Aug. 1, 1933. E. O. ZWIETUSCH 1,920,230

TELEPHONE SYSTEM

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FIG. 1

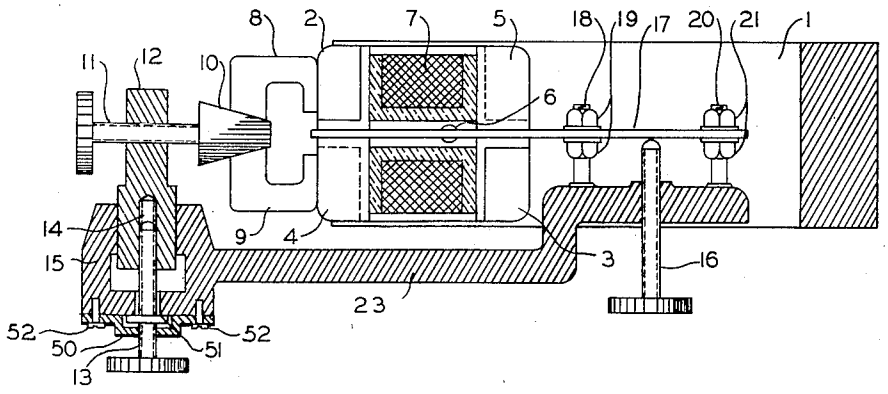


FIG. 2

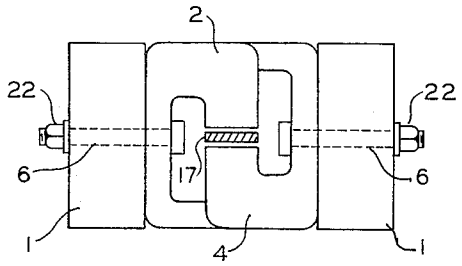
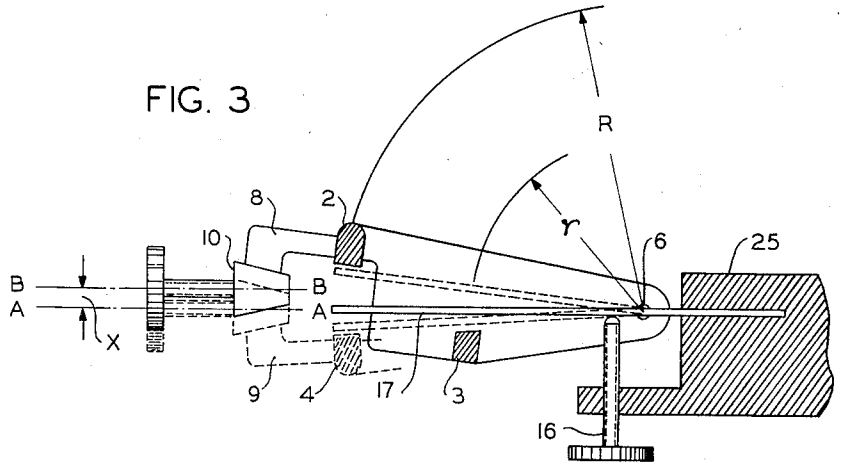


FIG. 3



INVENTOR
EDUARD O. ZWIETUSCH
BY R. C. Hopgood
ATTORNEY

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FIG. 5

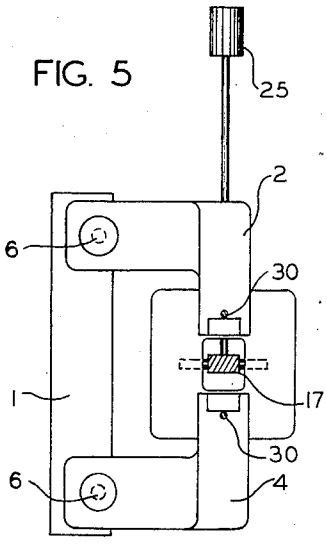
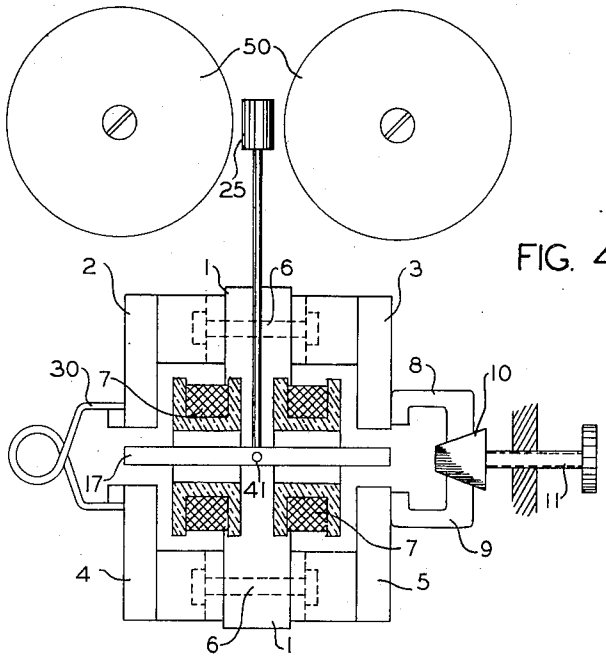


FIG. 4



INVENTOR
EDUARD O. ZWIETUSCH
BY R. C. Hopgood
ATTORNEY

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FIG. 6

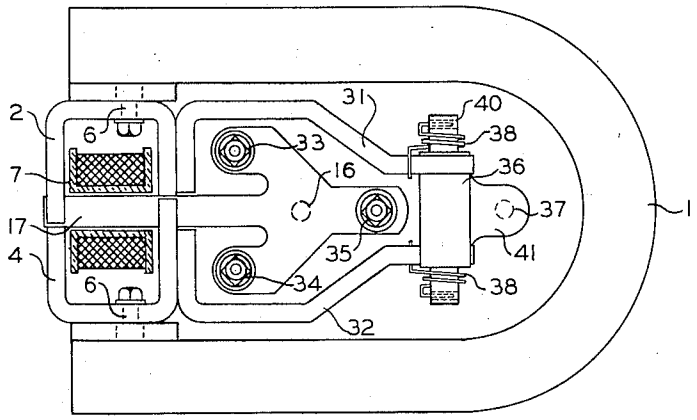


FIG. 7

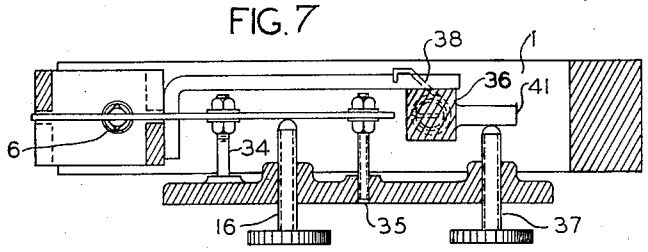
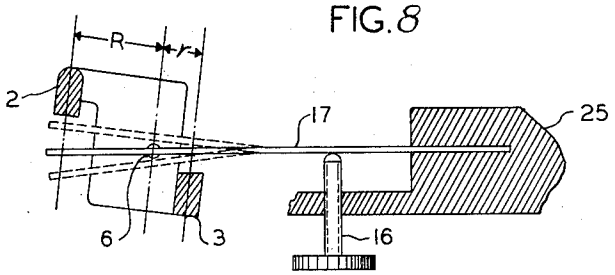


FIG. 8



INVENTOR
EDUARD O. ZWIETUSCH
BY R. C. Hoppood
ATTORNEY

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UNITED STATES PATENT OFFICE

1,920,230

TELEPHONE SYSTEM

Eduard O. Zwietusch, Berlin-Steglitz, Germany, assignor to International Communications Laboratories, Inc., New York, N. Y., a Corporation of New York

Application July 28, 1931, Serial No. 553,592, and in Germany August 15, 1930

16 Claims. (Cl. 175—339.)

My invention relates to improvements in the adjustment of electromagnetic devices used in loud speakers or in telephone ringers. The object of my invention is the design of such devices wherein the pole pieces and armature are accurately positioned in relation to one another to obtain the greatest sensitivity.

My invention provides an adjusting arrangement which allows the individual pole pieces or the similar pairs of pole pieces to be moved different distances from the armature.

The adjustment of the pole pieces or pairs of pole pieces to different distances in respect to the armature is performed by an adjusting member whose moving axis is displaced against the symmetrical axis of the pole pieces.

The two similar pole pieces are each pivoted around a common axis and movement of the pole pieces is in arc paths when approaching or moving away from the armature.

Various features of my invention will be pointed out in the description to follow.

My invention is illustrated in the accompanying drawings which show the essential features:

Fig. 1 is a side view, partly in section, showing the adjusting features applied to a loud speaker unit.

Fig. 2 is an end view of the pole pieces shown in Fig. 1.

Fig. 3 is a schematic drawing showing the varying positions assumed by the armature and pole pieces.

Fig. 4 is a plan view showing the adjusting features as applied to a telephone ringer.

Fig. 5 is a side view of Fig. 4.

Fig. 6 is a plan view of a still further modification.

Fig. 7 is a side view of Fig. 6, partly in section.

Fig. 8 is a schematic drawing showing the positions assumed by the armature and pole pieces.

In the embodiments of the invention which have been chosen for purposes of illustration in Figs. 1 and 2 are shown a permanent magnet 1 of the horseshoe type mounted upon a frame or support 23. Two pole pieces, respectively including pole ends 2, 3 and 4, 5 formed on suitable body portions, are pivotally mounted on opposite branches of the permanent magnet 1 by means of bolts 6 and nuts 22. An armature 17 has a free end disposed between the pole ends 2, 3 and 4, 5 and is secured proximate its other end to the frame 23 by means of posts 18 and 20 and lock nuts 19 and 21.

An adjusting screw 16 is screw-threaded through the frame 23 and acts as a tensioning member upon the armature 17 at a point intermediate the posts 18 and 20 and is adapted to effect a degree of adjustability of the armature. A pair of snugs 8 and 9 are attached, respectively, to the faces 2 and 4 of the pole pieces in any suitable manner and are engaged by a cone 10, adjustment of which will move the snugs 8 and 9, and their pole pieces, in a manner to be described in detail later.

The faces of the snugs engaged by the cone 10 are shaped to conform to the curvature of the cone, and this cone is screw-threadedly mounted by means of a screw 11 in a bearing 12. The bearing 12, in which the screw 11 is mounted, is itself slidably mounted in a portion 15 of the frame 23. The threaded portion of an adjusting screw 13 engages a threaded portion in the bearing 12 and a collar or ring 51 is rigidly attached to the screw 13 and is housed by a cap 50, which is in turn attached to the frame 23 by means of screws 52.

In the operation of the pole adjustment mechanism shown in Figs. 1 and 2, it is assumed, for purposes of illustration, that the pole points 2 and 3 are too close to the armature, during its maximum points of normal vibration, and the pole points 4 and 5 are too far away. By turning the screw 13 so that it moves the cone carrying member 12 upwards, the snug 8 will move the pole points 2 and 3 away from the armature and the snug 9, under the influence of some suitable spring such as is shown in connection with Figs. 4 and 5, will follow the cone 10 and bring the pole points 4 and 5 closer to the armature. It is to be noted, in connection with the movement of these pole points, that, due to the location of the pivot point 6, the points 2 and 4 will have a larger extent of movement than the points 3 and 5. This difference in extent of movement of the pole points should approximate the difference in extent of movement of the armature at those points.

By adjusting the cone 10 either to the right or left the pole points 2, 4 and 3, 5 may be made to simultaneously approach or recede from each other; and by raising or lowering the cone 10 the pole points 2, 4 and 3, 5 may be made to simultaneously approach or recede from the armature while remaining at the same distance from each other. By virtue of these two adjustments it is apparent that by adjusting the cone either vertically or horizontally or both, any desired spacing of the pole points with respect to each other and to the armature may be effected.

The embodiment of the invention illustrated in Fig. 3 is especially adapted to be used when, due to the type of polarization of the armature 17, the armature has a tendency to vibrate to a larger extent in one direction than in another. The actual structure making up the adjustment members and the pole points is identical with that shown and described in detail in connection with Fig. 1 except that the pivot mounting 6 is located at the right of both pole points and proximate the fulcrum or center of vibration of the armature 17.

Assuming, for the purpose of illustration, that the point of maximum throw of the armature 17 is upwards, and the device was originally properly centered for vibrations of equal directional amplitude, it becomes necessary to move the pole ends 2 and 5 upwards or away from the armature and the pole pieces 3 and 4 upwards or towards the armature. This adjustment may be effected merely by moving the cone 10 upwards from its old axial position A—A to its new axial position B—B. By moving cone 10 to the right separation of the snugs 8 and 9 is effected and will cause the pole points 2 and 4 to move away from the armature and points 3 and 5 to approach it. The form of adjustment just described is rendered effective by locating pivotal point 6 at the center about which the armature 17 vibrates, so that the pole pieces 3 and 5 will move on an arc having radius r and the pole pieces 2 and 4 will move about an arc having radius R, which radii are the radii of the portions of the armature proximate these pole pieces. It is apparent that the structure shown in this modification of the invention is especially effective when an armature vibrates to a greater amplitude in one direction than in another.

The application of the adjustments for a ringing system with an armature movable around a rotating axis is shown in Figs. 4 and 5. In this case there are rotatably located on a permanent magnet 1 both pairs of pole pieces 2 and 3, and 4 and 5 on bearing 6. The signal alternating currents pass through coils 7. On armature 17 is provided a hammer 25. Adjustment of the pole pieces is effected by cone 10 which is shifted against the oblique surfaces of the snugs 8 and 9 fixed to the pole pieces when screw 11 is turned.

If the cone 10 is turned to the right, it moves the surfaces of snugs 9 and 8 apart and, consequently, removes the pole pieces 2, 3 and 4, 5 from the armature 17. When the cone is turned to the left the pole pieces are moved toward the armature under the tension of spring 30.

Referring to Figs. 6 and 7, the pole pieces are provided with bearings 6 attached to the poles of the magnet 1. The armature end 17 passes between the pole pieces and the body portion is supported by nuts and bolts at 33, 34 and 35. The screw 16 serves to adjust the position of the armature in relation to the pole pieces.

The two yokes or extensions 31 and 32 are fastened at one end to the pole pieces as shown. The opposite end of 31 rests upon the upper surface of the block 36, while the opposite end of 32 rests upon the under surface of the block. The block 36 is provided with a pivot bearing 40. Springs 38 are fastened to the bearing and to the yokes 31 and 32, and serve to hold them under tension against the surfaces of the block 36.

A screw 37 engages an extension 41 of the block 36 and serves to tilt it when turned in either direction. The tilting of the block moves the yokes 31 and 32 and, consequently, moves the pole pieces about the bearings 6. One yoke and set of pole pieces moves in one direction and the other yoke and set of pole pieces moves in the opposite direction about the bearings 6, so the distance between the pole pieces and armature may be varied as desired. This movement is produced due to the fact that the block 36 as shown in Fig. 7 is provided with flat surfaces upon which the ends of yokes 31 and 32 rest. These ends are held in place under the tension of spring 38. The opposite ends of the yokes are fastened to the pole pieces pivoted at 6. It naturally follows that when the block 36 is tilted, one yoke end will be forced upward and the other forced downward causing their respective pole pieces to rotate in opposite directions.

Referring to Fig. 8, the armature 17 is shifted in position between the pole pieces by the screw 16. Only two similar pole pieces 2 and 3 are shown, for simplicity, but on the other side of the armature there would be two opposite pole pieces.

When the armature 17 is vibrating, its end opposite the pole piece 2 describes a larger path or arc than that part opposite the pole piece 3. For adjustment, the pole pieces 2 and 3 are moved about the bearing 6. The pole piece 2 with the radius (R) describes a large arc about the bearing 6, while the pole piece 3 describes a smaller arc with the radius (r). For particularly accurate adjustment the pole pieces 2 and 3 are arranged so their surfaces facing the armature lie in different planes.

From the foregoing description it will be noted that provision is made for accurate adjustment of the pole pieces in relation to the armature of an electro-magnetic device as applied to loud speakers, telephone ringers or similar systems. It will be readily apparent that various modifications may be made to the structural arrangements without departing from the spirit of my invention.

What is claimed is:

1. A device comprising an armature and pole pieces, means for adjusting the zero position of the armature between said pole pieces, and a single adjusting means for moving the pole pieces toward or away from said armature.

2. A device comprising an armature and pole pieces, means for adjusting the position of the armature between said pole pieces, and a single adjusting means for moving the pole pieces toward or away from said armature, the movement of said pole pieces in either direction being in arc paths.

3. A device comprising an armature and two similar pole pieces pivoted around a common axis, means for adjusting the position of the armature between said pole pieces, and means for moving said pole pieces around said axis to move toward or away from said armature.

4. A device comprising an armature and two similar pole pieces rotatable about a common axis and having their surfaces facing the armature lying in different planes.

5. A device comprising an armature and a plurality of pole pieces, wherein the similar pole pieces facing the armature lie in different planes, a single adjusting means for simultaneously moving said pole pieces in relation to said armature.

6. A device comprising an armature and pole pieces, means for causing said pole pieces to jointly approach or move away from said armature, and means for moving said pole pieces to

individually approach or move away from said armature.

7. A device comprising an armature and pole pieces, means for causing said pole pieces to jointly approach or move away from said armature, and means for moving said pole pieces to individually approach or move away from said armature, the movement of said pole pieces in either direction being in circular paths.

8. A device comprising an armature and pole pieces, means for causing said pole pieces to jointly approach or move away from said armature, and means for moving said pole pieces to individually approach or move away from said armature, the joint and individual moving means comprising an adjusting member whose moving axis is adapted to be shifted against the symmetrical axis of the pole pieces.

9. A device comprising an armature and two movable pairs of pole pieces, a single adjusting means for moving said pairs of pole pieces toward or away from said armature.

10. A device comprising an armature and two movable pairs of pole pieces, means for moving said pole pieces in arc paths toward or away from said armature.

11. A device comprising an armature and two movable pairs of pole pieces, means for moving the similar pole pieces on circular paths having different radii, toward or away from said armature.

12. A device comprising an armature and two movable pole pieces, means comprising a cone shaped member for causing the movement of said pole pieces toward or away from said armature.

13. A device comprising an armature and two movable pole pieces, a cone shaped adjusting member movable in one plane to adjust the position of said pole pieces in relation to said armature, and means for moving said cone shaped member in a different plane to provide a different adjustment for said pole pieces.

14. A device comprising an armature and two movable pole pieces, a cone shaped adjusting member movable in two planes to adjust the position of said pole pieces in relation to said armature.

15. A device comprising two pole pieces movable about a common axis, an adjusting member movable in two planes for adjusting the positions of said pole pieces about said axis.

16. A device comprising a movable pole piece, an adjusting member movable in two planes for adjusting the position of said pole piece.

EDUARD O. ZWIETUSCH.