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ELECTROMAGNETIC DEVICE

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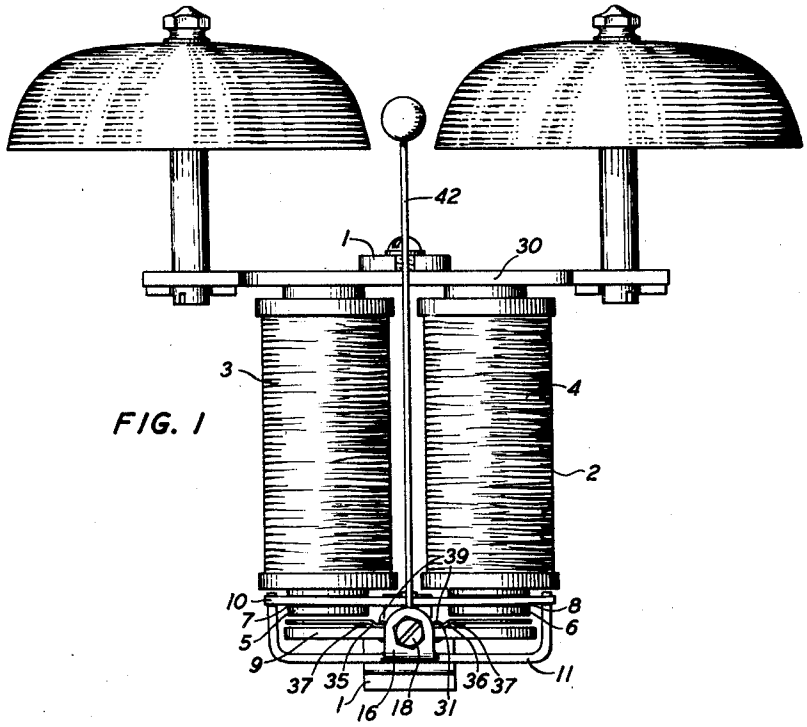


FIG. 1

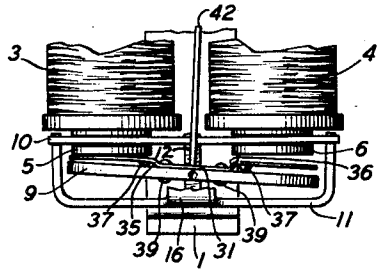


FIG. 2

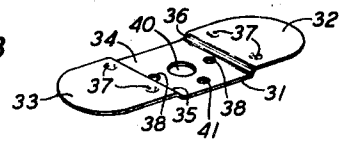


FIG. 3

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ELECTROMAGNETIC DEVICE

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4 Claims. (Cl. 172—126)

This invention relates to electromagnetically operated devices and more particularly to devices of this kind commonly known as telephone ringers.

The object of this invention is to provide, in an electromagnetically operated device, means for maintaining an armature in correct spaced relation relative to an attracting pole of an electromagnet.

A feature of this invention resides in spring means associated with the armature.

In the drawing:

Fig. 1 is a front elevational view of a polarized ringer of this invention showing the parts in normal position;

Fig. 2 is a front elevational view of a portion of the polarized ringer shown in Fig. 1, a part being broken away to get a clearer view of the invention and showing the armature in attracted position; and

Fig. 3 is a view in perspective of the spring.

In a telephone ringer the armature is supported in some predetermined spaced relation to an attracting pole of an electromagnet, the correct spacing of the armature from the attracting pole being important to obtain efficient operation of the ringer. After an armature has been attracted toward a pole of the electromagnet and the attracting force is diminished or discontinued, it is necessary that the armature be returned again to normal position. It is common practice in biased telephone ringer construction to attach a spring to an armature and to a support, the spring serving to withdraw the armature from the pole of the electromagnet when the attractive force of the electromagnet is diminished or discontinued. It is also common practice in biased and unbiased telephone ringer constructions to provide a nonmagnetic element between an armature and the attracting pole of an electromagnet to prevent sticking of the armature to the pole of the electromagnet.

In unbiased telephone ringers now in use the return of the armature to normal position depends largely on the quickness of decay of the attractive force in the pole of the electromagnet and the correct balancing of the armature in its supporting means. It sometimes happens in the operation of unbiased telephone ringers that the pole of the electromagnet becomes so affected by the current supplied through the operating winding that it fails to release the armature. This occurs, for instance, when a so-called comparatively large soak current is applied to the ringer. Under such conditions the armature remains drawn toward the pole of the electromagnet even when a non-stick element is provided between the armature and the pole of the electromagnet. The ringer then fails to operate until the effect of the comparatively large soak current becomes dissipated.

In this invention a spring of non-magnetic material is provided on the armature. The spring is located between the armature and the attracting pole of the electromagnet and serves as a return spring and a non-stick element.

The invention is shown in the drawing as applied to a polarized ringer of the type disclosed in E. B. Craft Patent 1,096,287, May 12, 1914, and to which reference may be had for a detailed description of the construction of the ringer.

The ringer is provided with a permanent magnet 1 and an electromagnet 2 comprising the two spools 3 and 4 joined by a suitable yoke 30. The poles 5 and 6 project as indicated and are provided with annular grooves 7 and 8. The mounting for an armature 9 is supported on the projecting ends of the poles 5 and 6. This mounting comprises a forked or slotted brass plate 10 and a bridge member 11, the free ends of the bridge member 11 engaging and resting upon the outer ends of the tangs of the brass plate 10. The tangs of the brass plate 10 rest in the annular grooves 7 and 8 of the poles 5 and 6. A machine screw 12 extending through the bridge member 11 and threaded into a central aperture in the brass plate 10 serves to hold the bridge member 11 and the brass plate 10 together. The bridge member 11 is provided with spaced ears, such as 16, in each of which is inserted a screw such as 18 and by means of which the armature 9 is pivotally supported at its center.

A substantially flat spring 31, such as shown in Fig. 3 and of about the same length and width as the armature 9, is attached at its central portion to the upper surface of the armature 9. The spring 31 is made of non-magnetic spring material and has flexible free end portions 32 and 33 offset from the plane of the central portion 34 and extending above the plane of the central portion 34 and parallel with the upper surface of the armature 9. Adjacent the points of offset 35 and 36 and in the free end portions 32 and 33 of the spring 31 are spaced projections 37. The projections 37 extend downward from the free end portions 32 and 33 of the spring 31 and into engagement with the upper surface of the armature 9 and serve as fulcrums for the free end portions 32 and 33 of the spring 31.

The central portion 34 of the spring 31 is

apertured at 38—38 to accommodate rivets 39 or other like fastening means by means of which the spring 31 is secured to the upper surface of the armature 9. A comparatively large aperture 40 is provided in the central portion 34 of the spring 31 in register with a like comparatively large aperture in the armature 9 to permit passage therethrough of the screw 12 which serves to hold the bridge 11 and the brass plate 10 together. The central portion 34 of the spring 31 is also apertured at 41 to permit passage therethrough and into the armature 9 of a bell striker supporting rod 42. The spring 31 may be made of brass or bronze or other spring material and may be cut or stamped out of a sheet of this material. The projections 37 may be embossings formed on the lower surface of the spring 31.

As shown in the drawing, the free ends 32—33 of the spring 31 extend parallel to the upper surface of the armature 9 and between the upper surface of the armature 9 and the projecting ends of the poles 5 and 6. When the armature 9 is attracted by one of the poles of the electromagnet and is rocked on its pivotal support, for instance as shown in Fig. 2, a free end of the spring 31 is brought into engagement with the attracting pole and is flexed toward the upper surface of the armature 9, the free end of the spring being progressively flexed from the point of location of the adjacent projections 37 to the outer end of the free end of the spring, the projections 37 serving as a fulcrum for the free end of the spring. The spring pressure built up in the free end of the spring 31 by this flexing movement serves to urge the armature away from the pole of the electromagnet and will return the armature to normal position when the attractive force in the pole is diminished or discontinued. If the projections 37 were not provided, the free ends of the spring would be defined by the points of securement to the armature and the respective ends of the spring. The free ends of the spring in this case would be less effective in returning the armature to normal position since they would be more flexible. With the projections 37 provided, and located at the positions indicated, the portions of the spring which serve to return the armature to normal position are comparatively short and stiff and the spring pressure developed in the free end portions when the armature is attracted is greater than would be the case if the projections were not present. The spring structure described and shown therefore is more effective as an armature return spring than a spring of similar form but not having the projections to serve as fulcrums for the free ends. To merely shorten the spring would not be good practice since the spring serves also as a non-stick element and to be properly effective as such must be of sufficient length and width to provide a non-magnetic surface between the poles of the electromagnet and the adjacent face portions of the armature. The spring 31 being made of non-magnetic material and extending between the attracted end of the armature and the pole of the electromagnet prevents adherence of the armature to the pole of the electromagnet due to residual or lingering magnetism in the parts. The spring 31, therefore, serves as a combined non-stick and return spring element for the armature 9. The particular structure of the spring 31 also serves as an aid in obtaining correct spacing of the armature 9 relative to the poles 5 and 6 of the electromagnet when the ringer is being assembled.

In assembling the ringer a gauge strip of predetermined thickness may be placed between the upper surface of the spring 31 and the poles of the electromagnet and directly above the projections 37. By turning the machine screw 12 the armature assembly may then be moved toward the projecting ends of the poles 5 and 6 of the electromagnet to the extent permitted by the gauge strip. The projections 37 in this instance serve to prevent flattening of the free ends 32 and 33 of the spring 31 against the upper surface of the armature 9. After the adjustment of the armature has been made in the manner above described the gauge strip may be withdrawn leaving the armature in adjusted position.

Although brass or bronze has been indicated as being suitable material for the spring 31, it is obvious that other non-magnetic material may be employed instead without departing from the spirit of the invention. While the invention has been shown and described as being applied to a telephone ringer, it is realized that it may be found applicable to other electromagnetic devices. The scope of the invention, therefore, is considered as being only limited to the extent indicated in the following claims.

What is claimed is:

1. In an electromagnetically operated device, an electromagnet pole, an armature spaced from said electromagnet pole, a spring of sheet material secured to said armature and extending parallel to said armature and between said electromagnet pole and said armature, a free end portion on said spring spaced from said armature and from said electromagnet pole and a projection on said free end portion of said spring, said projection bearing against said armature and serving as a fulcrum for the free end portion of said spring when the armature is attracted and the free end portion of said spring is brought into engagement with said electromagnet pole.

2. In an electromagnetically operated device, electromagnet poles, an armature spaced from said electromagnet poles, a flat spring secured at its central portion to said armature and extending parallel to said armature and between said electromagnet poles and said armature, free ends of said spring offset from the central portion of the spring and spaced from said armature and from said electromagnet poles and embossings on the free ends of said spring adjacent the points of offset said embossings extending into engagement with said armature and serving as fulcrums for the free ends of said spring when said armature is operated by means of said electromagnet poles.

3. In an electromagnetically operated device, a centrally pivoted armature, a leaf spring of non-magnetic material attached to a central portion of said armature, free ends of said spring offset from the plane of the central portion of said spring and extending in spaced relation with and parallel to said armature and spaced projections on the free ends of said spring adjacent the points of offset and engaging said armature, said projections serving as combined spacers and fulcrums for the free ends of said spring by preventing flattening of said free end portions against said armature and by providing fulcrum points for the free end portions when said armature is moved toward the electromagnets of the device.

4. In an unbiased telephone ringer, a centrally pivoted armature, a spring of non-magnetic mate-

rial attached at its central portion to an upper face of the central portion of said armature, free end portions offset from the central portion of said spring and extending parallel to and spaced from said armature, and a plurality of aligned spaced embossings adjacent each point of offset in said spring and within each free end of said spring, said embossings extending downward from the free ends of said spring and into engagement with the upper surface of said armature, said embossings serving as fulcrums for the free ends of said spring when said armature is rocked on its pivotal point and the free ends of said spring are brought into engagement with the pole of an electromagnet.

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