

July 17, 1934.

E. O. ZWIETUSCH

1,966,476

ELECTROMAGNETIC SIGNALING DEVICE

Filed July 31, 1930

FIG. 1

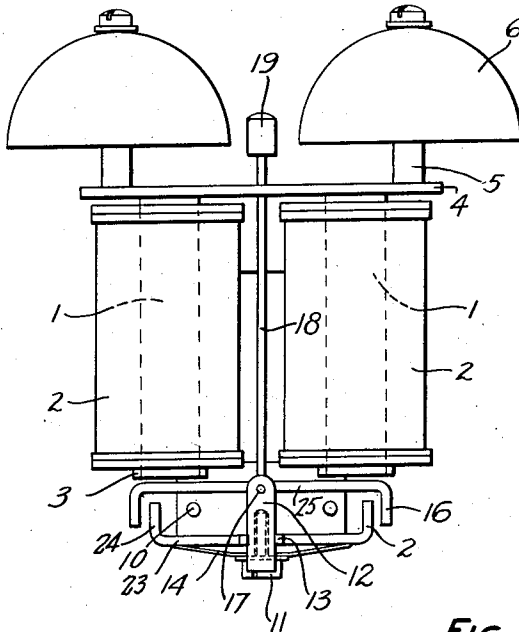


FIG. 2

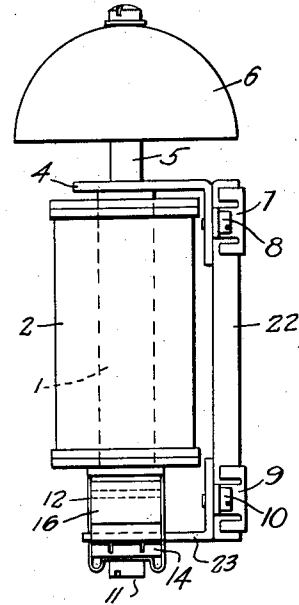


FIG. 3

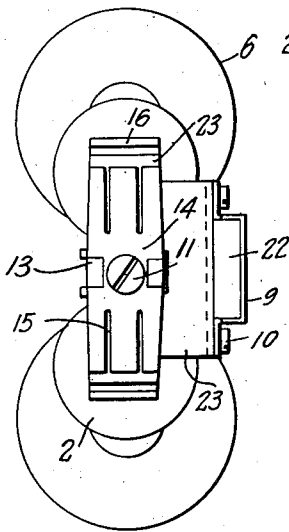


FIG. 4

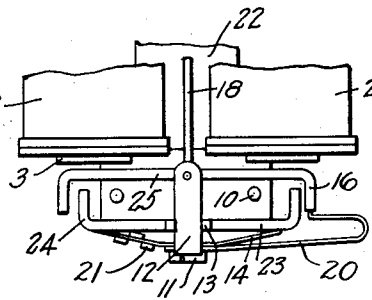


FIG. 6



FIG. 5

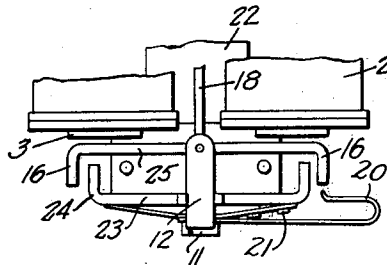
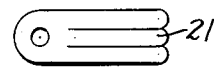


FIG. 7



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## UNITED STATES PATENT OFFICE

1,966,476

## ELECTROMAGNETIC SIGNALING DEVICE

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Application July 31, 1930, Serial No. 471,911  
In Austria September 26, 1929

7 Claims. (Cl. 177-7)

This invention relates to electromagnetic signaling devices and more particularly to ringers of the alternating current and pulsating direct current type.

An object of this invention is to enable an exact adjustment of the armature in devices of this type.

Another object of this invention is to facilitate the adjustment of the armature so that the devices will be responsive to comparatively weak currents and the armature will vibrate with sufficient amplitude, at all times, to produce signals of a desired intensity.

The principal features of the ringers of this invention will be apparent from the following: Instead of the permanent magnet of rather complicated bent form commonly employed heretofore, upon which the pole-pieces are fastened by bolts, the signaling device of this invention employs a simple bar magnet upon which the pole-pieces are mounted by connecting plates or displaceable lugs. This enables a rough adjustment of the armature by shifting the position of the connecting plates or lugs along the bar magnet; a fine and exact adjustment is accomplished in accordance with this invention, by a feather spring which cooperates with an armature supporting spring and whose degree of flexure is varied by a set screw. The head of said screw may be regularly slotted, may have two holes therein or may be hexagonal.

In accordance with another feature of this invention, a satisfactory magnetic flux path is obtained by providing the armature and the adjacent pole-pieces with large contiguous flanges and by eliminating all bolts and associated pieces from the magnetic flux path.

In accordance with a further feature of this invention, the armature is simply pivoted in sockets and may be easily mounted, demounted, and manufactured.

In accordance with still another feature, a ringer which is normally employed as an alternating current ringer may be readily converted into a ringer operable by pulsating direct currents of either polarity by a simple flat spring. Similarly, such a direct current ringer may be converted into an alternating current unit by means of a simple auxiliary spring which disengages the first mentioned spring from the armature. It is thus possible to use the ringer of this invention for both alternating current and pulsating direct current systems.

In the accompanying drawing:

Fig. 1 is a front view of the ringer;

Figs. 2 and 3 are side and bottom views, respectively;

Fig. 4 shows a ringer for pulsating direct currents embodying the aforementioned flat spring;

Fig. 5 shows how the flat spring is rendered inoperative by an auxiliary spring so that the ringer is operable by alternating currents; and

Figs. 6 and 7 are side and plan views respectively of the auxiliary spring shown in Fig. 5.

The ringer comprises two coil cores 1 and coils 2 mounted thereon. A flat pole-piece 3 is mounted on each armature core at the end adjacent the armature. The pole-pieces have a greater cross-section than the coil cores and thereby insure a favorable flux path to the armature. The other ends of the cores are magnetically connected in the usual manner by a pole-piece 4 upon which the gong supports 5 and the gongs 6 are mounted. The pole-piece 4 is adjustably attached to the permanent bar magnet 22 by the displaceable lug or connecting plate 7 and set screws 8 only one of which is shown. The other end of the permanent magnet 22 is similarly connected to another pole-piece 23 by a lug 9 and screws 10. The last named pole-piece has an upturned flange 24 at each end and is provided with a tap for accommodating the spring regulating screw 11, which engages a U-shaped armature supporting spring 12, and is further provided with two rectangular slots 13 which serve to locate the arms of the armature supporting spring. The span spring 14 is secured between the pole-piece 23 and the armature supporting spring 12 by the screw 11. The span spring 14 is provided with slots 15, as is clearly shown in Fig. 3, whereby a uniform pressure is obtained. The head of the screw 11 may be regularly slotted, provided with holes or formed in any other desired manner. The armature 25, which consists of a single piece of iron having a flange 16 at each end, is provided in the center with trunnions 17 projecting into apertures in the armature supporting spring 12. The armature carries the hammer rod 18 which mounts the hammer 19. The flanged overlapping ends 24 and 16 of the pole-piece and the armature 25 respectively in conjunction with the large pole-pieces 3 provide efficient magnetic flux paths.

The armature may be adjusted in two ways. It may be adjusted approximately by shifting the pole-piece 23 carrying the armature 25 along the bar magnet 22 and thereby varying

its position with respect to the coil cores; a further adjustment is obtained by rotating the regulating screw 11 which causes a displacement of the armature supporting spring 12 and makes possible very small variations in the position of the armature with respect to the pole-piece 23. The most satisfactory and efficient position of the armature is thereby obtainable.

The ringer described hereinabove and shown in Figs. 1 to 3 inclusive is adapted for operation by alternating current. It is oft times desirable and necessary to transfer a ringer from an alternating current circuit to one wherein only a pulsating direct current is available for ringer actuation. In accordance with a feature of this invention, a telephone ringer of the general construction described hereinabove, may be easily converted from one operable by alternating currents to one operable by pulsating direct current or vice versa. As shown in Fig. 4, a hook shaped spring 20 is secured at one end between the base of the armature supporting spring 12 and the span spring 14 by the screw 11. The other end of the spring 20 bears against one of the flanges 16 of the armature 25 so that the ringer is biased for and operable only by currents of a polarity such that the armature will be actuated in a direction whereby the flange in engagement with the spring 20 is lifted away from the spring. The ringer may be reconverted for use on alternating current circuits, as shown in Fig. 5, by a tri-armed rider spring 21, shown more clearly in Figs. 6 and 7, which is sprung on one arm of the span spring 14 and forces the end of the spring 20 out of engagement with the adjacent flange 16 on the armature. When not in use the rider spring 21 may be sprung on the span spring 14 at a portion thereof remote from the spring 20 as shown in Fig. 4.

What is claimed is:

1. An electromagnetic signaling device comprising a magnet, a pole piece attached to said magnet, an armature, and means supporting said armature adjacent said pole piece, said armature and pole piece each comprising a member having an angularly extending flange portion at opposite ends thereof, the flange portions of the armature being contiguous to the flange portions of the pole piece.

2. An electromagnetic signaling device comprising a bar magnet, a pole piece attached to one end thereof, a supporting member mounted on said pole piece, an armature pivotally mounted on said supporting member, a cantilever spring engaging said armature for preventing substantial rotation of said armature in one direction but allowing rotation thereof in the opposite direction, means supporting said cantilever spring, and means insertable between said

pole piece and said spring for rendering said cantilever spring ineffective.

3. An electromagnetic ringer comprising an electromagnet having a pole piece, a supporting structure mounted on said pole piece, an armature adjacent said pole piece pivotally supported on said structure, a cantilever spring member attached to said supporting structure, the free end of said spring member being adapted to engage one end of said armature, to resist displacement thereof in one direction while allowing displacement thereof in the opposite direction, and movable means reacting between said spring member and said supporting structure for disengaging the end of said cantilever spring from said armature.

4. An electromagnetic ringer comprising a permanent magnet, an L-shaped pole piece affixed to one end of said magnet, a pair of parallel coils and cores therefor mounted on said pole piece, another L-shaped pole piece affixed to the other end of said magnet and having flanges extending adjacent said cores, and an armature supported from said second mentioned pole piece and positioned between said flanges and cores, said armature having flanges contiguous with the flanges on said second mentioned pole piece.

5. An electromagnetic ringer comprising a bar magnet, a pole piece adjustably mounted on one end of said magnet, a U-shaped supporting member having its base adjacent said pole piece, a bowed leaf spring spacing said supporting member from said pole piece, means for displacing said supporting member relative to said pole piece against the tension of said spring, an armature pivotally mounted between the arms of said supporting member, and a leaf spring locked to said supporting member by said means and engaging one end of said armature.

6. An electromagnetic ringer comprising a magnet having a pole piece, an armature mounted in operative relation to said pole piece, means for biasing said armature, said means comprising a spring at one end engaging said armature and being fixed at its other end, and an auxiliary spring for disengaging said biasing spring from said armature to enable conversion of said ringer for use with direct current or alternating current at will.

7. A signaling device comprising a magnet, a pole piece for said magnet, an armature, and means for mounting said armature in operative relationship with said pole piece, said armature and pole piece having spaced intermediate supporting portions, and contiguous flanged end portions extending at angles to said supporting portions.

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