or other bodily sounds.
- c. an integral power source for operating the amplifier and the cathode ray tube.

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