

[54] EXPENDABLE STETHOSCOPE

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[56]

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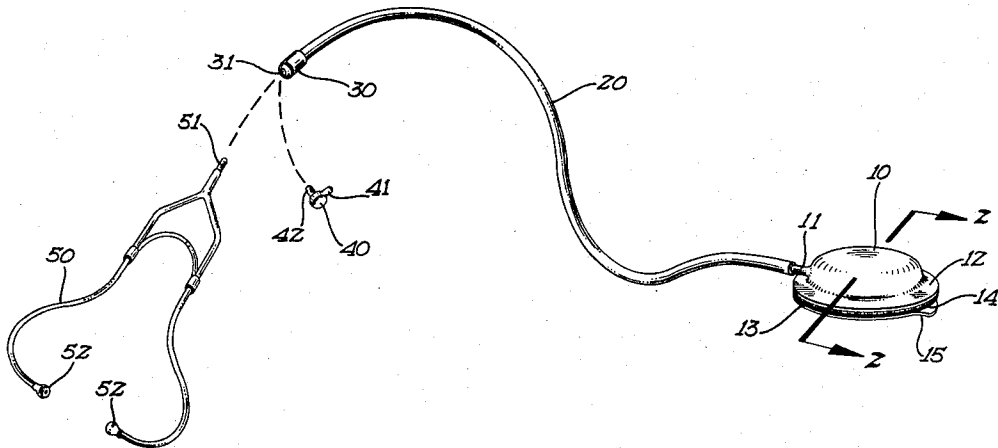
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[57] ABSTRACT

Stethoscope means for removable attachment to the skin surface of the body of a patient comprising bell means including a generally cup-shaped housing shell forming a chamber, and conduit means communicating with the chamber for the transmission of gaseous fluid compression waves therethrough. The chamber is in the form of a generally cup-shaped housing shell with a closed bottom wall, side walls extending from the bottom wall, and flanged surface mounting means extending outwardly about the entire edge surface of the side walls. Resilient pad means are secured continuously about the top annular surface of the flange means and circumscribe the chamber. A film of pressure-sensitive adhesive is secured to the exposed surface of the resilient pad means, thus enabling surface attachment of the bell means to the skin of the body of a patient.

4 Claims, 2 Drawing Figures



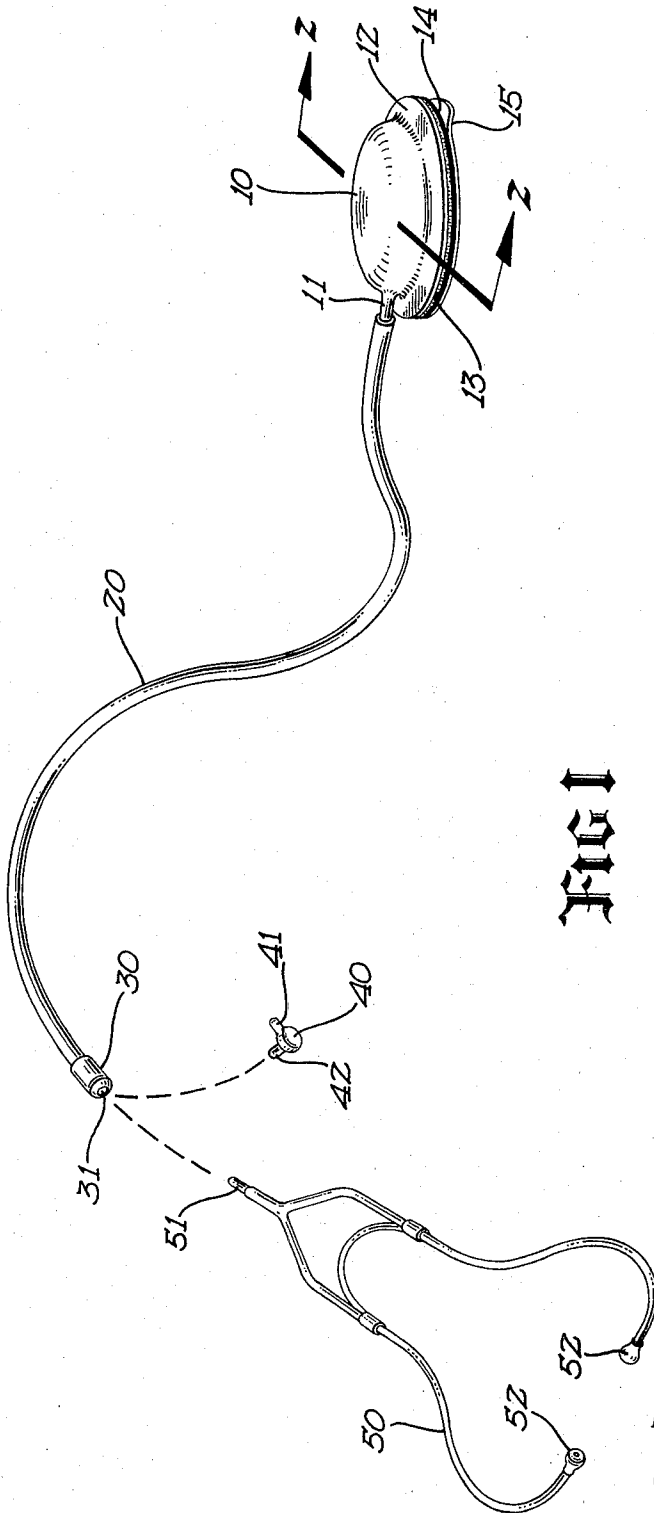


FIG 1

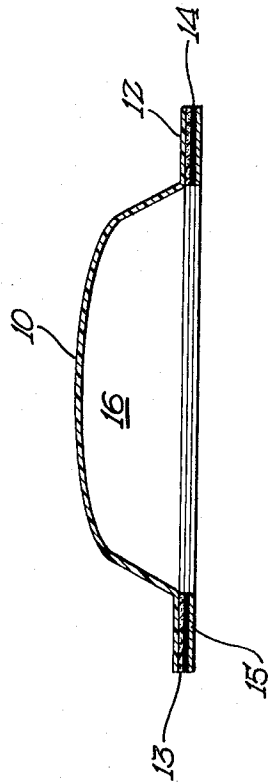


FIG 2

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## EXPENDABLE STETHOSCOPE

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates generally to certain auscultatory devices which generate an audible signal in response to conventional heart tones, or other bodily sounds, these devices normally being defined as "stethoscopes." More specifically, the invention relates to a mass-produced inexpensive stethoscope structure which is adapted to be removably attached to the skin surface of the body of a patient, with the attachment remaining during the period that frequent examination of the heart tones or other bodily functions may be required.

## 2. Description of the Prior Art

In the past, stethoscope devices have been used to monitor, examine, and otherwise evaluate those certain heart tones which are generated by the heart of a patient undergoing such treatment. It is sometimes necessary to monitor and evaluate heart tones on a frequent basis. During such occasions, a stethoscope bell may be attached to the chest of the patient, or an esophageal balloon may be utilized. In either of these devices, a conduit or tubing structure is secured to the outlet of the bell or balloon in order to accommodate the external auditory channel of an attending person. Such an arrangement allows for frequent monitoring of the heart during the surgical procedure.

Electronic equipment is available for accommodating the monitoring of the heart during such procedures. While this machinery is normally reliable, it has been found that some types of this equipment are disabled during or after the performing of electrocautery operations, or during or after other electrical disturbances which may occur in the immediate vicinity of the electronic apparatus. Hence, it is normally desirable during surgical procedures to have the heart tones monitored by mechanical techniques. Additionally, other auscultatory sensors may be attached to the skin surface of the body of a patient in order to monitor blood pressure.

The disadvantages of the prior art devices include the indentations or other trauma to the patient which may result whenever an individual or equipment strikes the stethoscope bell so attached to the patient. A further significant disadvantage is the possibility for cross-contamination of patients who are in contact with such a device.

It is also recognized in the art that the conventional use of stethoscopes normally requires relocation on the patient's body in order to determine the best area for auscultation. Thus, consistency of transmission is normally difficult to achieve.

## SUMMARY OF THE INVENTION

In accordance with the present invention, an improved stethoscope bell is provided which has means for removable attachment to the skin surface of the body of a patient. This structure includes a bell means having a generally cup-shaped housing shell with a closed bottom wall, side walls extending from the bottom wall, and flanged surface mounting means extending outwardly about the entire edge surface of the side walls. The bottom wall and side walls cooperate to form a generally closed chamber with an open top. A conduit is arranged in fluid communication contact with

the chamber, preferably through one of the side walls, the conduit means having generally fluid-tight attachment to the chamber. In addition, means are disposed on the conduit to receive an elongated flexible conduit for transmission of gaseous fluid compression waves therethrough. In addition, resilient pad means are secured continuously about the top surface of the flange means and these pad means circumscribe the chamber area. A film of pressure-sensitive adhesive is secured to the exposed surface of the pad means, thus enabling surface attachment of the stethoscope bell means to the skin of the body of a patient.

In use, the stethoscope bell means is attached to the skin surface of the body of a patient at the desired location. Normally, a tubing element will be secured to the bell chamber, and the head piece of the stethoscope is thereafter attached to the conduit or tubing. If desired, adaptor means can be secured to the free end of the tubing in order to facilitate attachment and removal of the head piece of the stethoscope. When the need for the structure has ceased, the bell means may be readily removed from the skin of the patient, without discomfort.

Therefore, it is a primary object of the present invention to provide an improved stethoscope bell means which may be removably attached to the skin surface of the body of a patient, the bell means including a cup-shaped housing forming a chamber, with flange elements extending outwardly from the edges of the chamber, and with resilient pad means being secured continuously about the surface of the flanges for facilitating attachment to the body of the patient.

It is yet a further object of the present invention to provide an improved stethoscope bell means for removable attachment to the skin surface of the body of a patient wherein a film of pressure-sensitive adhesive may be secured to the exposed surface of the resilient pad in order to facilitate attachment of the bell means to the patient's skin.

Other and further objects of the present invention will become apparent to those skilled in the art upon a study of the following specification, appended claims, and accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the improved stethoscope bell means of the present invention, along with a conduit and a head piece, the conduit being utilized to transmit sound generated in the stethoscope bell means to the ear pieces of the headset; and

FIG. 2 is a vertical sectional view taken along the line and in the direction of the arrows 2-2 of FIG. 1 and showing the internal detail of the stethoscope bell means of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with the preferred modification of the present invention, and with particular reference to FIG. 1 of the drawing, the structure as illustrated includes a stethoscope bell means 10, a conduit means 20, and a stethoscope head piece 50. As is apparent from FIG. 1, the conduit 20 is utilized to transmit gaseous fluid compression waves from the chamber 10 to the ear pieces 52-52 of the head piece 50.

With continued attention being directed to FIG. 1, and with attention also being directed to FIG. 2, it will

be seen that the stethoscope bell means includes a chamber generally designated 16, the chamber being formed within the confines of the bell means 10, the bell means 10 comprising, as shown, a closed bottom wall with side walls extending from the bottom wall. Also, flanges 12 extend outwardly from the edge surfaces of the side walls, thus completing the enclosure and defining the chamber 16. Resilient pad means 13 are secured continuously about the top surface of the flange means and form to circumscribe the chamber. A film of pressure-sensitive adhesive 14 is secured to the exposed surface of the resilient pad means 13, the adhesive enabling surface attachment of the stethoscope bell means to the skin of the body of a patient. If desired, a stripable film 15 may be utilized to enclose or cover the pressure-sensitive adhesive film 14 in order to preserve the integrity of the adhesive film 14, and also to protect it from contamination.

In order to provide communication between the chamber 16 and the conduit 20, a coupling conduit means 11 is arranged in fluid communicating relationship with the chamber 16, such as is illustrated in FIG. 1. This communication is fluid-tight to the chamber, and the coupling conduit 11 is arranged to receive conduit 20 thereover. As is apparent from the drawing, any fluid compression waves present in chamber 16 will be transmitted through conduit 20 into head piece 50 and ultimately to ear pieces 52—52. At the free end of the conduit 20, an adaptor 30 is shown having a tip portion 31 for mating with an optional ear piece 40. Ear piece 40 is provided with a moldable canal coupling 41 which may be inserted into the external auditory canal of the listener, with fitting portion 42 being arranged to be received within opening 31 formed in adaptor 30. As an alternate, the standard stethoscope ear piece may be utilized, such as is shown at 50, this structure having a pair of ear pieces 52—52 for accommodating the auditory canal of the listener. Adaptor portion 51 is arranged to be received within the opening 31 formed in adaptor 30.

In actual use, protective film 15 is stripped from the pressure-sensitive adhesive film 14, and the unit is placed on the body of the patient. This location is, of course, determined by the nature of the situation. Once in place, conduit 20 is attached to the member 11, and the appropriate ear piece attached. It will be observed that the bell means includes a chamber having a high surface-to-volume ratio. In this connection, the structure presents a relatively low-profile to form this large surface-to-volume ratio. The structure may be fabricated from any conventional rigid material, it being understood that the rigidity must be sufficient so as to prevent dissipation of any sounds generated in or on the

body of the patient. In this connection, therefore, it will be appreciated that the skin surface of the patient will function as a diaphragm to transmit sounds to the bell means, with these sounds thereafter being transmitted through conduit 20 into the ear piece worn by the listener. For most purposes, it has been found that molded nylon, polypropylene, or polyethylene terephthalate having wall thicknesses in the range of about 5 mils are useful. If desired, films of this material may be formed in order to provide the appropriately shaped stethoscope bell housing. Coupling 11 may be joined to the chamber by any suitable welding techniques.

I claim:

1. Stethoscope bell means for removable attachment to the skin surface of the body of a patient and comprising:
  - a. bell means including a substantially rigid, self-supporting generally cup-shaped housing shell with a closed bottom wall, side walls extending from said bottom wall, and flanged surface mounting means extending outwardly about the entire edge surface of said side walls, said bottom wall, side walls, and flange means forming a generally closed chamber with an open top;
  - b. coupling conduit means communicating with said chamber through one of said walls and having the outer periphery thereof in generally fluid-tight attachment to said chamber, said coupling conduit arranged for releasably securing an elongated sound transmitting conduit for transmission of sound waves therethrough; and
  - c. a film of pressure-sensitive adhesive secured to the exposed surface of said flanged surface mounting means enabling surface attachment of said stethoscope bell means to the skin of the body of a patient and formation of a closed chamber.
2. The stethoscope bell means as defined in claim 1 being particularly characterized in that resilient pad means are secured continuously about the outer surface of said flange means forming a layer over said flanged surface and circumscribing said chamber.
3. The stethoscope bell means as defined in claim 2 being particularly characterized in that said adhesive film is disposed outwardly from and covers said resilient pad, and a protective layer of film is provided to cover said pressure-sensitive adhesive film.
4. The stethoscope bell means as defined in claim 2 being particularly characterized in that said chamber is generally hemi-elliptical in configuration, with the major axis of said hemi-ellipse being disposed generally along the plane of said flange means.

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