March 16, 1926. 1,577,294

A. PIHL

TELEPHONE RECEIVER

Original Filed August 2, 1922

Fig. 1.

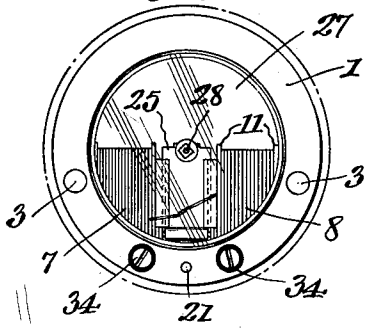


Fig. 2.

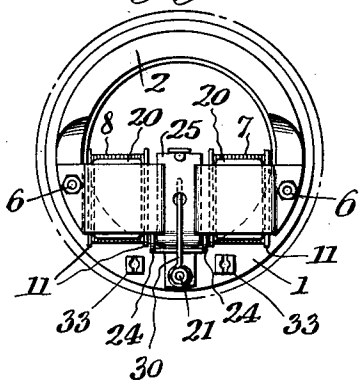
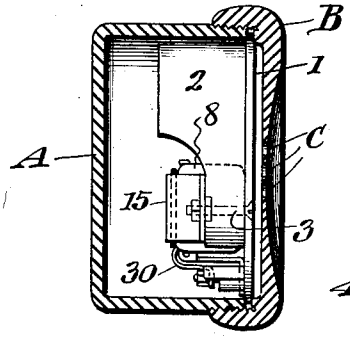


Fig. 3.



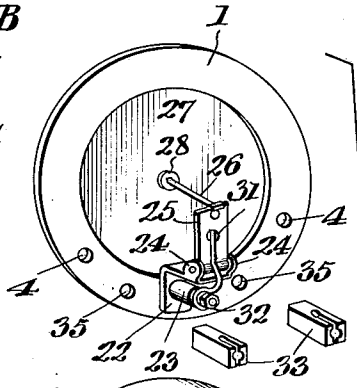


Fig. 5.

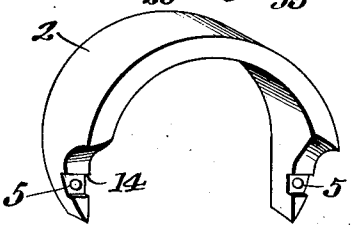


Fig. 4.

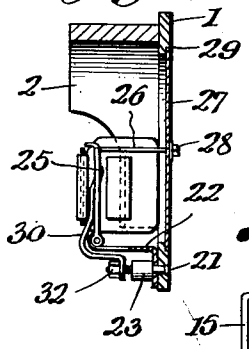
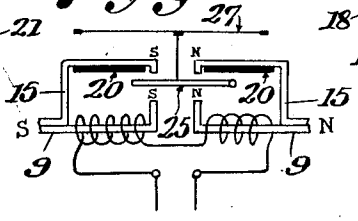
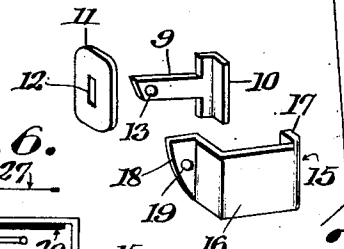


Fig. 6.





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UNITED STATES PATENT OFFICE.

ALBERT PIHL, OF MURRAY, UTAH, ASSIGNOR TO GEORGE F. BORKMAN, OF SALT LAKE CITY, UTAH.

TELEPHONE RECEIVER.

Application filed August 2, 1922, Serial No. 579,300. Renewed February 9, 1926.

To all whom it may concern:

Be it known that I, ALBERT PIHL, a citizen of the United States, and resident of Murray, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Telephone Receivers, of which the following is a specification.

My invention relates to an improved telephone receiver which is particularly adapted for wireless telephony. It is preferably of what is known as the watch case type and is very compact and simple in structure.

One object of the invention is to provide an arrangement of coils and pole pieces that will increase the sensitiveness of the receiver and eliminate a large proportion of the disturbances due to static.

Another object is to provide a diaphragm and armature so mounted and connected that a very small amount of current is necessary for their operation.

Other objects will be apparent from the following detailed description and the appended claims.

In the drawings:

Figure 1 is a face view of the receiver with the cover or cap removed.

Figure 2 is a bottom plan view of the receiver removed from its inclosing case.

Figure 3 is a section through the case with the receiver in side elevation.

Figure 4 is a fragmentary section through the receiver removed from the case.

Figure 5 is a view of the main parts of the receiver disassembled.

Figure 6 is a diagrammatic view showing the relation of the coils, pole pieces and armature.

The receiver proper is inclosed within a casing composed of a cup member A and a cover or cap B screw threaded thereon and provided with the usual perforations C in its face adjacent the diaphragm. This case is provided with an opening or openings (not shown) for the admission of the wires or conductors. The case will be made of any suitable non-conducting material.

To a ring 1 of suitable material is secured a permanent magnet 2 of the general U shape shown in Figure 5. These parts are fastened together by bolts 3 passing through holes 4 and the ring and registering holes 5 in the magnet and provided with nuts 6 on the rear side of the receiver.

Two coils 7 and 8 are provided, each coil being wound on a soft iron core 9 (see Fig. 5), having its inner end 10 turned up for a purpose hereinafter mentioned. The sides of the spool are formed by pieces 11 each having an opening 12 therein through which the core 9 may pass. When assembled two of these pieces 11 fit on each core 9 as clearly shown in Figures 1 and 2, one of the pieces lying adjacent the upturned end 10 and the other next to the permanent magnet near the outer end of the core. The core 9 and pair of pieces 11 form in effect a spool upon which the wire coil may be wound. The outer end of each core 9 has a hole 13 which registers with the hole 5 in the permanent magnet, the end of the core lying in a groove 14 in said magnet.

Associated with each coil is a pole piece 15 of the form shown in Figure 5, having a central portion 16 that overlies the coil, an inner downturned end 17 that faces the upturned end 10 of the core, and an outer bent portion with a flange 18 provided with a hole 19 that registers with the hole 5 in the permanent magnet. The bolts 3, in addition to holding together the ring 1 and the permanent magnet 2 also pass through the holes 13 in the cores and the holes 19 in the pole pieces and therefore hold all of these parts in proper relation. Since the cores lie in the grooves 14, the flanges 18 rest directly on the permanent magnet.

Lying between each pole piece and the corresponding coil is a piece of mica 20 or other suitable insulating material. A bolt 21 passes through the ring 1 and an angular bracket 22 has an opening fitting over said bolt so that the base of the bracket rests against the inner face of the ring 1. This bolt is threaded and a sleeve like nut 23 passes thereover and holds the bracket in place. The free end of the bracket has a pair of ears 24 and hinged between said ears is an armature member 25 which extends inwardly about to the center of the diaphragm. This armature member lies between the ends 10 of the cores 9 and the ends 17 of the pole pieces 15. At its free end the armature is connected by a link or wire connection 26 to the diaphragm 27 to which it is fastened by a nut 28. This diaphragm may be made of mica, aluminum or other suitable ma-

terial and fits in a depression in the ring 1 as shown in Figure 4, so that it lies flush with the face of the ring. One end of a spring 30 is hooked through an opening 31 in the armature, and the other end has an eye fitting around the bolt or post 21 but loosely so that its position may be adjusted by a nut 32 threaded on said bolt. In this manner the armature may be adjusted and tuned.

Binding posts 33 are fastened to the ring 1 by means of screws 34 which pass through holes 35 in said ring and into the posts. These posts are of the split type shown in Figure 5 so that they form clamps to which the terminals may be attached without the use of set screws.

The wire forming the coils is wound thereon in opposite directions as indicated in Figure 6, and a larger amount of wire is employed than is usually the case. For example, with No. 40 wire, each coil may consist of 11,000 turns or even more. This makes the receiver very sensitive, and experiments have demonstrated that receivers constructed in this manner are much more free from disturbances due to static than the ordinary type of receivers.

The efficiency of the device is also greatly increased by the specific arrangement of coils and pole pieces. When the device is not in use the poles are as indicated in Figure 6, the polarity being determined entirely by the permanent magnet. However, when a current is passed through the coils, each coil has a north and south end of its own. This changes the polarity of the inner ends of the core pieces 9, and gives a south pole on one core opposed to a north pole on one pole piece, while on the other core a north pole is opposed to a south pole on the other pole piece. This arrangement permits the use of a large amount of wire and renders the device very sensitive.

Obviously size, proportion, and minor details may be changed without in any way departing from the spirit of my invention, which is to be regarded as limited only by the scope of the appended claims.

I claim as my invention:

1. A telephone receiver comprising a ring member, a U-shaped permanent magnet carried by said member, two coils having cores attached to the ends of the permanent magnet, pole pieces also attached at one end to the permanent magnet and overlying and partially surrounding the coils, an armature lying between the ends of the coils and also between the inner ends of the pole pieces and the inner ends of the cores, a pivoted support for one end of the armature, a diaphragm carried by the ring member, and means connecting the diaphragm to the other end of the armature.

2. A telephone receiver comprising a ring member, a U-shaped permanent magnet carried by said member, two coils having cores attached at their outer ends to the permanent magnet, said cores having angular inner ends, pole pieces also attached at their outer ends to the permanent magnet overlying said coils and having angular inner ends facing the ends of the cores, a diaphragm carried by said ring, a support carried by the ring, and an armature hinged at one end to said support and connected at the other end to the diaphragm, said armature lying between the ends of the cores and the ends of the pole pieces.

3. A telephone receiver comprising a ring member, a U-shaped permanent magnet carried by said member, two reversely wound coils having cores attached at their outer ends to the permanent magnet and having angular inner ends, separate pole pieces attached at their outer ends to the permanent magnet and extending across the coils and having their inner ends facing the angular ends of the cores, and a pivoted armature mounted to lie between the inner ends of the cores and the inner ends of the pole pieces and normally out of contact with both.

4. A telephone receiver comprising a ring member, a permanent magnet, a pair of cores attached at their outer ends to the permanent magnet, coils reversely wound on said cores, a pair of pole pieces distinct from said cores attached at their outer ends to the permanent magnet and having free inner ends, a diaphragm carried by the ring member, an armature connected at one end to the diaphragm and pivoted at its other end to oscillate between the free ends of the pole pieces and the free ends of the cores.

5. A telephone receiver comprising a ring member, a permanent magnet, coils having cores, pole pieces extending over said coils and having their free ends adjacent the free ends of the cores, and means for fastening the permanent magnet, cores and pole pieces to the ring member at the same time.

6. A telephone receiver comprising a ring shaped member, a diaphragm supported thereby, a post rising from said ring member, an angular bracket through which said post passes, an armature hinged at one end to the angular bracket and connected at the other end to the diaphragm, a spring engaging the armature at one end and having an eye at the other end loosely surrounding the post, and means for adjusting the eye of the spring to tune the armature.

7. A telephone receiver comprising a ring member, a groove on one face at the inner edge of the ring, a diaphragm fitting in said groove and lying flush with the face of the ring, a post rising from the other face of the ring, an angular bracket thereon, and an armature hinged at one end to the bracket

and connected at the other end to the diaphragm.

8. A telephone receiver comprising a ring member, a groove on one face at the inner edge of the ring, a diaphragm fitting in said groove and lying flush with the face of the ring, a post rising from the other face of the ring, a bracket thereon, an armature pivoted at one end to the bracket and connected at the other end to the diaphragm, a spring engaging the armature, and means for varying the force exerted by said spring.

In testimony whereof I have hereunto subscribed my name.

ALBERT PIHL.