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STEREOPHONIC RECEPTION

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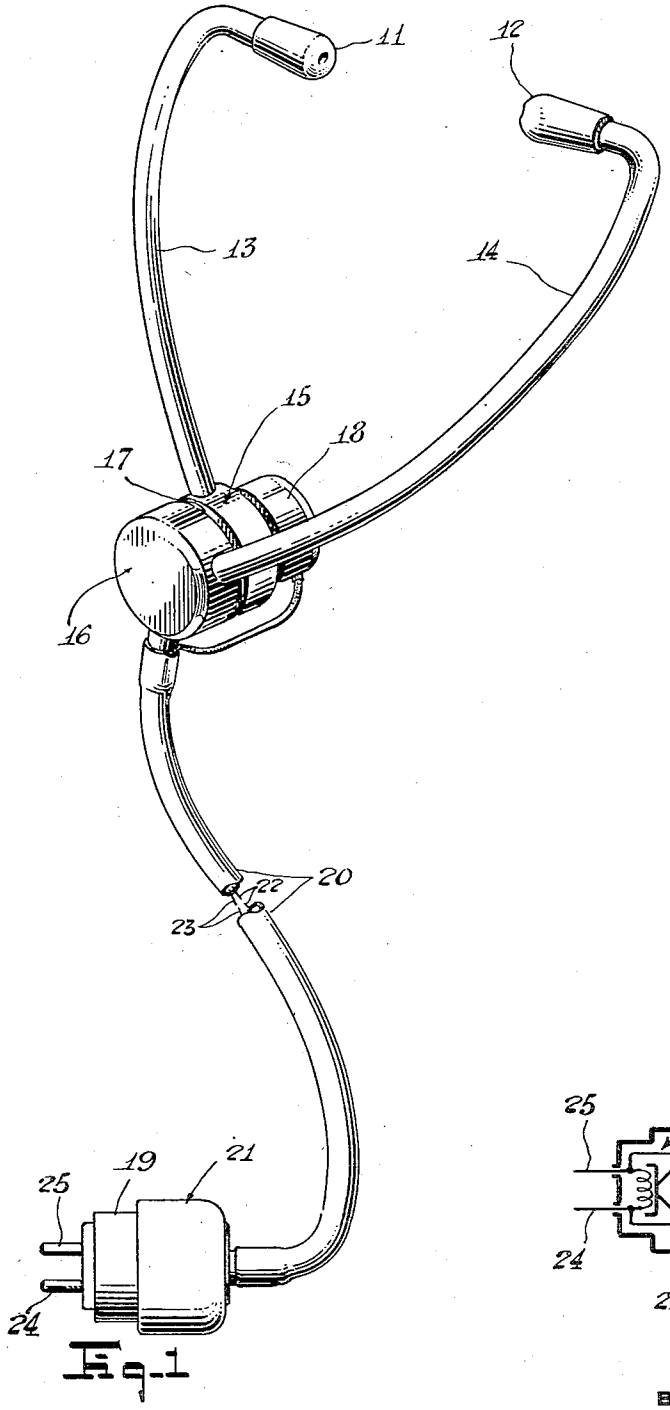


Fig. 1

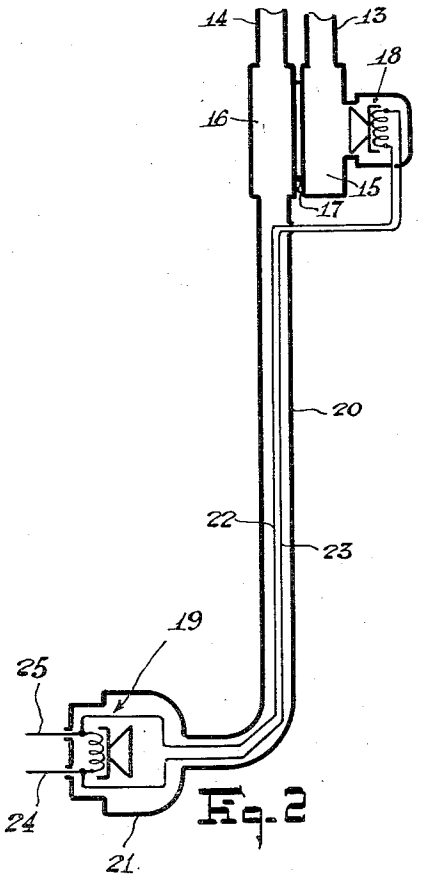


Fig. 2

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STEREOPHONIC RECEPTION

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This invention relates to sound transmission and reception and, in particular, to a method and apparatus including ear pieces for dictating machines, stethoscopes, and other devices employed in phonographic reproduction.

A study of certain peculiarities in the sense of hearing, regarding the reception of sounds by the ears, having particular reference to a first reception by one ear and a second reception by the other ear, has led to a development of the present invention.

Sound is improved in quality by the reception of reflected portions thereof, such as those which may reach the ears from the walls of a room or other reflecting surfaces. However, when a reflected wave is more than eighty feet behind the primary wave, the two do not merge and appear as one sound, but the reflected wave is heard as an echo. When one ear hears the sound before the other ear, and the time interval between the reception by the two ears is less than the so-called binaural limit, the sound appears at some definite angle to the listener. If both ears hear the same sound at the same time, the sound appears to come from the direction directly ahead of or behind the listener.

In phonograph receiving apparatus which carries sound to the ears, it has been the practice to convey the sound in one path and then split it into two paths, usually of equal length, for presentation to the two ears. The sounds thus heard are not the most natural sounds that can be obtained. In accordance with the present invention, it is proposed to distribute the sound from a plurality of sources so that it may appear to be of improved quality and differentially received by the two ears with a more natural effect.

Because of the general use of dictating machines, the invention will be specifically described with reference to such devices, with no intention to limit it thereto. In this use of such devices, typists are obliged to sit for long periods of time, typing words received by them through ear pieces from a phonographic record of dictation. The more unnatural the sound heard, the more strain there is on the typist.

The mechanism proposed in accordance with my invention utilizes two sound transducers, desirably in the form of miniature speakers such as are used in hearing aids. One of these, the primary transducer is placed at or close to the ear, and the other as a secondary transducer, is placed relatively remote from the ear, and the sound is carried to the ear piece through an acoustical tube. This tube is of such length that the sound from the secondary transducer is heard a split second, desirably less than the binaural limit, after the sound from the primary transducer. This means that the sound heard by one ear is out of phase with that heard by the other. The time lag has an extending or prolonging effect on vocal or musical sound impulses. The end result is a dramatic reproduction of great depth, which seems to surround the listener and has an intimate, personal, and unusually clear quality.

There is also a modification of the sound by virtue of the fact that high-frequency sounds are attenuated to a greater extent when conducted through a tube than those of lower frequency. This gives a differential in the quality of the sound transmitted to the two ears, resulting in a more natural effect than that which would be obtained if the lengths of the tubes from the speakers to the ears were exactly the same.

An object of the invention is to improve on the quality of the aggregate sound heard at the ear pieces of dictating machines or those employed in other phonographic reproduction.

Another object of my invention is to provide for the transmitting of sounds to one ear at a slightly out-of-phase relationship with respect to the sounds transmitted to the other ear.

A further object of my invention is to provide for the use of two receivers or speakers in connection with the ear pieces and their connections, used with dictating machines and the like, one of said receivers being at the connection between the two ear pieces, and the other being at the remote end of a tube connecting with the sound pick-up device, and transmitting sound to only the other ear piece.

These and other objections and advantages of the invention will become apparent from the following specification when taken with the accompanying drawing.

In the drawing, wherein like reference characters denote like parts in several views:

Figure 1 is a perspective view, with a part of the flexible tube broken away, of apparatus embodying my invention.

Figure 2 is a fragmentary diagrammatic sectional view axially of the swivel connection between the ear pieces.

Referring to the drawing in detail, there is shown a device such as employed for receiving phonographically-produced sounds, comprising ear pieces **11** and **12** respectively connected by tubes **13** and **14** to sound boxes **15** and **16**. The tubes **13** and **14** are desirably relatively rigid and may be formed of plastic, hard rubber, or other suitable material. The sound box portions **15** and **16** are pivoted or swiveled coaxially with respect to one another, as indicated at **17**, so that the ear pieces **11** and **12** may rotate or swing with respect to one another about the axis of the boxes to and from the ears of the user.

The sound box **15** has connected thereto the primary sound transducer or speaker **18**, which may be in the form of a miniature sound receiver like that used in hearing aids. Although in Figure 2 it is shown integral with the sound box **15**, it may be snapped into and out of engagement therewith, like a hearing aid receiver, in a manner well understood in the art, and as may be inferred from Figure 1. This means that the output of the receiver **18** goes to the ear which receives it at ear piece **11** through the relatively short tube **13**.

The secondary transducer or speaker **19** is likewise in the form of a miniature sound receiver like that used in hearing aids, which may be snapped into and from engagement with the end member or sound box **21** of the device. This sound box **21** is directly connected to the sound box **16** by means of a flexible tube **20**, formed of rubber, flexible plastic, or other suitable material. The length of this tube may for practical purposes be between 3½ and 6 feet, which means that the out-of-phase relationship, by virtue of the extra distance traveled by the sound from receiver **19**, as compared with that traveled from receiver **18**, to the ear piece **12**, is not longer than the binaural limit. As shown by the diagrammatic representation in Figure 2, the transducers **18** and **19** are connected in parallel, by means of wires **22** and **23**, and both receive their power through contact prongs **24** and **25**, which are to be connected to a single source of sound

representing oscillations or pick-up device (not shown) such as the phonographic device which reproduces the sound from a record on a dictating machine.

From the foregoing disclosure, it will be seen that I have devised mechanism using two sound transducers, one of which is close and the other remote with respect to the user's ears, so that a stereophonic audible effect is produced corresponding with the combination of sounds received directly and after reflection from surrounding walls or the like, giving the operator a more pleasant, because more natural, sound and decreasing the strain of transcribing, as in the use of a dictating machine. Although a preferred embodiment has been disclosed, it will be understood that I do not wish to be limited to the exact illustration.

Having now described my invention in detail in accordance with the requirements of the patent statutes, various changes and modifications will suggest themselves to those skilled in this art, and it is intended that such changes and modifications shall fall within the scope and spirit of the invention, as defined by the following claims.

I claim:

1. Apparatus for hearing sound from a dictating machine or the like, comprising two electrically-energizable sound transducers, an acoustic ear piece for each ear, electric circuit means connecting said transducers for energization by a common source of sound-representing electrical oscillations, acoustic circuit means connecting said transducers independently of each other to said ear pieces respectively, one of said circuit means including means adapted to cause the sound in one of said ear pieces to be out of phase with and to differ in frequency characteristic from that of the other of said ear pieces.

2. A hearing device for reproducing sound from an electrical circuit carrying sound-representing oscillations, comprising two sound transducers connected to said circuit for providing separate sources of substantially identical sound, a receiving unit comprising two ear pieces, and separate sound tubes connecting said transducers to said ear pieces respectively, one of said tubes being substantially longer than the other to cause the sounds at the respective ear pieces to differ in phase and frequency characteristic.

3. The hearing device set forth in claim 2 wherein the transducer feeding into the shorter of said sound tubes is structurally connected to an intermediate portion of the longer of said sound tubes, including wiring within said longer tube electrically interconnecting said transducers.

4. A hearing device for reproducing sound from an electrical circuit carrying sound-representing oscillations, comprising two sound transducers electrically connected to said circuit to provide separate sources of substantially identical sound, a receiving unit comprising separate ear pieces having rigid tubular extensions and a swivel joint therebetween, separate sound boxes at said joint respectively connected acoustically to said tubular extensions, one of said transducers being connected to one of said sound boxes with the sound box forming a junction between the transducer and one of said ear pieces, and a sound tube of a length substantially greater than the length of said ear piece extensions connected at one end to the other of said transducers and at the other end to the other of said sound boxes with the sound box forming a junction between the sound tube and the other of said ear pieces.

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