Oct. 19, 1926. 1,603,431

G. W. WACKER

EAR PHONE

Filed August 17, 1923

Fig. 1.

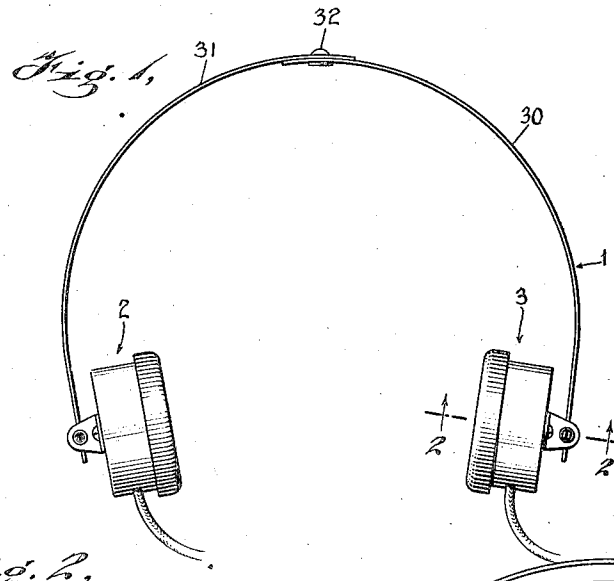


Fig. 4.

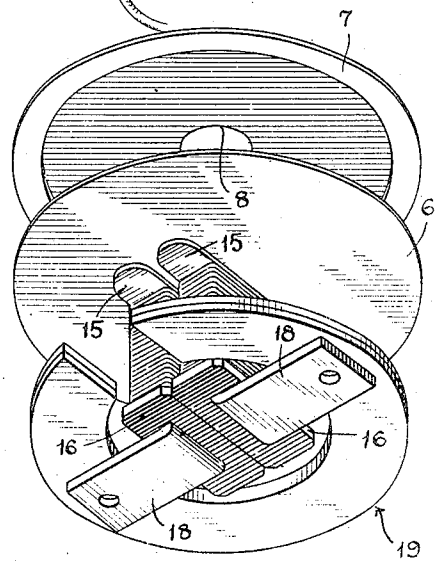


Fig. 2.

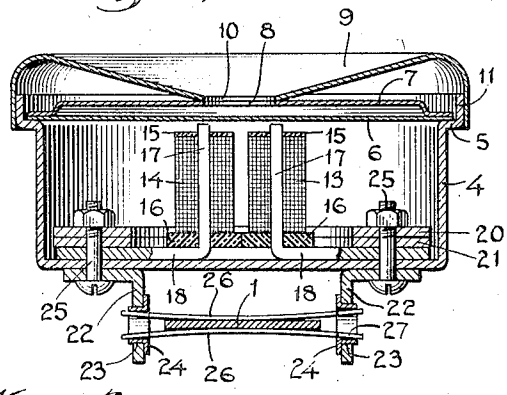


Fig. 3.

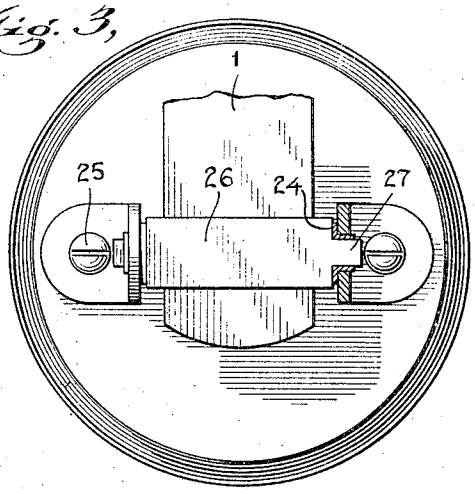
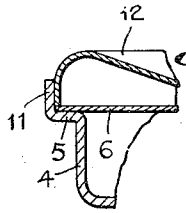


Fig. 5.



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UNITED STATES PATENT OFFICE.

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EAR PHONE.

Application filed August 17, 1923. Serial No. 657,905.

This invention relates to ear phones of the type which are now in general use for the reception of wireless telegraphic or telephonic communications, although the phones are equally adaptable for use on ordinary telephonic communications when the coils therein are properly modified for the reception of waves for lower frequency and co-ordinately relates to the manner of supporting said phones in position on the head.

In general the object of this invention is to provide a cheap but very efficient receiver. In the receivers of this type it is customary to manufacture the same so that they may be adjusted longitudinally along a strap passed over the head of the wearer called the head band and it has also been found desirable to pivot the phones so that they may conform readily to the configuration of the ear and to fit snugly thereagainst so as to eliminate sounds external to those received through the ear phone. Another object of my invention therefore is to provide ready means for adjusting the ear phone or receiver longitudinally along the head band. A still further object of my invention is to provide means so that the receiver may readily adjust itself angularly with respect to the head band. It has been found in some pivotal constructions of the receiver that the hair is apt to catch in the pivots to the annoyance of the wearer of the receiver and so it is a further object of my invention to so construct the receiver that the catching of hair within the pivot will be reduced to a minimum. A further object of my invention is to construct the receiver, so that the same may be readily assembled, will be of a minimum number of parts and will have a minimum amount of material therewithin. Other and further objects of this invention will be apparent after reading the specification when taken in connection with the drawings in which—

Figure 1 is a view of my receiver as mounted on the head band;

Figure 2 is a cross section through one of the receivers taken on the line 2—2 of Figure 1;

Figure 3 is a view of the back of one of the receivers a portion thereof being shown in section;

Figure 4 is a view of some of the portions within the shell of the receiver; and

Figure 5 is a fragmentary view of a modified form of my receiver.

Now referring to the figures more in detail 1, represents the head band upon both ends of which are shown as mounted the receivers 2 and 3 which are duplicates of each other. The receivers each consist of a non-magnetic metallic shell 4 made up of some such material as brass which is preferably struck or drawn out by a machine so as to provide a cup shaped shell the upper or open position of the cup being bent so as to provide a ledge 5 on which is adapted to rest the ordinary diaphragm 6 as will be readily understood by those skilled in the art. In order to hold this diaphragm in place within the cup, an inverted saucer shaped non-magnetic resilient member 7 is laid upon the diaphragm 6 the member 7 having an aperture 8 therethrough so as to permit the sound wave created by the diaphragm 6 to pass readily therethrough. It will be noted that this saucer shaped member presses upon the diaphragm 6 only at its circumferance and does not in any way interfere with or prevent the free vibrations of the diaphragm 6 due to the energization by the electromagnets in the cup. Pressing the members 7 down toward the members 6 is the ear shell or cap 9 which has an opening 10 in alignment with the opening 8 in member 7, said ear shell being frictionally retained by the cup 4 at its flanged edge 11 as will be clearly understood by referring to Figure 2 of the drawings. The edge in the opening 11 presses against the edge of the opening 8 and thereby exerts its pressure upon the diaphragm 6 through the plate 7 to keep the diaphragm in its proper place. The member 7 may be eliminated by adopting the construction shown in Figure 5 wherein the ear piece 12 which is equivalent to the ear piece 9 of Figure 2 is frictionally held within the circumference of the flange 11 and presses directly upon the diaphragm 6.

Within the cup is a pair of electromagnets 13 and 14 each of which is provided with a pair of heads 15 and 16, between which heads is wound the coils of the electromagnets. The core of each of the electromagnets is a thin flat plate of soft magnetic material bent into the shape of an L one limb 17 of which extends through the coil and heads of the electromagnet and the

other limb 18 of which is in magnetic contact with pole tips of a permanent magnet 19 thereby forming pole pieces for the permanent magnet. The magnets in this instance are shown as composed of a pair of magnets 20 and 21 overlapping each other. For as is long known in the art a laminated permanent magnet has greater strength than a like magnet not so laminated.

As means for supporting the receiver to the head band, a support is fastened to the back of the shell of the receiver, such support comprising a pair of non-magnetic ears 22. These ears 22 the permanent magnets 20 and 21 and the pole pieces are secured to the bottom of the shell by means of preferably non-magnetic screws 25 passing therethrough thus securely binding them together. The ears 22 are provided with the registering apertures 23 within which are received the narrowed ends 27 of a pair of flat springs 26, the wider parts of which are slightly longer than the distance between the two apertures 23. The narrowed tabs 27 extend from these wider parts through the aperture 23.

As will be obvious the springs 26 when positioned within the ears 22 with the extension 27 in the apertures 23 will be caused to assume the bowed condition illustrated in Figure 2, due to the fact that the length of the widened portion of the spring 26 is greater than the distance between the ears 22. The springs 26 will be spaced a substantial distance apart adjacent the apertures 23 which spacing gradually decreases toward the center. One of the ends of the head band 1, can therefore be readily positioned between and gripped by the plates 26 by inserting a corner between the plates at a point adjacent the openings 23 where the spacing between the plates 26 is the greatest and then moving the band to a position intermediate the ears 22 as clearly shown in Figure 2, in which position a very substantial frictional gripping action of the head band by the spring members 26 will be attained. By the employment of this character of retaining means, it will be readily apparent that the receiver may be slid along this head band and yet frictionally retained in place at any adjusted position so that the wearer thereof may by merely pressing against the receiver move the same up and down along the head band to conveniently adjust the receiver to his ear. Furthermore, due to the bowed character of the springs the receiver may be tilted in a plane at right angles to the head band, so that the receivers may adjust themselves to the ear in a plane rotating about the axis of the head band. The ear pieces 2 and 3 in Figure 1 can furthermore be given a variation about a horizontal axis because of the fact that the end 1 of the head band and the spring plates 26 can be rotated as a unit within the apertures 23.

For the purpose of maintaining the two spring members 26 as a unit and at the same time for preventing the ends thereof from cutting the ears 22 at the openings 23 and from catching in the hair of the wearer, I provide the bushings 24 as clearly shown in Figures 2 and 3 in which bushing are received the narrow extensions 27 of the members 26 and which bushings in return are snugly received within the apertures 23.

It will be noted that practically the whole of the receiver is a metallic structure so that with the exception of the coils no molding has to be done to manufacture the receiver, thereby eliminating a chief source of expense. The ear piece, the cup, diaphragm and the resilient member 7 as well as the ears 22 can all be struck up by a machine at a very small cost, while the other parts may be also manufactured very cheaply.

To permit of a still further relative angular variation of each of the ear phones 2 and 3 with reference to each other and to the head of the wearer, I arrange that the head band 1 shall be made up of the sections 30 and 31 pivoted vertically at 32 as shown in Figure 1.

It will be understood that by my invention, I provide a receiver in which the ear phones are in a sense attachments to the head band and readily separable therefrom, and in which the means for attaching the ear phones to the head band are also separable means of such a character as to require no modification of the head band for the proper association of the parts. As a result of this, the parts of the receiver are readily adjustable and replaceable, and the receiver is complete with either one or two ear phones.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:

1. A telephone receiver comprising a shell, diaphragm, actuating means within said shell, a support outside of said shell and a binding means simultaneously securing said actuating means and support to said shell.

2. A telephone receiver comprising a metallic non-magnetic shell, a diaphragm actuating means within said shell, comprising a permanent magnet, pole pieces therefor, a non-magnetic support outside of said shell and a binding member securing together said shell, magnet, pole pieces and support.

3. A telephone receiver comprising a pressed out metallic non-magnetic cup, said cup at its mouth being bent so as to provide a ledge, a diaphragm mounted on said ledge a diaphragm actuating means within said cup and means for securely holding said diaphragm in place in the ledge.

4. A telephone receiver comprising a metallic cup, said cup at its open end being provided with a ledge, a diaphragm resting on said ledge, means within said cup for energizing said diaphragm and an ear cap frictionally retained by said cup and holding said diaphragm in position on said ledge.

5. A telephone receiver comprising a pressed out metallic non-magnetic cup, said cup at its mouth being bent so as to provide a ledge, a diaphragm mounted on said ledge, and means for holding said diaphragm in place comprising an ear cap sprung into the cup and a resilient member interposed between the ear cap and the diaphragm.

6. A telephone receiver comprising a metallic cup, said cup at its open end being provided with a ledge, a diaphragm resting on said ledge, diaphragm energizing means within said cup, an ear cap sprung over said cup and an inverted saucer shaped resilient member interposed between said cap and said diaphragm to retain said diaphragm in place, said member being apertured to permit sound waves to emanate unobstructed from said diaphragm.

7. A telephone receiver comprising a pressed out cup, a permanent magnet in said cup, a pair of flat stamped out pole pieces for said magnet, said pole pieces contacting at its one end with the pole tips of the magnet and bent at its opposite ends to provide cores for a pair of electromagnets, electromagnetic coils mounted on said cores, a diaphragm mounted on said cup in position to be actuated by said coils and a pressed out metallic cap frictionally retained by said cup predeterminedly and fixedly spaced from the aforementioned electromagnets.

8. A telephone receiver comprising a pressed out cup having formed at the mouth thereof a ledge portion, a diaphragm adapted to rest upon said ledge portion, a cap frictionally engaging said cup, and a resilient spacer member between said cap and said diaphragm serving to hold said diaphragm upon the ledge and spacing the same from the cap.

9. A telephone receiver comprising a pressed out cup having formed at the mouth thereof a ledge portion, a diaphragm adapted to rest upon said ledge portion, a cap frictionally engaging said cup, and a resilient, metallic spacer member between said cap and said diaphragm, with a sound transmitting aperture therein, serving to hold said diaphragm upon the ledge and spacing the same from the cap.

10. A telephone receiver comprising a pressed out cup having formed at the mouth thereof a ledge portion, a diaphragm adapted to rest upon said ledge portion, an ear piece frictionally engaging said cup, and a resilient, metallic spacer member between said ear piece and said diaphragm, with a sound transmitting aperture therein, said aperture being in substantial alignment with the sound transmitting aperture of the ear piece, serving to hold said diaphragm upon the ledge and spacing the same from the ear piece.

11. A telephone receiver comprising a pressed out cup, a ledge portion formed at the mouth thereof, adapted to hold a diaphragm upon said ledge portion, a diaphragm therefor, and an ear piece engaging said cup and serving to position the diaphragm.

In testimony whereof I have hereunto signed my name.

GEORGE W. WACKER.