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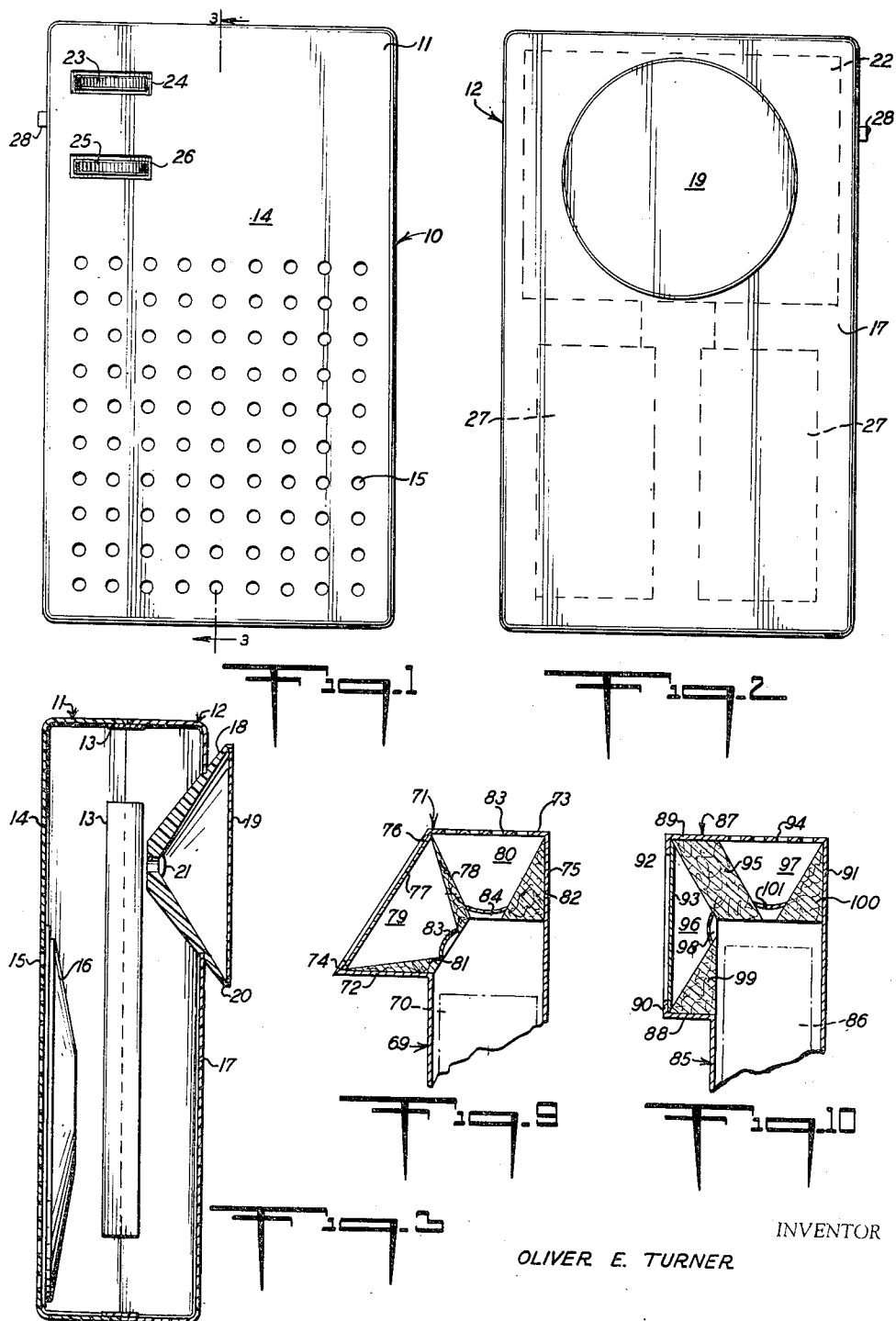
O. E. TURNER

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PORTABLE SELF CONTAINED ELECTRONIC STETHOSCOPE

Filed Dec. 7, 1955

2 Sheets-Sheet 1



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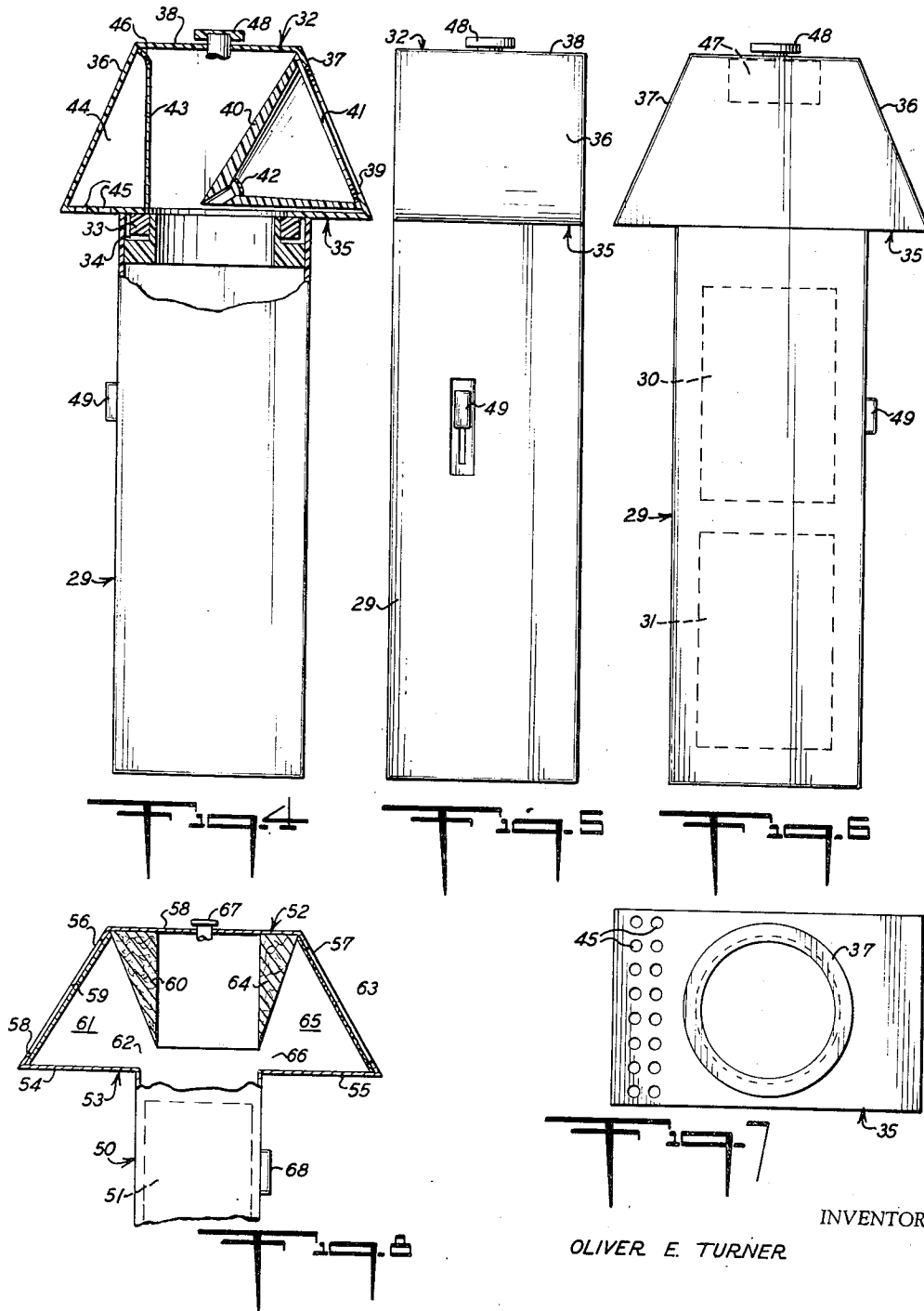
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1

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PORTABLE SELF-CONTAINED ELECTRONIC STETHOSCOPE

Oliver E. Turner, Pittsburgh, Pa.

Application December 7, 1955, Serial No. 551,681

18 Claims. (Cl. 179—107)

This invention relates to a diagnostic apparatus and more particularly to a portable self contained electronic stethoscope which may be conveniently carried by a doctor and utilized in making routine physical examinations.

As is well known, the stethoscope commonly used by physicians in making physical examinations includes a diaphragm which is placed in contact with the body of the patient, as a result of which, the diaphragm is caused to vibrate by heart or lung sounds and such sounds are transmitted through a flexible tube of rubber or the like, to a pair of ear pieces which are placed in the ears of the physician. This conventional stethoscope is essentially mechanical in nature, in that, there is no amplification of the heart or lung sounds and if the same are relatively faint or weak, it is sometimes extremely difficult for the physician to hear the same at a sufficient volume to permit accurate diagnosis. Furthermore, if the hearing of the physician is somewhat impaired, no means has heretofore been provided for making the heart and lung sounds audible, even though they may be of normal volume. Furthermore, conventional prior art stethoscopes are relatively bulky and awkward to carry and use and are also, relatively delicate and subject to damage.

It is also sometimes desirable, to make the heart and lung sounds audible to a group of doctors simultaneously, in order that a diagnosis may be made based on the simultaneous examination of all of the doctors present. With prior art stethoscopes, this has, of course, been impossible, since the same are constructed and intended only for the use of a single person. While self contained portable amplifiers incorporating a microphone and loud speaker have heretofore been proposed and utilized, particularly for making voices audible over relatively great distances, these prior art devices have been relatively bulky and heavy and are not in any way adapted for use as stethoscopes in making physical examinations.

With the development of transistors which are extremely small electronic devices to be substituted for and accomplish substantially the same result as a vacuum tube, it has become possible to design and construct an electronic amplifier of extremely small size and low weight and furthermore, the power requirements of transistors are extremely low when compared to conventional vacuum tubes and consequently, relatively small batteries for supplying the necessary power may be extremely small in size and of lightweight and, at the same time, provide relatively long useful life.

It is accordingly an object of this invention to provide a portable self contained electronic stethoscope incorporating an amplifier, as well as a battery power supply and including a microphone operating in conjunction with a diaphragm intended to be placed in contact with the body of a patient and in which the heart and lung sounds are amplified and propagated from a loud speaker.

A further object of the invention is the provision of a portable self contained electronic stethoscope incor-

2

porating an amplifier of extremely small size and weight, such amplifier utilizing transistors and being supplied with power from a relatively small lightweight battery unit with the entire stethoscope being enclosed in a small conveniently handled housing which may be carried in the physician's pocket or bag.

A still further object of the invention is the provision of a portable self contained electronic stethoscope which may be conveniently and economically manufactured from readily available components and materials and which may be conveniently provided in a variety of shapes and sizes to be readily adaptable to various uses and applications.

Another object of the invention is the provision of a portable self contained electronic stethoscope incorporating an amplifier, microphone, loud speaker and battery power supply, together with all necessary controls for affording the desired volume output and a tone best suited to the person utilizing such stethoscope.

A further object of the invention is the provision of a portable self contained electronic stethoscope which may be provided with a loud speaker for propagating heart and lung sounds to or within hearing distance and in which there is also provided means for permitting attachment of an ear piece for use when it is desired that the heart and lung sounds be heard by only a single person.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing wherein:

Fig. 1 is a front elevational view of a portable self contained electronic stethoscope constructed in accordance with one form of the instant invention;

Fig. 2 a rear elevational view of the device shown in Fig. 1;

Fig. 3 a sectional view on the line 3—3 of Fig. 1;

Fig. 4 an elevational view with parts in section for greater clarity, and showing a modified form of the electronic stethoscope of this invention;

Fig. 5 a side elevational view of the device shown in Fig. 4;

Fig. 6 a rear elevational view of the device shown in Fig. 4;

Fig. 7 a bottom plan view of the head attached to the casing of the device shown in Fig. 4;

Fig. 8 a fragmentary side elevational view showing an electronic stethoscope constructed in accordance with this invention and having a modified form of head;

Fig. 9 a fragmentary side elevational view with parts in section for greater clarity and showing a further modified form of the invention; and

Fig. 10 a fragmentary sectional view showing a still further modified form of the invention.

With continued reference to the drawing and particularly Figs. 1 to 3, there is shown a portable self contained electronic stethoscope constructed in accordance with this invention and which may well comprise a generally rectangular container 10 having a front portion 11 and a back portion 12 detachably fitted together along a median plane and in which reinforcing strips 13 may be provided to strengthen the joint between front and back portions 11 and 12 respectively. The front portion 11 is provided with a front wall 14 having a grille 15 therein adjacent the lower part and a small loud speaker 16 of the so-called miniature type, is disposed within the container 10 and rearwardly of the grille 15 and may be secured to the front wall 14 of the front portion 11 or may be supported within the container 10 in any suitable manner.

The back portion 12 of the container 10 is provided with a rear wall 17 and in the upper portion of such wall, there is disposed an outwardly opening hollow cone 18 which

3

may extend through the rear wall 17 and be secured thereto in any desired manner. The cone 18, as clearly shown in Fig. 3, projects outwardly of the rear wall 17 and a flexible diaphragm 19 is disposed across the open outer end 20 of the cone 18 and secured thereto in any suitable manner. A microphone 21 is secured in the cone 18 substantially at the apex thereof, and such microphone 21 is connected through suitable wires or other electrical conductors to an amplifier 22 mounted in the upper portion of the container 10. The amplifier 22 may be of conventional design and construction, except for reasons of size, weight and low electrical current consumption, the amplifier 22 preferably incorporates transistors, rather than conventional vacuum tubes. The amplifier 22 may be provided with a suitable volume control 23 projecting through an opening 24 in the front wall 14 of the container 10 and there may be likewise, provided a tone control 25 projecting through an opening 26 in the front wall 14 of the container 10. Since the particular circuit and construction of the amplifier 22 forms no part of the present invention, a detailed description thereof is not considered necessary or desirable, and consequently, such amplifier is merely indicated by a dotted outline in Fig. 2 of the drawing.

Also housed within the container 10, are suitable batteries 27 and in view of the fact, that transistors are used in the amplifier 22, these batteries may be relatively small and light in weight and, at the same time, will have a relatively long useful life.

The loud speaker 16 is, of course, connected to the amplifier 22 by any suitable electrical conductors and in use, the electronic stethoscope, above described, may be conveniently held in the hand of the physician and with the diaphragm 19 in contact with the body of the patient, the diaphragm will be caused to vibrate by heart or lung sounds and will transmit sound waves to the microphone 21 for amplification by the amplifier 22 and propagation by the loud speaker 16.

Since, it is desirable in certain instances, for only the physician to hear the heart or lung sounds emanating from the stethoscope of this invention, there has been provided a jack 28 mounted on the container 10 and connected to the amplifier 22, which jack 28 serves to receive a plug, not shown, connected to a suitable ear piece, preferably of the type commonly employed in hearing aids. Insertion of the ear piece plug into the jack 28 serves to automatically disconnect the loud speaker 16, with the result that the sounds emanating from the amplifier 22 will only be heard by the person wearing the ear piece.

With particular reference to Figs. 4 to 7 inclusive, there is shown a modified form of electronic stethoscope construction in accordance with this invention and which may well comprise an elongated hollow casing 29, generally rectangular in cross section, although other shapes or configurations may, of course, be utilized, if desired. An amplifier 30 may be disposed within the casing 29 and such amplifier may be of the same type as described above, in connection with the first form of the invention. Also disposed within the casing 29 and connected to the amplifier 30 by suitable electrical conductors, are batteries 31 and in view of the use of transistors in the amplifier 30, these batteries 31 may be relatively small, light in weight and, at the same time, have a relatively long useful life.

A hollow head 32 is detachably secured to one end of the casing 29 by a ring 33 frictionally received in an annular groove 34 in the upper end of the casing 29 and the ring 33 is secured in any suitable manner to the bottom wall 35 of the head 32, the bottom wall 35 extending outwardly of opposite sides of the casing 29 to provide overhanging portions, as clearly shown in Figs. 4 and 6. Upwardly and inwardly inclined opposite end walls 36 and 37 respectively, connect the outer ends of the bottom wall 35 with a top wall 38. End wall 37 is provided with an opening 39 and a hollow cone 40 is disposed in the head

4

32 in axial alignment with the opening 39 and with the base of the cone 40 secured to the end wall 37 or supported within the head 32 in any other suitable manner. The opening 39 in the end wall 37 is closed by a flexible diaphragm 41 and disposed in the cone 40 substantially at the apex thereof, is a microphone 42 which is connected through suitable conductors to the amplifier 30.

A partition 43 is disposed in the hollow head 32 and extends between the bottom wall 35 and the top wall 38, at substantially right angles to the bottom wall 35 to provide a chamber 44 which is generally triangular in vertical cross section, as clearly shown in Fig. 4 of the drawing. A grille 45 is provided in the bottom wall 35 between the partition 43 and the end wall 36, and a loud speaker 46 is mounted in the chamber 44 adjacent the upper end thereof, and the loud speaker 44 is, of course, connected to the amplifier 30 by any suitable electrical conductors.

Suitable tone and/or volume controls 47 may be disposed in the hollow head 32 and connected to the amplifier 30 for control thereof and the tone and/or volume controls 47 may be provided with an actuating knob 48 extending exteriorly of the top wall 38 of the hollow head 32. There may also be provided on the casing 29 an on-off switch 49 which serves to disconnect the batteries 31 from the amplifier 30 when the stethoscope is not in use.

The modified form of the electronic stethoscope, above described, is comparable in size to a conventional flashlight and may be conveniently carried in the pocket of the user and during use thereof, the diaphragm 41 is placed in contact with, or adjacent the body of a patient whereupon the diaphragm will be caused to vibrate by the heart or lung sounds of the patient and will transmit sound waves to the microphone 42 for amplification by the amplifier 30 and propagation by the loud speaker 46. The tone or volume may, of course, be suitably adjusted by manipulation of the knob 48 and when the examination is completed, the amplifier 30 may be disconnected from the batteries 31 by manipulation of the switch 49 thereby conserving the batteries.

A further modified form of the invention is shown in Fig. 8, and this is somewhat similar to the form above described and shown in Figs. 4 to 7, in that, there is provided an elongated hollow casing 50, generally rectangular in cross section, although other shapes or configurations may, of course, be utilized if desired, and disposed within such casing 50 is an amplifier 51 and suitable batteries, not shown, for provision of the necessary power for operating the amplifier 51. A hollow head 52 is secured to one end of the casing 50, the head 52 having a bottom wall 53 extending outwardly of the opposite sides of the casing 50 to provide overhanging portions 54 and 55. Upwardly and inwardly inclined opposite end walls 56 and 57 respectively connect the outer ends of the bottom wall 53 with a top wall 58. End wall 56 is provided with an opening 58 and such opening is closed by a flexible diaphragm 59 secured to the end wall 56 in any suitable manner. A partition 60 of suitable sound insulating material is disposed in the head 52 inwardly of the end wall 56 with the partition 60 extending between the bottom wall 53 and the top wall 58 and, as clearly shown in Fig. 8, the partition 60 is substantially triangular in vertical cross section to provide with the end portion 54 of the bottom wall 53 and the end wall 56 a chamber 61 which is substantially triangular in vertical cross section. Disposed within the chamber 61 adjacent the apex thereof, is a microphone 62 which is connected by suitable electrical conductors to the amplifier 51. The microphone 62 is, of course, disposed in the apex of the chamber 61 opposite to the diaphragm 59.

The end wall 57 is provided with a grille 63 and a partition 64 of suitable sound insulating material is disposed in the hollow head 52 and extends between the bottom wall 53 and the top wall 58. The partition 64 as clearly shown in Fig. 8, is substantially triangular in

vertical cross section and provides with the portion 55 of the bottom wall 53 and the end wall 57, a chamber 65 which is substantially triangular in vertical cross section. A loud speaker 66 is disposed substantially at the apex of the chamber 65 opposite the grille 63 and the loud speaker 66 is connected to the amplifier 51 by any suitable electrical conductors. Suitable volume and tone controls may be disposed in the hollow head 52 and operated by a knob 67 projecting above the top wall 58. There may also be provided on the casing 50 an on-off switch 68 which serves to disconnect the batteries from the amplifier 51 when the device is not in use thereby conserving such batteries.

The use of the above described form of the device is substantially the same as that heretofore described, but it is to be noted, that the provision of the sound insulating partitions 60 and 64 prevent transmission of sound between the chambers 61 and 65 thereby preventing what is known as acoustic feed back and distortion of the sound output of the electronic stethoscope.

A still further modified form of the invention is shown in Fig. 9, in which there is provided an elongated hollow casing 69 which serves to receive an amplifier 70 and suitable batteries, not shown, and there is also provided a hollow head 71 at one end of the casing 69. The hollow head 71 is formed by a lower wall 72 projecting outwardly from one side of the casing 69 at substantially right angles thereto, a top wall 73 spaced from the lower wall 72 and substantially parallel thereto and an upwardly and inwardly inclined sidewall 74 connecting the lower wall 72 and one edge of the top wall 73. An opposite side wall 75 forms a continuation of the opposite side of the casing 69 and is connected to the opposite edge of the top wall 73. The inclined side wall 74 is provided with an opening 76 therein and such opening is closed by a flexible diaphragm 77.

A partition 78 of suitable insulating material extends between the upper end of the casing 69 and the line of juncture of the inclined side wall 74 and the top wall 73 to provide two chambers 79 and 80, chamber 79 being defined by the lower wall 72, the inclined side wall 74 and the partition 78. The chamber 80 is defined by the partition 78, the top wall 73 and the opposite side wall 75. It is to be noted, that if desired, the lower wall 72 may be provided on its inner surface with sound insulating or absorbing material 81 and likewise, the opposite side wall 75 may also be provided on its inner surface with sound insulating or absorbing material 82.

A microphone 83 is disposed in the chamber 79 and connected to the amplifier 70, while the top wall 73 is provided with a grille 83 and disposed within the chamber 80 is a loud speaker 84 which is also connected to the amplifier 70. As in the previously described form of the invention, the sound insulating partition 78 prevents acoustic feed back between the loud speaker 84 and the microphone 83 thereby eliminating distortion in the sound output of the device.

Another modified form of the invention is shown in Fig. 10 and is somewhat similar to the form shown in Fig. 9, but differs therefrom in the configuration and design of the head. In this form of the invention, there may be provided an elongated hollow casing 85 which serves to receive an amplifier 86, as well as batteries, not shown, for supplying power to the amplifier. A hollow head 87 is provided on one end of the casing 85 and such head 87 may be formed by a lower wall 88 extending outwardly from one side of the casing 85 at substantially right angles thereto, a top wall 89 spaced from the lower wall 88 and substantially parallel thereto, a side wall 90 connecting an edge of the lower wall 88 and an edge of the top wall 89 and disposed at substantially right angles to the lower and top walls and an opposite side wall 91 forming a continuation of the opposite side of the casing 85 and connected to the opposite edge of the top wall 89. The side wall 90 is provided with an opening 92 which is

closed by a flexible diaphragm 93 and the top wall 89 is provided with a grille 94.

A partition 95 of suitable sound insulating or absorbing material extends between the upper end of the casing 85 and the line of juncture of the side wall 90 and the top wall 89 to provide two chambers 96 and 97. The chamber 96 is defined by the lower wall 88, the side wall 90 and the partition 95 and the chamber 97 is defined by the partition 95, the top wall 89 and the opposite side wall 91.

A microphone 98 is disposed in the chamber 96 and it is to be noted, that sound insulating material 99 may be applied to the inner surface of the lower wall 88 and to the adjacent surface 85. Similarly sound insulating or absorbing material 100 may be applied to the inner surface of the opposite side wall 91 and to the adjacent end surface of the casing 85 and a loud speaker 101 is disposed in the chamber 97 and connected to the amplifier 86 by any suitable electrical conductors.

As in the above described forms of the invention, the sound insulating partition 95 prevents acoustic feed back between the loud speaker 101 and the microphone 98 thereby preventing distortion of the sound output of the device. The casing or container utilized to house the components and units of this invention may be formed of plastic or other suitable material and may be of such a size and shape as to be conveniently transported in the pocket of the user or, of course, be carried in the conventional physician's bag and likewise, the device of this invention may be of relatively small size and light weight, thereby permitting convenient use wherever desired in routine physical examinations. Small size and light weight may be attained by utilizing the design principles commonly employed in the manufacture of hearing aid devices and the like, thereby resulting in a device which may be economically produced in large numbers and conveniently carried and utilized by physicians in general practice.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A portable self contained electronic stethoscope comprising a generally rectangular container having front and back portions detachably fitted together along a median plane, a front wall on said front portion and a rear wall on said back portion, a grille in the lower part of said front wall, a loudspeaker disposed rearwardly of said grille, an outwardly opening hollow cone fixed in the upper portion of said rear wall and projecting rearwardly thereof, a diaphragm closing the outer end of said cone, a microphone disposed substantially at the apex of said cone, an amplifier disposed in said container and connected to said microphone and loudspeaker, volume and tone controls for said amplifier and batteries disposed in said container and connected to said amplifier whereby upon placing said diaphragm in contact with the body of a patient, said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

2. A portable self contained electronic stethoscope comprising a container having front and back portions detachably fitted together along a median plane, a front wall on said front portion and a rear wall on said back portion, a grille in the lower part of said front wall, a loudspeaker disposed rearwardly of said grille, an outwardly opening hollow cone fixed in the upper portion of said rear wall and projecting rearwardly thereof, a diaphragm closing the outer end of said cone, a microphone disposed substantially at the apex of said cone, an amplifier disposed in said container and connected to said microphone and loudspeaker, volume and tone controls for said amplifier and batteries disposed in said container

and connected to said amplifier whereby upon placing said diaphragm in contact with the body of a patient, said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

3. A portable self contained electronic stethoscope comprising a container having front and back portions, a front wall on said front portion and a rear wall on said back portion, a grille in the lower part of said front wall, a loudspeaker disposed rearwardly of said grille, an outwardly opening hollow cone fixed in the upper portion of said rear wall and projecting rearwardly thereof, a diaphragm closing the outer end of said cone, a microphone disposed substantially at the apex of said cone, an amplifier disposed in said container and connected to said microphone and loudspeaker, volume and tone controls for said amplifier and batteries disposed in said container and connected to said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

4. A portable self contained electronic stethoscope comprising a container having front and back portions, a front wall on said front portion and a rear wall on said back portion, a grille in the lower part of said front wall, a loudspeaker disposed rearwardly of said grille, an outwardly opening hollow cone fixed to the upper portion of said rear wall, a diaphragm closing the outer end of said cone, a microphone disposed substantially at the apex of said cone, an amplifier disposed in said container and connected to said microphone and loudspeaker, volume and tone controls for said amplifier and batteries disposed in said container and connected to said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

5. A portable self contained electronic stethoscope comprising a container having front and back portions, a front wall on said front portion and a rear wall on said back portion, a grille in said front wall, a loudspeaker disposed rearwardly of said grille, an outwardly opening hollow cone fixed to said rear wall, a diaphragm closing the outer end of said cone, a microphone disposed in said cone, an amplifier disposed in said container and connected to said microphone and loudspeaker, controls for said amplifier and batteries disposed in said container and connected to said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

6. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head detachably secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a hollow cone disposed in said head in axial alignment with said opening with the base of said cone secured to said one end wall, a diaphragm closing the base of said cone, a microphone disposed substantially at the apex of said cone and connected to said amplifier, a partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall at substantially right angles to said bottom wall to provide a chamber generally triangular in vertical cross section, a grille in said bottom wall between said partition and said other end wall, a loudspeaker disposed in said chamber adjacent the upper end thereof and connected

to said amplifier, tone and volume controls disposed in said head and connected to said amplifier and an on-off switch on said casing whereby upon placing said diaphragm with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

7. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head detachably secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a hollow cone disposed in said head in axial alignment with said opening with the base of said cone secured to said end wall, a diaphragm closing the base of said cone, a microphone disposed substantially at the apex of said cone and connected to said amplifier, a partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall at substantially right angles to said bottom wall to provide a chamber generally triangular in vertical cross section, a grille in said bottom wall between said partition and said other end wall, a loudspeaker disposed in said chamber adjacent the upper end thereof and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

8. A portable self contained electronic stethoscope comprising an elongated hollow casing, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a hollow cone disposed in said head in axial alignment with said opening with the base of said cone secured to said one end wall, a diaphragm closing the base of said cone, a microphone disposed substantially at the apex of said cone and connected to said amplifier, a partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall at substantially right angles to said bottom wall to provide a chamber generally triangular in vertical cross section, a grille in said bottom wall between said partition and said other end wall, a loudspeaker disposed in said chamber adjacent the upper end thereof and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

9. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a diaphragm closing said opening, a sound insulating partition disposed in said head inwardly of said one end wall and extending between said bottom wall and said top wall, said partition being substantially triangular in vertical cross section to provide with said bottom wall and said

one end wall a chamber substantially triangular in vertical cross section, a microphone disposed in said chamber adjacent the apex thereof opposite said diaphragm and connected to said amplifier, a grille in said other end wall, a second sound insulating partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall, said second partition being substantially triangular in vertical cross section to provide with said bottom wall and said other end wall a second chamber substantially triangular in vertical cross section, a loudspeaker disposed in said second chamber adjacent the apex thereof opposite said grille and connected to said amplifier, tone and volume controls disposed in said head and connected to said amplifier and an on-off switch on said casing whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

10. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a diaphragm closing said opening, a sound insulating partition disposed in said head inwardly of said one end wall and extending between said bottom wall and said top wall, said partition being substantially triangular in vertical cross section to provide with said bottom wall and said one end wall a chamber substantially triangular in vertical cross section, a microphone disposed in said chamber adjacent the apex thereof opposite said diaphragm and connected to said amplifier, a grille in said other end wall, a second sound insulating partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall, said second partition being substantially triangular in vertical cross section to provide with said bottom wall and said other end wall a second chamber substantially triangular in vertical cross section, a loudspeaker disposed in said second chamber adjacent the apex thereof opposite said grille and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

11. A portable self contained electronic stethoscope comprising an elongated hollow casing generally triangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a diaphragm closing said opening, a sound insulating partition disposed in said head inwardly of said one end wall and extending between said bottom wall and said top wall, said partition providing with said bottom wall and said one end wall a chamber substantially triangular in vertical cross section, a microphone disposed in said chamber adjacent the apex thereof opposite said diaphragm and connected to said amplifier, a grille in said other end wall, a second sound insulating partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall, said second partition providing with said bottom wall and said other end wall a second chamber sub-

stantially triangular in vertical cross section, a loudspeaker disposed in said second chamber adjacent the apex thereof opposite said grille and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

12. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head secured to one end of said casing, said head having a bottom wall extending outwardly of opposite sides of said casing to provide overhanging portions, upwardly and inwardly inclined opposite end walls connecting the outer ends of said bottom wall with a top wall, one of said end walls having an opening, a diaphragm closing said opening, a sound insulating partition disposed in said head inwardly of said one end wall and extending between said bottom wall and said top wall, said partition providing with said bottom wall and said one end wall a chamber, a microphone disposed in said chamber and connected to said amplifier, a grille in said other end wall, a second sound insulating partition disposed in said head inwardly of said other end wall and extending between said bottom wall and said top wall, said second partition providing with said bottom wall and said other end wall a second chamber, a loudspeaker disposed in said second chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

13. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head on one end of said casing, said head comprising a lower wall extending outwardly from one side of said casing at substantially right angles thereto, a top wall spaced from said lower wall and substantially parallel thereto, an upwardly and inwardly inclined side wall connecting said lower wall and one edge of said top wall, an opposite side wall forming a continuation of the opposite side of said casing and connected to the opposite edge of said top wall, said inclined side wall having an opening therein, a diaphragm closing said opening, a sound insulating partition extending between said casing and the line of juncture of said inclined side wall and said top wall to provide two chambers, one chamber being defined by said lower wall, said inclined side wall and said partition, the other chamber being defined by said partition, said top wall and said opposite side wall, a microphone in said one chamber connected to said amplifier, a grille in said top wall, a loudspeaker disposed in said other chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

14. A portable self contained electronic stethoscope comprising an elongated hollow casing, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head on one end of said casing, said head comprising a lower wall extending outwardly from one side of said casing at substantially right angles thereto, a top wall spaced from said lower wall and substantially parallel thereto, an upwardly and inwardly inclined side wall connecting said lower wall and one edge of said top wall, an opposite side wall, said inclined side wall having an opening therein, a diaphragm closing said opening, a sound insulating partition extend-

ing between said casing and the line of juncture of said inclined side wall and said top wall to provide two chambers, one chamber being defined by said lower wall, said inclined side wall and said partition, the other chamber being defined by said partition, said top wall and said opposite side wall, a microphone in said one chamber connected to said amplifier, a grille in said top wall, a loudspeaker disposed in said other chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

15. A portable self contained electronic stethoscope comprising an elongated hollow casing, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head on one end of said casing, said head comprising a lower wall extending outwardly from one side of said casing and substantially right angles thereto, a top wall spaced from said lower wall and substantially parallel thereto, an upwardly and inwardly inclined sidewall connecting said lower wall and one edge of said top wall, an opposite side wall, said inclined side wall having an opening therein, a diaphragm closing said opening, a sound insulating partition extending between said casing and said top wall to provide two chambers, one chamber being defined by said lower wall, said inclined side wall and said partition, the other chamber being defined by said partition, said top wall and said opposite side wall, a microphone in said one chamber connected to said amplifier, a grille in said top wall, a loudspeaker disposed in said other chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

16. A portable self contained electronic stethoscope comprising an elongated hollow casing generally rectangular in cross section, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head on one end of said casing, said head comprising a lower wall extending outwardly from one side of said casing at substantially right angles thereto, a top wall spaced from said lower wall and substantially parallel thereto, one side wall connecting an edge of said lower wall and an edge of said top wall and disposed at substantially right angles of said lower and said top walls, an opposite side wall forming a continuation of the opposite side of said casing and connected to the opposite edge of said top wall, said one side wall having an opening therein, a diaphragm closing said opening, a sound insulating partition extending between said casing and the line of juncture of one side wall and said top wall to provide two chambers, one chamber being defined by said lower wall, said one side wall and said partition, the other chamber being defined by said partition, said top wall and said opposite side wall, a microphone in said one chamber connected to said amplifier, a

grille in said top wall, a loudspeaker disposed in said other chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

17. A portable self contained electronic stethoscope comprising an elongated hollow casing, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head on one end of said casing, said head comprising a lower wall extending outwardly from one side of said casing at substantially right angles thereto, a top wall spaced from said lower wall and substantially parallel thereto, one side wall connecting an edge of said lower wall and an edge of said top wall and disposed at substantially right angles to said lower and top walls, an opposite side wall, said one side wall having an opening therein, a diaphragm closing said opening, a sound insulating partition extending between said casing and the line of juncture of said one side wall and said top wall to provide two chambers, one chamber being defined by said lower wall, said one side wall and said partition, the other chamber being defined by said partition, said top wall and said opposite side wall, a microphone in said one chamber connected to said amplifier, a grille in said top wall, a loudspeaker disposed in said other chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

18. A portable self contained electronic stethoscope comprising an elongated hollow casing, an amplifier disposed in said casing, batteries disposed in said casing and connected to said amplifier, a hollow head on one end of said casing, said head comprising a lower wall extending outwardly from one side of said casing at substantially right angles thereto, a top wall spaced from said lower wall and substantially parallel thereto, one side wall connecting an edge of said lower wall and an edge of said top wall and disposed at substantially right angles to said lower and top walls, an opposite side wall, said one side wall having an opening therein, a diaphragm closing an opening, a sound insulating partition extending between said casing and said top wall to provide two chambers, one chamber being defined by said lower wall, said one side wall and said partition, the other chamber being defined by said partition, said top wall and said opposite side wall, a microphone in said one chamber connected to said amplifier, a grille in said top wall, a loudspeaker disposed in said other chamber and connected to said amplifier and controls for said amplifier whereby upon placing said diaphragm in contact with the body of a patient said diaphragm will vibrate and transmit sound waves to said microphone for amplification by said amplifier and propagation by said loudspeaker.

No references cited.