

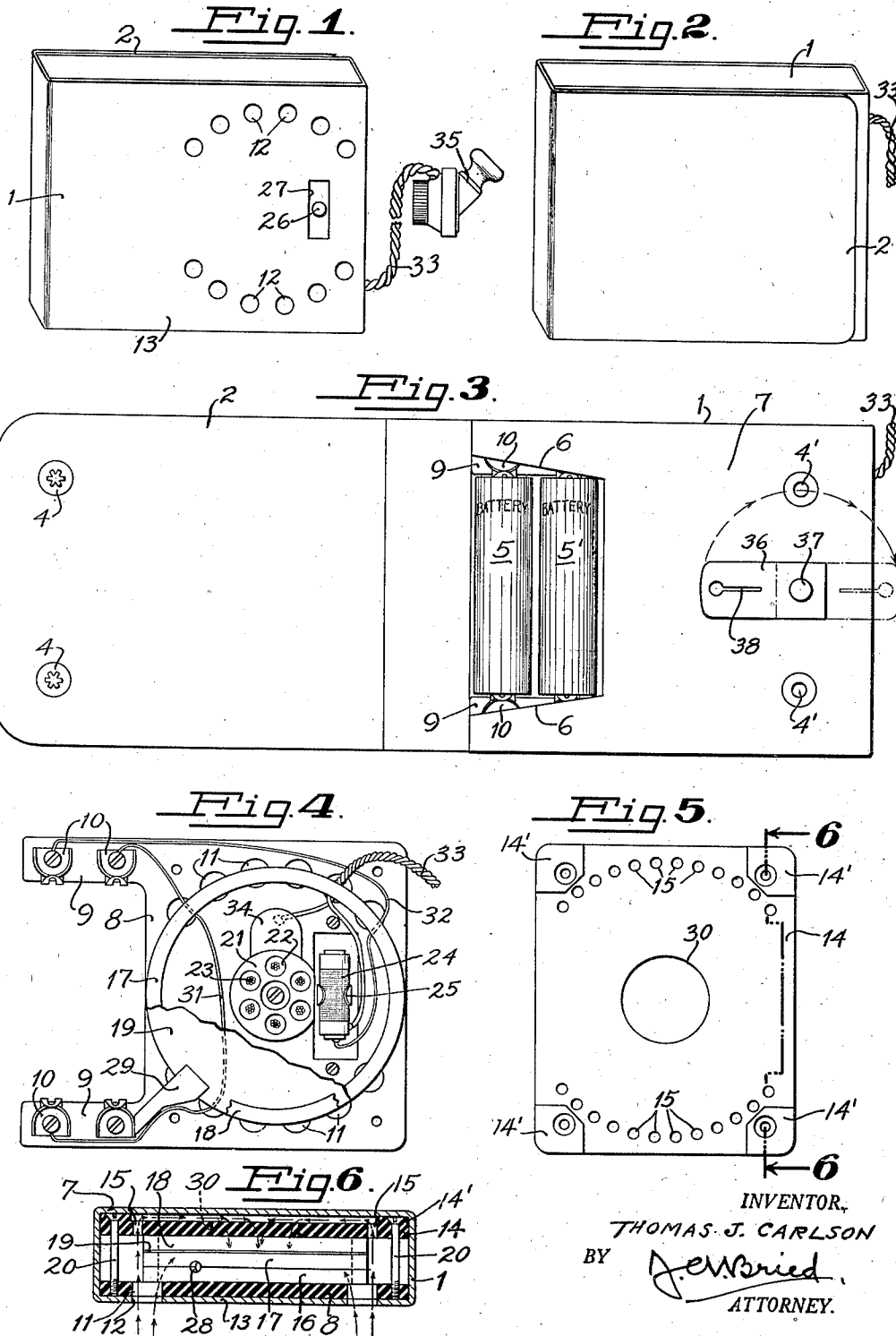
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AUDIPHONE

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AUDIPHONE

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14 Claims. (Cl. 179—107)

This invention relates to portable microphones as used in the type of hearing aid apparatus for the deaf generally known as audiphones, and in which a microphone receiver is worn on the person, and the sound current actuates the diaphragm of an ear piece fitted to or in the ear.

The object of the present invention is to provide improved construction of such microphones whereby they are cheaper to manufacture and also more effective.

Another object of the invention is to provide a construction which may be adjusted to more naturally translate the sounds received, to the ear of the wearer.

Another object is to provide an improved assemblage and case for the microphone incorporating the effect of a sound box and making it more sensitive.

Another object is to provide a construction which will avoid the requirement of metal stampings, moulded parts, or large threaded members, which are expensive and go to build up a prohibitive cost of these instruments to the public.

Other features and advantages of the construction will appear in the following description and accompanying drawing.

In the drawing:

Figure 1 is a front perspective view of my complete audiphone device in its case and showing the ear piece attached to the cord. The view is reduced somewhat from the actual size.

Figure 2 is a perspective view of the rear side of the case, also reduced somewhat in size.

Figure 3 is a full size plan view of the rear side of the case with the flap open and showing the two dry batteries which operate the device.

Figure 4 is a plan view of the mechanism chassis pulled out of the case and with the diaphragm cover plate removed and the diaphragm and spacing ring partly broken away to reveal the carbon pot and rheostat mounted on the base plate or chassis plate below.

Figure 5 is a full size plan view of the diaphragm cover plate.

Figure 6 is a full size cross section of the upper and lower plates assembled with the diaphragm spacing rings in place, as seen from the line 6—6 of Figure 5, if all were assembled together and positioned within the outer case.

In further detail, my improved construction as shown in the drawing comprises a small rectangular case about three-quarters of an inch thick outside, preferably made of thin leather stiffened with paper or thin cardboard, and with a closing flap 2 which snap buttons to the rear

side as shown in Figures 1 and 2, and opens out flat as shown in Figure 3, and in which latter view the snap buttons or fasteners are indicated at 4 and 4'.

When the flap 2 is opened as in Figure 3, the end of the case adjacent the flap is open for insertion and removal of the chassis, and also exposes two small dry batteries 5, 5', through a cut-out portion 6 of the rear side or wall 7 of the case so that the batteries may be easily renewed.

The chassis includes a lower or base plate 8 of a rigid insulating material such as hard rubber, "Bakelite" or fiber and provided with two projecting ends 9 to which are secured two pairs of spring metal terminal clamps 10 for frictionally clamping the batteries when shoved in place from above to the position shown in Figure 3, and which may be readily done through the cut-away portion 6 of the case when the chassis is within the case.

This chassis base plate is formed with two arcuate rows of holes 11 which substantially align with two similar rows of holes 12 in the front wall 13 of the case.

The front or top plate of the chassis is designated 14 and is similar to plate 8 except that it has no projections such as those of the base plate shown at 9, and its arcuate rows of holes 15 are smaller and more numerous, and also on a somewhat larger circle, as will later appear, and it is also provided with a relatively large central hole 30, or a group of smaller holes.

The two chassis plates are clamped against three superimposed narrow, hard fiber spacing rings 16, 17, 18 between the latter two of which a thin diaphragm 19 is positioned. Four screws 20 positioned some distance outside of the rings serve for clamping the assemblage in place, yet allow room for lateral shifting or adjusting of the rings and diaphragm before the screws are tightened up.

The diaphragm may be of metal, but I prefer the usual thin carbon diaphragm commonly used in microphones of this type, and as the contacting or sensitive element I also prefer to use the usual carbon pot 21 formed with a plurality of beveled depressions 22 containing the usual small carbon balls 23. The carbon pot is fixedly secured to base plate 8 as is also a small rheostat coil 24 fitted with a spring slider 25 provided with an operating button 26 which is adapted to project slightly out of a slot 27 in the front wall of the case when the chassis is in place (see Figure 1).

The two lower spacing rings 16 and 17 are

complementarily notched at several points as at 28 (Figure 6) for the passage of circuit wires, and by which construction no threading of any wires through holes is required, as ring 16 is first laid down upon the base plate, the wires are then laid in the notches, and ring 17 placed on top of rim 16. The diaphragm is next placed on ring 17, a very thin sheet metal contact plate 29 is extended from one of the battery terminals to slightly overlap the diaphragm, ring 18 is then placed on top, upper plate 4 is positioned over the assemblage and clamped in place with the screws, the entire assemblage requiring but a few moment's time.

In order to wire the dry batteries in series, yet permit them to be both placed in their terminal clamps directed the same way as shown in Figure 3, one of the clamps of each pair is wired to the other as by a wire 31 which is extended through the spacing rings as shown in Figure 4 so that no wires will be visible in the case cut-out portion 6. The rheostat 24 is in series with the carbon pot and connected by wire 32 which passes through a notch in the rings and connects to the remaining battery terminal clamp. The ear piece cord 33 also passes through a notch in the rings and one leg connects to a metal mounting plate 34 of the carbon pot and the other with the rheostat slider guide as indicated in Figure 4.

The ear piece is of the usual type indicated at 35 in Figure 1 of the drawing, but forms no part of the claimed invention.

When assembled as described, opening 30 of plate 4 is disposed over the diaphragm, and arcuate rows of holes 15 are entirely outside of the spacing ring. The arcuate rows of larger holes 11 in the base plate 8 are of a size to straddle the width of the rings and each provide a free minor passageway inside of the rings and a major passageway outside the rings as clearly shown in Figure 4.

By the construction described, it will be seen that no die stamped parts are used at all and every part is of the simplest form, very easy to make, and extremely easy to disassemble without disconnecting a single wire.

An important feature resulting from the construction is that the spacing rings and diaphragm assembly may be bodily shifted slightly out of center with the carbon pot, and secured in position. Such slight eccentricity has been found to give a more natural tone in some cases.

Another feature is that the use of the fiber spacer rings permits a very slight compression by screws 20 for slight adjustment of the diaphragm relative to the carbon pot.

When the assembled chassis is shoved into the case, the rheostat shifting button or switch 26 projects through the slot 27 and prevents the chassis from again being withdrawn unless a small screw driver or the like is wedged between the base plate and the case to force the latter outward of the rheostat button and free it from the slot. The chassis thus requires no other means for securely locking it in place in the case.

When the chassis is in the case there is a small space between plate 14 and the inner surface of the adjacent wall 7 of the case which contributes somewhat the effect of a sound box and through which the sound waves travel laterally to central opening 30, after entering holes 11 in the opposite plate and passing around the outer sides of the spacer rings, though some of

the sound waves enter direct to the underside of the diaphragm through those portions of holes 11 which extend slightly within the ring. Spacers 14' on the corners of plate 14 insure spacing of plate 14 from wall 7 of the case.

In Figure 6 the small arrows indicate the paths of the sound waves in reaching the diaphragm and from which it will also be observed that the base or rear plate 8 is adjacent the front perforated wall 13 of the case and that, therefore, in general use of the instrument the diaphragm is turned away from the source of the sounds received.

The mechanics of permitting a percentage of the sound waves to pass to the inner surface of the diaphragm is not understood, but it appears to contribute to the other features in promoting sensitiveness, as the fact is that with but two little "pencil" batteries of the full size shown in Figure 3 (of the original drawing filed in the case), such as the "Eveready" battery, No. 915, the apparatus is equal to any and superior to most similar devices on the market using a great deal more power.

A novel feature of the enclosing case not heretofore described is the short strap 36 shown in Figure 3. This strap is pivotally secured to the rear wall 7 of the case at 37 to swing outward to dotted position, and the strap is provided with a button hole 38 to suspend it, as from an eye-glass hook or button on the dress of the wearer.

Having thus described my invention and the preferred manner of its construction, what I claim is:

1. Audiphone apparatus comprising a case having relatively narrow edges and two flat sides, a chassis frame mounting a microphone assembly slidably edgewise into said case, battery terminal clamps secured to said chassis and between which clamps a dry battery is adapted to be frictionally held in electric contact, one of said flat sides of the case formed with a cut-out portion exposing substantially said battery only for quick replacement, and a cover on said case for covering said cut-out portion.

2. Audiphone apparatus comprising a case having relatively narrow edges and two flat sides and a closure flap extended from one of said sides adapted to cover an open end of the case and extend over the other of said flat sides, a chassis frame mounting a microphone assembly slidable through said open end into said case, battery terminal clamps secured to said chassis and between which clamps a dry battery is adapted to be frictionally held in electric contact, one side of said case formed with a cut-out portion exposing substantially said battery only for quick replacement, said closure flap when closed covering said battery and cut-out portion of the case.

3. Audiphone apparatus comprising a case having relatively narrow edges and two flat sides, a chassis frame mounting a microphone assembly fitting within said case, a pair of confronting arms extending from opposite edges of said chassis frame, battery terminal clamps secured to said arms and between which clamps a plurality of dry batteries are adapted to be frictionally held in electric contact, one side of said case formed with a cut-out portion exposing substantially said batteries only for quick replacement, and a cover on said case for covering said cut-out portion.

4. Audiphone apparatus comprising a case having relatively narrow edges and two flat sides, and a closure flap adapted to cover an open end

of the case, a chassis frame mounting a microphone assembly slidable through said open end of and within said case, a rheostat switch button on said assembly arranged to project through an opening in one of said flat sides of said case to hold the assembly in place.

5 Audiphone apparatus comprising a base plate, a microphone sensitive element secured thereto, a diaphragm supported above said element, and an upper perforated plate over said diaphragm, a pair of arms extending integrally from and in the plane of one of said plates, battery terminal clamps secured to said arms adapting dry batteries to be frictionally engaged at opposite ends between them.

10 6. Audiphone apparatus comprising a base plate, a microphone sensitive element secured thereto, a diaphragm supported above said element, and an upper perforated plate over said diaphragm, a pair of arms extending integrally from and in the plane of one of said plates, two pairs of battery terminal clamps secured to said arms adapting dry batteries to be frictionally engaged at opposite ends between them, an electrical conductor connecting together one of each of said pairs of clamps on opposite arms, and whereby when two dry batteries are sprung endwise between the clamps with both batteries pointing in the same direction they will be electrically connected in series.

20 7. Audiphone apparatus comprising a flat apertured base plate and a flat apertured upper plate, microphone elements including a diaphragm secured between said plates to form a relatively narrow flat pack, a case closely surrounding the above assembled elements, said case apertured adjacent said base plate and imperforate over the upper plate and providing a narrow sound transmitting space between the case and the upper plate.

40 8. Audiphone apparatus comprising an apertured base plate and an apertured upper plate, microphone elements secured to said base plate, a diaphragm covering said elements secured between said plates, a case entirely surrounding the above assembled elements, said case apertured through the side adjacent said base plate only in substantial alignment with its apertures, and formed to provide a sound transmitting space between the opposite side of the case and the upper plate, the apertures in said plates arranged to direct some of the sound waves received through the apertures in the base plate independently to both sides of the diaphragm.

55 9. Audiphone apparatus comprising an apertured base plate and an apertured upper plate, microphone elements secured to said base plate including a diaphragm covering said elements secured between said plates, a case entirely surrounding the above assembled elements, said case apertured through the side adjacent said base plate only in substantial alignment with its apertures, and formed to provide a sound transmitting space between the opposite side of the case and the upper plate, the apertures in said plates arranged to direct some of the sound waves received through the apertures in the base plate independently to both sides of the diaphragm.

rounding the above assembled elements, said case apertured through the side adjacent said base plate only in substantial alignment with its apertures, and formed to provide a sound transmitting space between the opposite side of the case and the upper plate, the apertures in said plates arranged to direct some of the sound waves received through the apertures in the base plate independently to both sides of the diaphragm, with the major volume thereof to the upper side.

10 10. In a construction as set out in claim 9, said upper plate provided with a relatively large central opening over the diaphragm below the imperforate said opposite side of the enclosing case.

15 11. Audiphone apparatus comprising a base plate, a microphone sensitive element secured to said plate, a pair of superimposed spacing rings on said plate embracing said element, a diaphragm on said spacing ring covering said element, a spacing ring above said diaphragm, and an upper plate over said last mentioned ring, and notches extending transversely between said superimposed rings for passage of electric wiring to said element.

25 12. Audiphone apparatus comprising a base plate, a microphone sensitive element secured to said plate, a pair of superimposed spacing rings on said plate embracing said element, a diaphragm on said spacing ring covering said element, a spacing ring above said diaphragm, and an upper plate over said last mentioned ring, and confronting notches extending transversely between said superimposed rings for passage of electric wiring to said element.

35 13. Audiphone apparatus comprising a pair of plain flat plates, microphone elements secured to one of said plates, a loose spacing ring surrounding said elements, a diaphragm supported by said loose spacing ring, and means clamping the plates together at points spaced exteriorly to the ring while preserving freedom between the clamping means and the outer diameter of the diaphragm and its spacing ring to permit free lateral adjustment of the diaphragm and ring relative to the microphone elements secured to the opposite plate.

45 14. Audiphone apparatus comprising a base plate, a microphone sensitive element mounted on said plate, a spacer ring surrounding said element, a diaphragm supported on said spacer ring, an upper plate over said diaphragm, and means clamping said plates together, said plates forming the outermost members of the assembly and said upper plate apertured over said diaphragm and also apertured outwardly of said ring, and said base plate apertured to atmosphere with holes of a size to straddle the width of said ring when in position on said base plate.

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