July 14, 1931. A. A. JOHNSON 1,813,931

HEARING TUBE

Filed Feb. 23, 1926

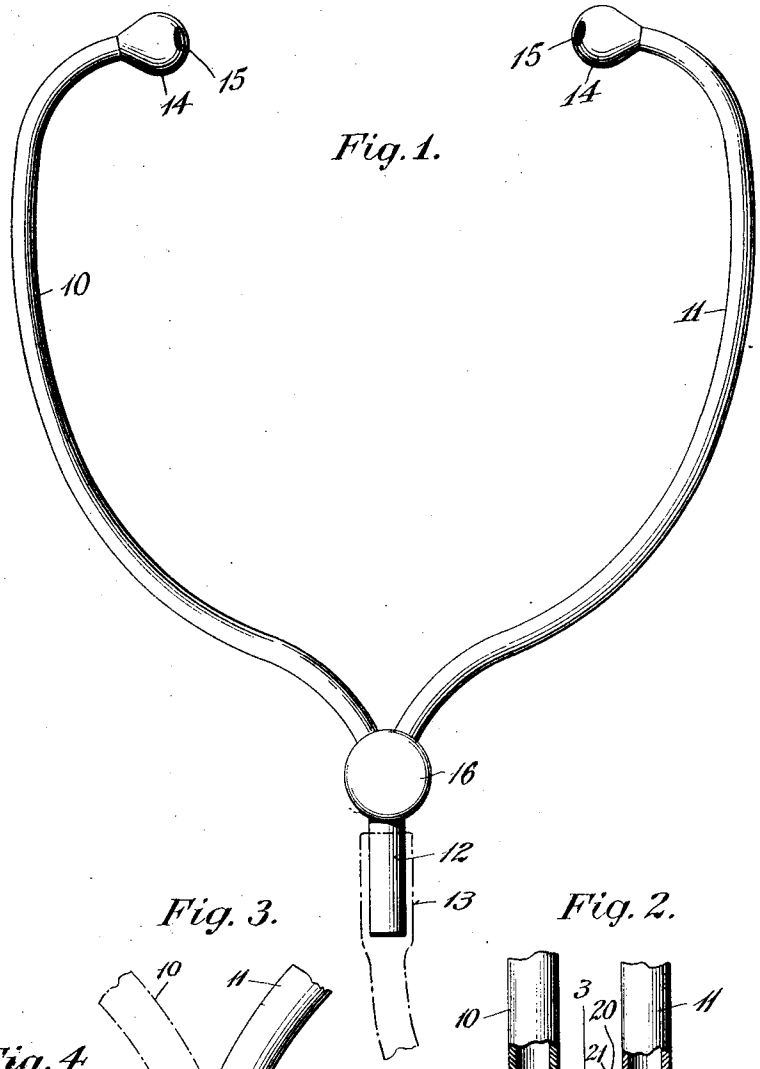


Fig. 1.

Fig. 3.

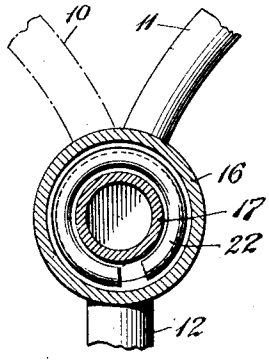
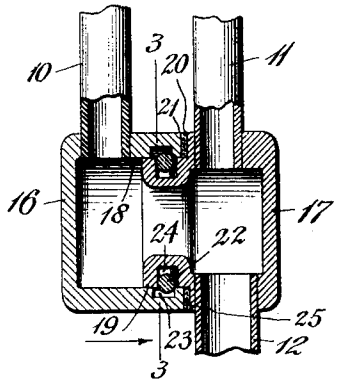


Fig. 4.



Fig. 2.



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UNITED STATES PATENT OFFICE

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HEARING TUBE

Application filed February 22, 1926. Serial No. 89,864.

This invention relates to hearing tubes such as are used in conjunction with dictation machines, other phonographs, and sound producing machines, and more particularly to the type of hearing device which comprises a pair of tubes swiveled together at the place where they are acoustically connected to the sound-conveying tube.

An object of the invention is to produce a device of the kind above specified which is simple in construction, economical to manufacture, easily assembled and efficient in use.

In attaining this object, the present invention, in its more specific aspect, provides, on two relatively moving parts of the device, companion bearing surfaces whereby one part may turn on another, and a concealed, self-acting connection between said moving parts whereby the parts are permanently locked together in proper operative relation when the device is once assembled.

According to the present invention, this self-acting locking device may also constitute the means for frictionally holding the parts against accidental or unintentional relative movements when in use.

Further objects and advantages will hereinafter appear.

In the accompanying drawings, which illustrate a form of the invention that at present preferred—

Figure 1 is a view showing the hearing device with the sound-conducting tube applied thereto.

Fig. 2 is a sectional view showing the companion bearing surfaces on the relatively movable parts of the device with the self-acting locking device holding the parts together.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2, showing in elevation the self-acting locking device in operative position.

Fig. 4 is a perspective view of the self-acting locking device.

In connection with dictation machines, other phonographs, radio receiving devices, surgical instruments such as stethoscopes, and noise and sound-locating devices used in the mechanical arts, a now prevalent means for transmitting sound from the source to the ears of the listener comprises a sound-conducting tube leading to sound discharging devices located in or at the ears of the listener, so that very little, if any, sound energy is lost in the transmission. One type of such devices, which has been found extremely efficient, is that employing a pair of rigid or semi-rigid tubes, one for each ear of the listener, and both of which come together at a common point where they are connected acoustically to the sound-conveying tube. These ear-tubes, in order that they may properly fit the head of different listeners or users, are usually pivoted together in some way to permit the movement of the hearing tubes relative to each other in applying and removing them from the head, and to facilitate fitting them to heads of different persons. This is the type of device to which the present invention more particularly applies.

Hence, in the drawings there is shown a hearing device comprising a pair of rigid or semi-rigid tubes 10 and 11, and these, with a tube or nipple 12 adapted to be connected to a sound-conveying tube or pipe 13, form a Y-shaped structure. The terminal or ear-engaging portions of the tubes 10 and 11 in the drawings are provided with tips 14 adapted to be inserted bodily in the ears of the user, the tips 14 being provided at their ends with sound-discharging orifices 15. However, it should be distinctly understood that so far as the present invention is concerned, the terminal portions of the tubes may be of other forms if desired. For instance, they may be cup-shaped and of sufficient size as to close over the entire ear of the user or substantial part of it.

In order that the tubes 10 and 11 may have relative movement, permitting the device to be fitted to heads of different users and to permit the ear-engaging portions to be moved toward and from the users ears, the tubes 10 and 11 are provided respectively with hubs 16 and 17. These hubs are made to telescope with each other whereby one has an internal bearing surface 18 contacting with an external bearing surface 19 on the other, in the form shown the hub 16 having the internal bearing surface 18 riding on the external

bearing surface 19 of the hub 17. Preferably, the tube 10 alone is soldered or otherwise secured in the hub 16, while both the tube 11 and the nipple 12 are soldered or otherwise secured in the hub 17. Also, the outside diameters of the hubs 16 and 17 are the same so that there is no break in the surface across the two parts, and so that a shoulder 20 is provided on the hub 17 matching the shoulder 21 on the hub 16.

Instead of securing these two parts together by means passing through them to the exterior of the device through holes which otherwise would be liable to allow escape of some sounds, as has heretofore been the practice of securing the two relatively movable parts of the hearing device together, the present invention provides a self-acting device which forms, when placed in operative position when the two parts are assembled, a permanent self-acting lock for holding them together. This device in the preferred form of the present invention, comprises a split spring ring 22 adapted when in operative position to have some parts of it located in both of two annular grooves 23 and 24 in the hubs 16 and 17 resectively, as shown in Figs. 2 and 3. In this position, because of its simultaneous engagement in both annular grooves, separation of the two hubs with their tubes is positively and permanently prevented, unless, of course, the device itself or the ring 22 be completely destroyed.

In order to assemble the device, the split spring ring 22 is placed so as to be located entirely within the annular groove 24 which is made of sufficient depth to receive it, and in this condition, the bearing portion 19 of the hub 17 is inserted in the hub 16 until the annular groove 24 partially aligns with the annular groove 23, whereupon the ring 22, by its own resiliency, expands sufficiently to simultaneously lie in both annular grooves.

It will thus be seen that the device may be assembled without the use of screws or bolts or the tools required therefor, and that once it is assembled it cannot be tampered with by curious persons, and that an efficient connection is made without necessitating holes or apertures in the hubs 16 and 17 leading to the exterior of the device through which holes part of the sound might otherwise escape.

In order to frictionally hold the device, the tubes 10 and 11 in their adjusted position within a user's ears, a suitable friction connection may be provided between the two hubs. This, according to the present invention, is preferably accomplished by means of the ring 22 itself which is consequently not made in the form of a true circle, but which is preferably slightly deformed, to form a part of a helix, for instance, so that when it is confined in the annular grooves 23 and 24 it will exert a force tending to draw the bearing portion 18 on the hub 17 inwardly of the bearing portions 19 of the hub 16, and will thus produce against the side walls of the annular grooves sufficient friction to hold the parts against accidental or unintentional movement.

To further pack the connection and increase the friction between the parts, a felt washer 25 may be interposed between the shoulder 20 on the hub 17 and the shoulder 21 on the hub 16, and with this washer in place, it is doubly assured that no sound can escape through the swivel connection of the two hub portions.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having now described the invention, what is claimed as new and for which it is desired to obtain Letters Patent, is:—

1. A hearing device comprising a pair of initially separate sound-discharging tubes, and means for permanently securing said tubes together in connected relation against becoming separated except by destruction, said means being relatively rotatable with respect to each of said tubes.

2. A hearing device comprising a pair of connected sound-discharging tubes, and self-acting means for securing said tubes together in connected relation, when said tubes are assembled, against becoming separated except by destruction, said means being relatively rotatable with respect to each of said tubes.

3. A hearing device comprising a pair of initially separate sound-discharging tubes, initially separate means for uniting said tubes in a relatively swiveling manner, said means being constructed to be easily assembled and being substantially incapable of disassembly when the parts have been united.

4. A hearing device comprising a pair of initially separate sound-discharging tubes, and means for resiliently securing said tubes together in connected relation, said means being relatively rotatable with respect to each of said tubes.

5. A hearing device comprising a pair of initially separate sound-discharging tubes, and means for resiliently and definitely securing said tubes together in connected relation, said means being relatively rotatable with respect to each of said tubes.

6. A hearing device comprising a pair of initially separate sound-discharging tubes, and concealed means for securing said tubes together in connected relation, said means being relatively rotatable with respect to each of said tubes.

7. A hearing device comprising a pair of initially separate sound-discharging tubes, and concealed means for definitely securing said tubes together in connected relation,

said means being relatively rotatable with respect to each of said tubes.

8. A hearing device comprising a pair of initially separate sound-discharging tubes, and self-acting concealed means for securing said tubes together in connected relation, said means being relatively rotatable with respect to each of said tubes.

9. A hearing device comprising a pair of initially separate sound-discharging tubes, and self-acting concealed means for securing said tubes together in connected relation, said means being relatively rotatable with respect to each of said tubes.

10. A hearing device comprising a pair of sound-discharging tubes; coacting sound-distributing swivel bearings connected respectively to each of said tubes, and means within said bearings for securing said bearings together, said means being relatively rotatable with respect to each of said bearings.

11. A hearing device comprising a pair of sound-discharging tubes; coacting sound-distributing swivel bearings connected respectively to each of said tubes, and self-acting means within said bearings for securing said bearings together, said means being relatively rotatable with respect to each of said bearings.

12. A hearing device comprising a pair of sound-discharging tubes; coacting sound-distributing swivel bearings connected respectively to each of said tubes, and resilient means within said bearings for securing said bearings together, said means being relatively rotatable with respect to each of said bearings.

13. A hearing device comprising a pair of sound-discharging tubes; coacting sound-distributing swivel bearings connected respectively to each of said tubes, and concealed means within said bearings for securing the bearings together, said means being relatively rotatable with respect to each of said bearings.

14. A hearing device comprising a pair of sound-discharging tubes; coacting sound-distributing swivel bearings connected respectively to each of said tubes, and self-acting concealed means within said bearings for securing the bearings together, said means being relatively rotatable with respect to each of said bearings.

15. A hearing device comprising a pair of sound-discharging tubes; coacting sound-distributing swivel bearings connected respectively to each of said tubes, and self-acting concealed means within said bearings for securing the bearings together, said means being relatively rotatable with respect to each of said bearings.

16. A hearing device comprising a pair of sound-discharging tubes; coacting bearings connected respectively to each of said tubes and rotatively mounted one within the other, said bearings each having circumferential grooves in their coacting surfaces which grooves are brought into range with each other when the bearings are in operative position; and means simultaneously engaging both of said grooves for locking said bearings together against separation.

17. A hearing device comprising a pair of sound-discharging tubes; coacting bearings connected respectively to each of said tubes, and swiveling one upon the other, said bearings each having circumferential grooves in their coacting surfaces which grooves are brought into range with each other when the bearings are in operative position; and a split spring ring simultaneously engaging both of said grooves for locking said bearings together against separation.

18. A hearing device comprising a pair of sound-discharging tubes; coacting bearings connected respectively to each of said tubes, and swiveling one upon the other, said bearings each having circumferential grooves in their coacting surfaces which grooves are brought into range with each other when the bearings are in operative position; and a spring simultaneously engaging both of said grooves for locking said bearings together against separation.

19. A hearing device comprising a pair of sound-discharging tubes, coacting bearings connected respectively to each of said tubes, and swiveling one upon the other, said bearings each having circumferential grooves in their coacting surfaces which grooves are brought into range with each other when the bearings are in operative position; and a spring simultaneously engaging both of said grooves for frictionally holding said bearings against accidental or unintentional swiveling movement and for locking said bearings together against separation.

20. A hearing device comprising a pair of sound-discharging tubes; coacting bearings connected respectively to each of said tubes and swiveling one upon the other, said bearings each having circumferential grooves in their coacting surfaces which grooves are brought into range with each other when the bearings are in operative position; means simultaneously engaging both of said grooves for locking said bearings together against separation; and a washer located between said bearings.

21. A hearing device comprising a pair of connected sound-discharging tubes, and relatively movable coacting means for definitely securing said tubes together in connected relation and permitting relative swiveling movements of the tubes, said means also holding said tubes against accidental or unintentional movements.

22. A hearing device comprising a pair of connected sound-discharging tubes, and self-

acting means for securing said tubes together in connected pivotal relation, said means also holding said tubes against accidental or unintentional movements.

23. A hearing device comprising a pair of connected sound-discharging tubes, and resilient means for securing said tubes together in connected swiveling relation, said means also holding said tubes against accidental or unintentional movements.

24. A hearing device comprising a pair of connected sound-discharging tubes, and concealed means for securing said tubes together in connected rotatable relation, said means also holding said tubes against accidental or unintentional movements.

25. A hearing device comprising, in combination, a pair of sound-discharging tubes, a pair of rotatively interfitting hubs to which said tubes are respectively secured, and means rotatively movable within said interfitting hubs adapted to engage each of said hubs to prevent separation thereof in an axial direction.

Signed at Bridgeport, in the county of Fairfield, and State of Connecticut, this 20th day of February, 1926.

ARTHUR A. JOHNSON.