

March 10, 1964

R. CEFALY

3,124,211

MULTIPLE HEADED ACOUSTIC STETHOSCOPE

Original Filed Feb. 11, 1960

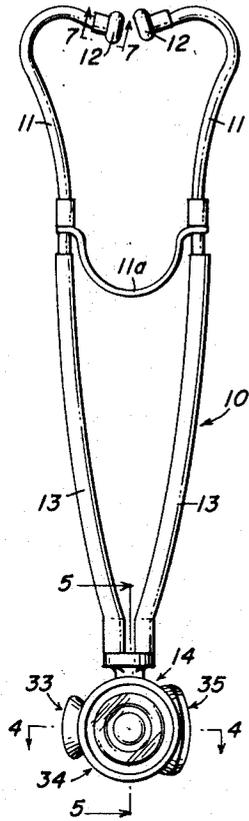


FIG. 1

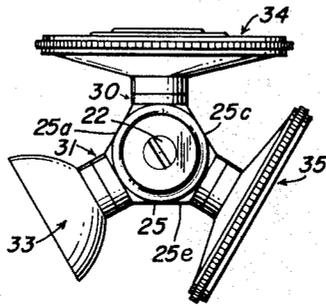


FIG. 3

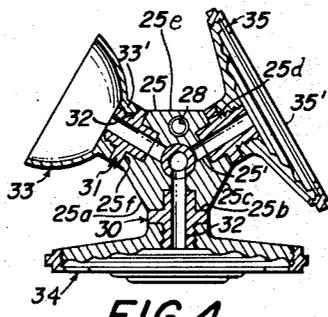


FIG. 4

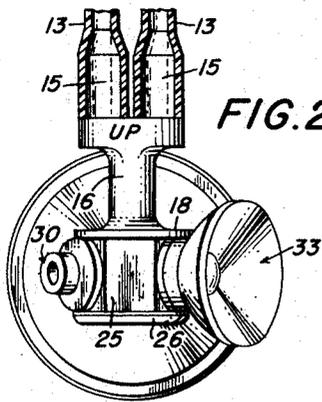


FIG. 2

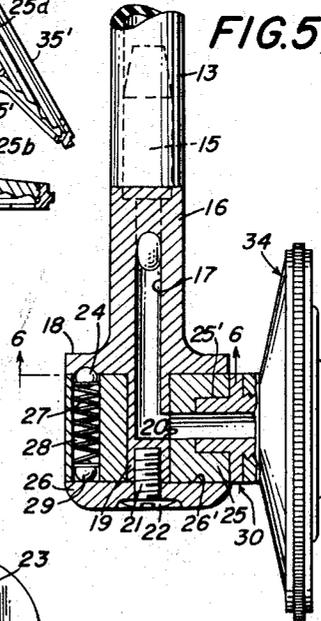


FIG. 5

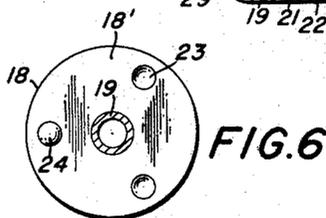


FIG. 6

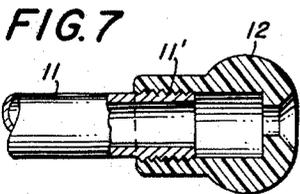


FIG. 7

INVENTOR  
RALPH CEFALY

BY *Peter J. Young, Jr.*  
ATTORNEY

1

3,124,211

## MULTIPLE HEADED ACOUSTIC STETHOSCOPE

Ralph Cefaly, Brentwood, Md., assignor, by mesne assignments, to Taylor Instrument Companies, a corporation of New York

Original application Feb. 11, 1960, Ser. No. 8,080, now Patent No. 3,109,508, dated Nov. 5, 1963. Divided and this application June 22, 1961, Ser. No. 127,072  
3 Claims. (Cl. 181—24)

This invention relates to improvements in stethoscopes.

This application is a divisional application of application Serial Number 8,080, filed February 11, 1960.

It is an object of this invention to provide a highly responsive stethoscope pickup device which will handle a range of frequencies which is essential for the examining physician.

A further object of the invention is to provide a stethoscope with three listening heads each of which serves to pick up a particular range and quality of sound.

A still further object of the invention is to provide in a stethoscope listening head a variable volume sound chamber.

Another object of the invention is to provide in a stethoscope listening head a diaphragm having a portion thereof protruding which contacts the object being sensed so that pressure may be applied to move the diaphragm in order to vary the volume of the sound chamber with which the diaphragm cooperates.

Yet a further object of the invention is to provide a stethoscope listening head that will receive sound with fidelity in the low range of about 16–20 cycles per second and provide amplification thereof having an increased amount of about 10–14 decibels over other known stethoscopes.

A still further object of the invention is to provide a stethoscope with a diaphragm and sound-receiving head mounting the diaphragm that permits the diaphragm to be pressed against the body being sensed thereby to vary the characteristics of the sound chamber formed between the diaphragm and the sound-receiving head.

A further object of the invention is to provide a highly useful stethoscope with three sound-receiving heads wherein any one of the heads may be quickly brought into contact with the body being sensed and wherein one head is of the bell type for local auscultation, one is of the flat diaphragm type which accentuates the high frequencies and at the same time filters the lower range of frequencies and a third type of larger diameter than the flat diaphragm type and having a diaphragm with a protruding portion for body contact and surrounding concave and convex in cross section portions whereby pressure on the diaphragm flexes it to vary the volume of the sound chamber formed by the diaphragm and its mounting head so as to detect and relay a wide range of heart sounds not capable of being picked up for analysis by either of the other two sound-receiving heads.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It is to be understood, however, that the detailed description and specific examples are given by way of illustration only and, while indicating preferred embodiments of the invention, are not given by way of limitation, since various

2

changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

For a more complete understanding of the nature and scope of this invention, references may be had to the drawings in which;

FIG. 1 is an elevational view of the combined stethoscope employing the multiple heads according to this invention;

FIG. 2 is a view on an enlarged scale of the multiple heads with one of the sound-receiving heads removed;

FIG. 3 is an end view of the multiple heads;

FIG. 4 is a cross-sectional view of the multiple heads along line 4—4 of FIG. 1, but on an enlarged scale over that of FIG. 1;

FIG. 5 is a modified view on an enlarged scale of the turret head on line 5—5 of FIG. 1 showing a locking means for holding the swivel head in a selected position;

FIG. 6 is a cross-sectional view along line 6—6 of FIG. 5;

FIG. 7 is an enlarged cross-sectional of an ear piece along line 7—7 of FIG. 1.

Throughout the description like reference numerals and characters refer to similar parts.

In FIG. 1 a stethoscope is generally indicated at 10 and comprises the binaural ear pieces 11—11 held apart by the conventional spring steel member 11a. The ear pieces 11—11 terminate at their upper ends in ear tips 12 which may be threadedly received on the upper ends of members 11 as indicated in FIG. 7 at 11'. Leading from the ear pieces 11 are flexible tubes or conduits 13 which connect the ear pieces in the multiple head, generally indicated at 14.

The multiple head 14 has a bifurcated pair of conduits 15—15 which slidably receive in a secure manner the lower ends of the tubes 13. The bifurcated members 15—15 which are hollow combine into a neck portion 16 having a central passage 17 therein, see FIG. 5, and a circular body portion 18 with a protruding cylindrical boss 19 through which there is an extension of aperture 17. The boss portion 19 is formed with a transverse aperture 20, as best shown in FIG. 5, connecting with the axially extending passage 17 while the extreme lower end of the boss 19 is provided with a threaded screw-receiving recess 21 to receive a securing screw 22, as will be explained. The lower face 18' of the portion 18, as shown in FIG. 6, has formed therein three equally spaced apart hemispherical recesses 23 to receive an upper detent ball bearing 24 therein as will be explained.

Received over the cylindrical boss 19 of member 16 is a main rotary member 25 having an aperture through its center that is received over the boss 19. This main rotary member 25 is in the illustration formed with six sides, 25a, 25b, 25c, 25d, 25e, and 25f, as best shown in FIG. 4, and is held engaged over the boss 19 by a circular end plate or washer 26 having a counter sunk central aperture that receives the cap screw 22 flush with the face thereof. In line with any one of the spaced apart apertures 23 in the circular body portion 18 as shown in FIG. 5 and lying on a radius from the center of the aperture 17 and the boss 19 within the member 25 is a vertical aperture 27 which receives and guides a compression spring 28 that presses against the detent or locking ball bearing 24 at the upper end and the ball bearing

29 at the lower end which rests against the inner face 26' of the end plate 26.

The main rotary member 25 has three of its equally spaced apart faces drilled to provide radially extending countersunk recesses 25', see FIGURES 4 and 5, to receive adapters 30 which are press fitted or otherwise soldered into place. Each of the adapters 30 is provided with shoulders 31 and a reduced externally threaded outer end at 32 to receive the respective listening heads or chest pieces as will be explained.

On one of the adapters 30 is received a bell or non-diaphragm sound listening head 33 of about 1½ inches in diameter for listening to local auscultation. Bell 33 has an interiorly threaded aperture 33' at its inner end which is received over the outer threaded end 32 of an adapter 30.

A special listening head according to the invention is shown as the largest head at 34. The next larger listening head is indicated at 35 which has the customary flat diaphragm 35'. Each of the listening heads 34 and 35 is alike except for size and diaphragms.

When it is desired to bring a listening head into cooperation with the transverse aperture 20 in the member 16 and leading to the passage 17 therein, it is merely necessary to rotate the main rotary member 25 so that the particular head desired is oppositely positioned from the "UP" indicia on member 16 as shown in FIG. 2. This orientation aligns the particular listening head and its adapter 30 so as to be in line with the selected transverse aperture 20 in the boss 19 on member 16. The main rotary member which mounts the adapters 30 is held in a selected position by the action of the compression spring 28 urging the sphere 24 and 29 outward whereupon sphere 24 is in engagement with the pocket 23 for the selected position.

Applicant has provided a highly useful stethoscope arrangement and a particularly advantageous sound-receiving head or chest piece structure that permits more accurate detection and diagnosis of within body sounds being sensed.

This application is a continuation-in-part of my co-pending application Serial No. 769,114, filed October 23, 1958, now U.S. Patent No. 3,020,971.

I claim as my invention:

1. A multiple headed stethoscope for pick up and transmission of a full range of sound frequencies comprising in combination a head member having a sound transmitting passageway extending axially therethrough connected with a sound transmitting aperture leading externally of said head adjacent one end thereof, said head having a bifurcated opposite end, said bifurcations having sound transmitting passageways therethrough communicating with the sound transmitting apertures in said head; sound transmitting conduits connected to said bifurcations on the head and terminating in sound transmitting binaural tips; a main member movably mounted on said head member and having means securing it to said head member for ready movement with respect thereto at said one end of the head member into selected positions, said main movable member having a plurality of sound transmitting passageways therein in spaced apart position and selectively alignable at one end thereof with said aperture leading externally of said head member when said main movable member is moved to permit such alignment; said main movable member having a plurality of sound receiving members attached thereto and respectively in sound communication with the other ends said sound transmitting passageways therein for pick up and transmission of local auscultation, and releasable means for holding said movable member in a selected position comprising a ball bearing and biasing means positioned in one of said members with the other of said members having a plurality of depressions therein adapted to accommodate a portion of said ball bearing, said ball bearing, said biasing means and said depressions

located within said members and inaccessible from the exterior thereof, said ball bearing being selectively and respectively engageable with said depressions under the biasing action of said biasing means to maintain said movable member respectively in said selected positions with respect to said head member, said movable member being movable by a slight exterior force applied thereto whereby the biasing action of said biasing means is overcome to effect disengagement of said ball from one of said depressions and permit movement of said movable member and effect engagement of said ball with another of said depressions.

2. A multiple headed stethoscope comprising, in combination, a head member having a centrally disposed protruding boss having a sound transmitting passageway extending axially therethrough connected with a transverse aperture leading externally of said boss, said head having a bifurcated opposite end to that of the protruding boss, said bifurcations having sound transmitting passageways therethrough communicating with the sound transmitting apertures in the head and boss, sound transmitting conduits connected to said bifurcations on the head and terminating in sound transmitting binaural tips, a main rotary member having a centrally disposed aperture received over said boss, said rotary member having means securing it to said boss for rotary movement to selected positions, said rotary member having radially extending sound transmitting passageways therein in spaced apart position and extending transverse to the central disposed aperture therein, the central axis of each of said radially extending passageways and of said transverse aperture in said boss being positioned in the same plane, said radially extending passageways being selectively rotatable into position in alignment with said transverse aperture in said boss, and sound receiving members connected to said rotary member respectively in sound transmitting communication with said radially extending sound transmitting passageways therein, said head member and said main rotary member having spring pressed detent means for holding said rotary member in a selected position.

3. A multiple headed stethoscope comprising, in combination, a head member having a centrally disposed protruding boss having a sound transmitting passageway extending axially therethrough connected with a transverse aperture leading externally of said boss, said head having a bifurcated opposite end to that of the protruding boss, said bifurcations having sound transmitting passageways therethrough communicating with the sound transmitting apertures in the head and boss, sound transmitting conduits connected to said bifurcations on the head and terminating in sound transmitting binaural tips, a main rotary member having a centrally disposed aperture received over said boss, said rotary member having means securing it to said boss for rotary movement to selected positions, said rotary member having radially extending sound transmitting passageways therein in spaced apart position and extending transverse to the central disposed aperture therein, the central axis of each of said radially extending passageways and of said transverse aperture in said boss being positioned in the same plane, said radially extending passageways being selectively rotatable into position in alignment with said transverse aperture in said boss, and sound receiving members connected to said rotary member respectively in sound transmitting communication with said radially extending sound transmitting passageways therein, said head having a centrally disposed circular body portion from which extends said boss in one direction and a reduced neck portion in the opposite direction, said centrally disposed circular body portion having a flat face and said boss extending therefrom in a direction transverse thereto, said reduced neck portion of said head diverging into said bifurcations at the end thereof opposite said circular body portion, said main rotary member being of hexagonal shape having six flat faces extending parallel to said centrally

disposed aperture therein and having opposite flat ends transverse to said hexagonal sides, one of said flat ends being engageable with said flat face of said centrally disposed circular body portion when said main rotary member is rotatably mounted on said boss, said means securing said rotary member rotatably on said boss comprising a centrally apertured circular washer-like member received over and engageable with the other of said flat ends of said rotary member and secured to said boss by a screw extending through said aperture in the washer and thread-

edly received in a threaded aperture in the end of said boss.

## References Cited in the file of this patent

## UNITED STATES PATENTS

705,934	Knudson et al. -----	July 29, 1902
965,174	Fuchs -----	July 26, 1910
1,872,081	Hawley -----	Aug. 16, 1932
2,719,594	Smithline -----	Oct. 4, 1955
2,722,989	Tynan -----	Nov. 8, 1955