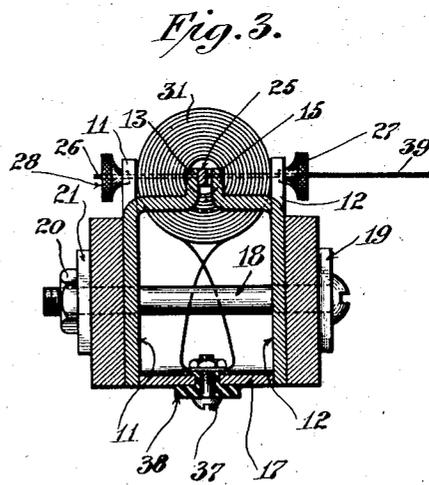
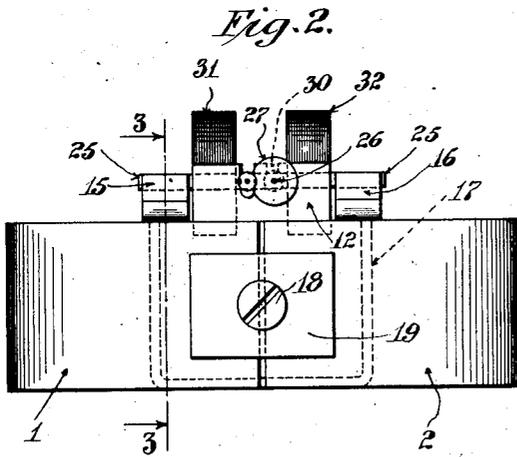
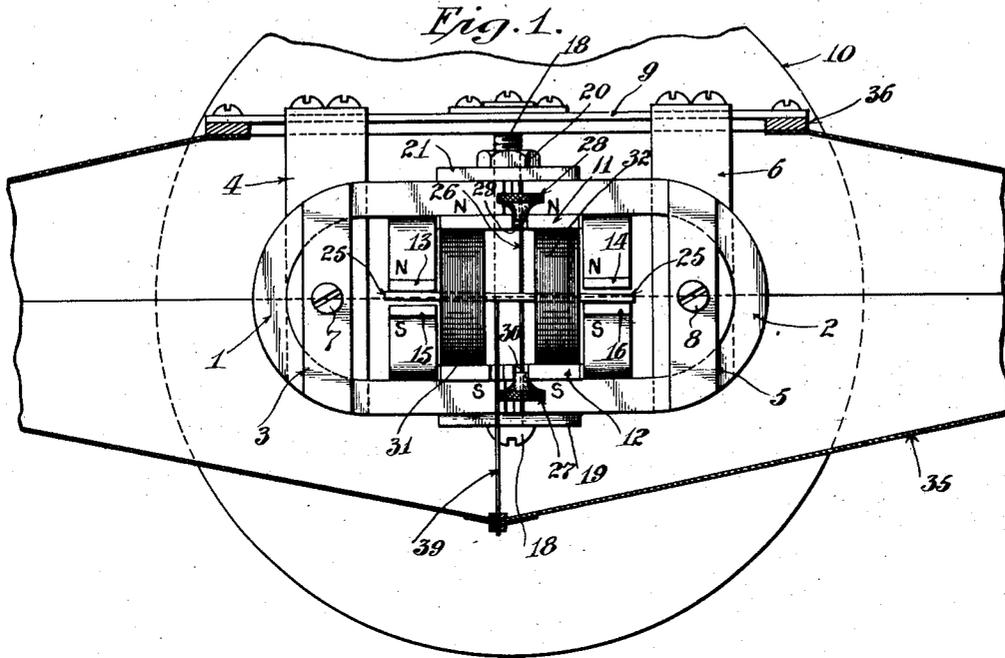


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W. F. HENDRY
TELEPHONE RECEIVER
Filed July 9, 1924



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UNITED STATES PATENT OFFICE.

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TELEPHONE RECEIVER.

Application filed July 9, 1924. Serial No. 725,056.

This invention relates to telephone receivers, and more particularly to new and useful improvements in magnet structures applicable to telephone receivers, loud speakers and the like.

The object of the present invention is to provide a telephone loud speaker of great efficiency and simplicity, and one which may be easily assembled and adjusted.

With this object in view, I provide certain arrangements of parts to be disclosed in detail and defined in the claims.

In the drawings, Fig. 1 is a top plan view of a magnet structure and illustrates also a portion of the diaphragm in horizontal cross-section; Fig. 2 is a side elevation of the magnet structure; and Fig. 3 is a vertical cross-section along lines 3—3 of Fig. 2.

Referring now to the drawings, 1 and 2 are U-shaped permanent magnets held between clamping plates 3, 4 and 5, 6, respectively. These plates are clamped against the two sides of the magnet by means of screws 7 and 8, respectively, traversing said plates. The plates 4 and 5 are mounted on a frame 9 which in turn is fastened to a base 10. The two magnets are placed with their like poles opposite each other, a narrow gap separating the N and S poles of one magnet from the corresponding poles of the other. Adjacent to the poles of the magnets are placed two iron discs or plates 11 and 12. Each of these plates has a relatively narrow edge bent into substantially S-shape, the free upturned end of which serves as a pole piece (see Fig. 3). The pole pieces thus formed of plate 11 are 13 and 14 (N), and those formed of plate 12 are 15 and 16 (S). Pole pieces 13, 15 and 14, 16 are opposite each other. The air gap between the pole pieces is determined by a U-shaped brass spacer 17, against the edges of which the legs of magnets 1 and 2 and the plates 11 and 12 are drawn by means of a bolt 18 passing through the gaps between the ends of the two U-shaped magnets and traversing the plates 11 and 12. The head of the bolt 18 rests on a washer 19, and a nut 20 engaging the screw-threaded end of the bolt 18, bears against a washer 21. By tightening the bolt 18 the pole pieces 13, 15 and 14, 16 will be drawn towards each other to an extent determined by the width of a spacer 17.

An armature 25 is centrally located within the elliptical space surrounded by the two permanent magnets. The ends of the armature are between the pole pieces 13, 14 and 15, 16. The armature 25 is mounted on a resilient wire 26, preferably of phosphor bronze or the like, which is stretched between the two plates 11 and 12. This is accomplished by means of thumb nuts 27 and 28 engaging the screw-threaded ends of wire 26 and bearing against plates 11 and 12 around slots 29 and 30 cut in said plates and through which the wire 26 passes. The armature is balanced between the pole pieces by the effect of the magnetic fields and also by the resiliency of wire 26 which may be varied by means of nuts 27 and 28. The wire 26 is attached to the armature as near its central point as is feasible, so as to insure maximum displacement of the two ends of said armature in response to the variations in the magnetic flux. These variations in the magnetic flux are generated by voice currents which traverse coils 31 and 32 surrounding the armature 25 on both sides of the wire 26. The coils 31 and 32 permit free vibration of the armature and are frictionally held between the plates 11 and 12, suitable insulation in the form of fish paper being provided between the coils and said plates.

In the present case, the diaphragm is made of paper and is substantially in the form of a double cone 35 mounted in a bracket 36 carried by the frame 9. The magnet structure is provided within this double cone and the operation of the armature 25 is transmitted to diaphragm 35 by means of a strut 39 attached to the armature near its point of suspension and between the two coils 31 and 32, the end of 39 being suitably attached by means of washers and nuts to the cone 35 at its apex. The two coils 31 and 32 are connected in series and with the line wires through two binding posts like 37 provided in the base of the U-shaped spacer 17 and suitably insulated therefrom by means of bushings like 38. It will be understood, of course, that two terminals like 37 must be provided.

The operation of the receiver is as follows.

The operating current traversing the coils 31 and 32 will alternately polarize the ends of armature 25 N and S. The armature will

vibrate around the wire 26 forming a pivot, one end being attracted by pole 15 and repelled by 13, and the other end attracted by 14 and repelled by 16, and vice versa. The vibrations of the armature are transmitted through strut 36 to the diaphragm 35 which reproduces in the form of sound vibrations the electrical variations produced in the coils 31 and 32.

10 While the invention is disclosed as applied to telephone loud speakers of the type in which the diaphragm is exposed and has the shape of a cone or the like, it will be obvious to those skilled in the art that its applica-
15 tion to telephone receivers, transmitters or the like, of other types may be readily practiced without departing from the spirit thereof.

What I claim is:

20 1. In a telephone receiver, two magnets, two plates, one contacting with the N and the other with the S poles of said magnets, two pole pieces projecting from each plate, an armature between said pole pieces, a spacer
25 of non-magnetic material, means for drawing said magnet poles and said plates together against said spacer, resilient means engaging at least one of said plates for bal-
30 ancing said armature around a pivot point, two coils surrounding said armature near its center on the two sides of its pivot point, a diaphragm, and a strut having one end attached to said diaphragm and the other end to said armature between said coils.

35 2. In a telephone receiver, two permanent magnets placed with their like poles opposite each other, two plates, one contacting with the N and the other with the S poles of said magnets, two pole pieces projecting
40 from one plate towards pole pieces projecting from the other plate, an armature between said pole pieces, a spacer of non-mag-

netic material, means for drawing said magnet poles and said plates together against said spacer, a resilient wire on which the armature is mounted near its center, means
45 for stretching said wire between said plates, two coils surrounding said armature near its center on the two sides of its pivot point, a diaphragm, and a strut having one end attached to said diaphragm and the other end
50 to said armature outside of the center point thereof and between said coils.

3. In a telephone receiver, two permanent magnets placed with their like poles oppo-
55 site each other, the two magnets surrounding a substantially elliptical space, an armature centrally located within said space, two iron plates opposite each other within said space, one contacting with the N and the other with
60 the S poles of said magnets, two pole pieces forming part of and projecting from each plate towards the ends of said armature, an S-shaped spacer of non-magnetic material,
65 a bolt for drawing said magnet poles and said plates together against said spacer, a resilient wire on which the armature is mounted near its center, notches in said plates through which said wire passes, nuts engaging screw-
70 threaded ends of said wire and bearing against said plates, two coils frictionally held between said plates and surrounding said armature near its center on the two sides of its pivot point, terminals for said coils pro-
75 vided in said spacer, a cone-shaped diaphragm, and a strut having one end attached to the apex of said diaphragm and the other end to said armature outside of the center point thereof but between said coils.

In testimony whereof, I have signed my
80 name to this specification this 7th day of July, 1924.

WILLIAM F. HENDRY.