C. O. HARRINGTON.

ELECTROMAGNETIC APPARATUS.

APPLICATION FILED MAR. 9, 1915.

1,216,446.

Patented Feb. 20, 1917.

2 SHEETS—SHEET 1.

FIG. 1

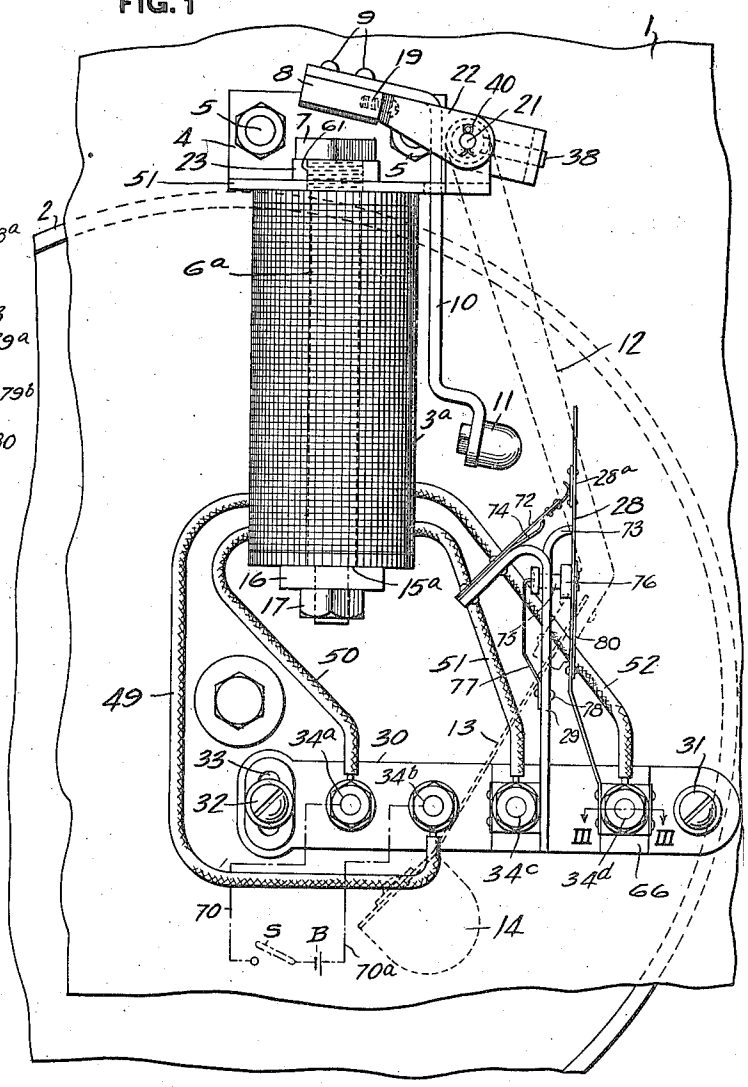


FIG. 4

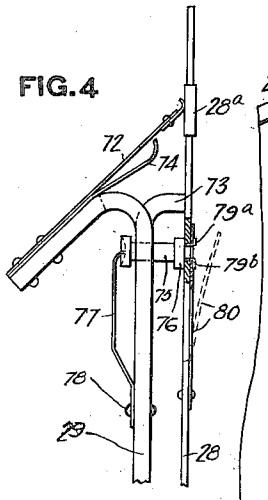


FIG. 5

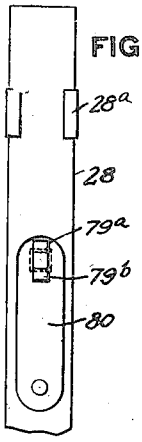


FIG. 6

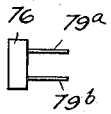
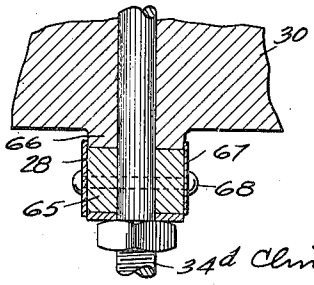


FIG. 3



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 2

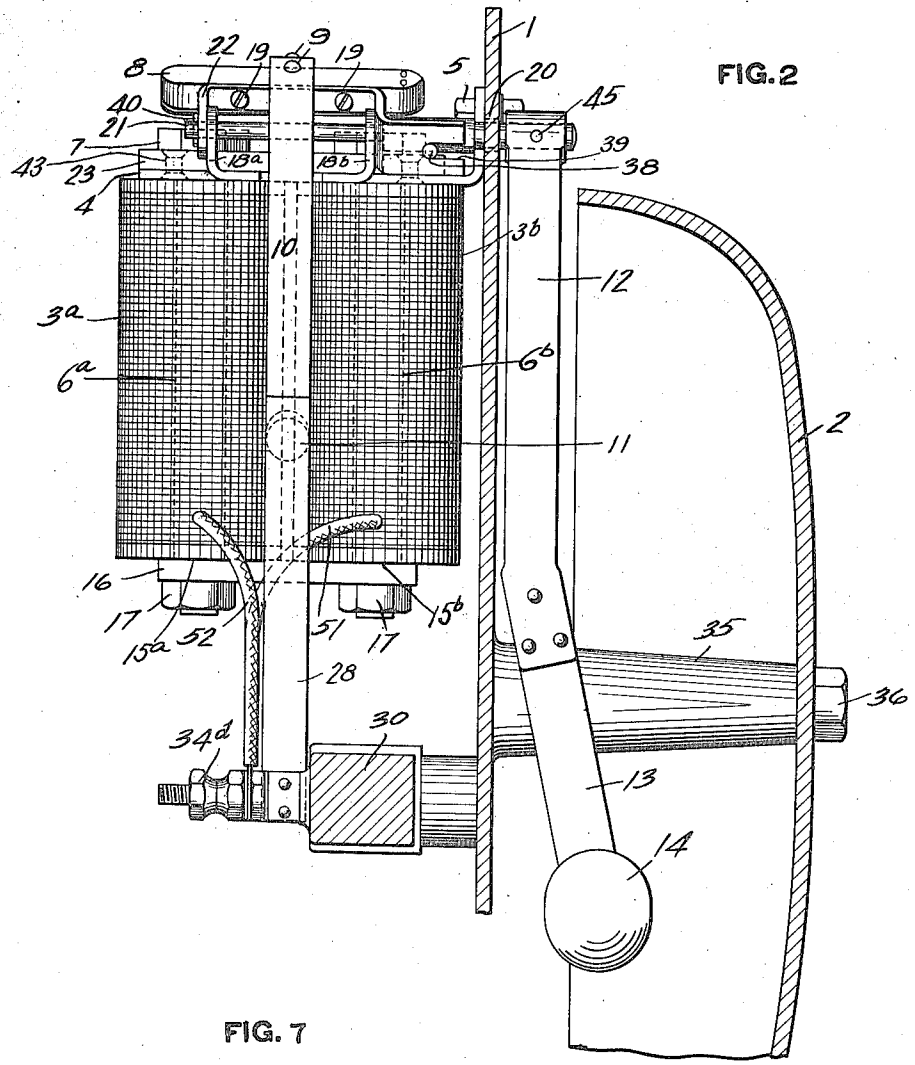
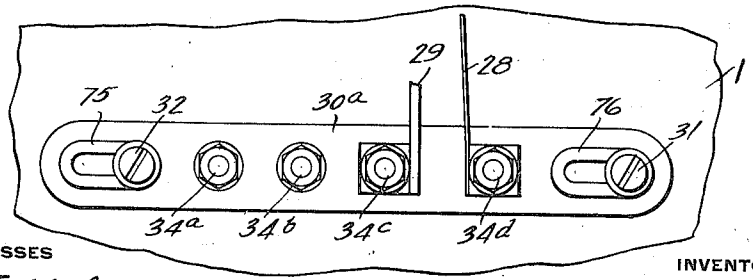


FIG. 7



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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC APPARATUS.

1,216,446. Specification of Letters Patent. Patented Feb. 20, 1917.

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To all whom it may concern:

Be it known that I, CLINTON O. HARRINGTON, a citizen of the United States, residing at Edgewood Borough, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electromagnetic Apparatus, of which the following is a specification.

My invention relates to electromagnetic apparatus, and particularly to apparatus for causing repeated operation of a member.

I will describe certain forms of apparatus embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings Figure 1 is a front elevation of one form of apparatus embodying my invention and Fig. 2 is a side elevation thereof. Fig. 3 is a sectional view on the plane indicated by the line III—III of Fig. 1, looking in the direction of the arrows. Figs. 4, 5 and 6 are views showing parts of Figs. 1 and 2 on a larger scale. Fig. 7 is a view showing a modification of a part of the apparatus shown in Figs. 1 and 2.

Similar reference characters refer to similar parts in each of the several views.

Referring first to Figs. 1 and 2, I have here shown an electric bell, the gong 2 of which is secured by means of a screw 36 to a stud 35, which projects from one side of a plate 1. A bracket 4, which is fastened to the other side of plate 1 by bolts 5 serves as a support for an electromagnet 3^a—3^b, as I shall now describe. A brass filler plate 23 is attached to the bracket by means of rivets 43 so as to give greater rigidity. The bracket and the filler plate are provided with two threaded holes 61, through which are passed the cores 6^a and 6^b of electromagnet 3^a—3^b. The upper ends of cores 6^a and 6^b are shaped into enlarged poles 7. Immediately below the poles the cores 6^a and 6^b are threaded so that the cores can be passed through the holes 61 and screwed into place until the poles 7 engage the filler plate 23. Thus the cores 6^a and 6^b are held rigidly in place. The windings 3^a and 3^b, which have previously been wound on bobbins as is usual in the construction of this type of electromagnet, are then passed over the cores 6^a and 6^b respectively, and are supported by means of a back strap 16, which is forced by nuts 17 against shoulders 15^a and 15^b formed on cores 6^a and 6^b respectively by the threaded extremities of the cores.

The armature 8 of the electromagnet is attached to a U shaped brass supporting member 22, by means of screws 19. Member 22 is supported by a shaft 21 and is locked thereto by means of a pin 38 which passes through the shaft 21 and through a slot 39 of member 22. The bearings for shaft 21 are holes in the standards 18^a and 18^b which are integral with the bracket 4. Shaft 21 extends through a hole 20 in plate 1 and forms a support for an arm 12—13 which carries a clapper 14 adapted to strike the gong 2. Arm 12—13 which is locked to shaft 21 by means of a pin 45, is formed of two parts, a relatively stiff member 12 and a relatively flexible member 13, as is usual in the construction of bell clappers.

Mounted on the plate 1 is a terminal board 30, provided with four terminal posts 34^a, 34^b, 34^c and 34^d. One end of this block is pivotally fastened to the plate 1 by means of a screw 31 and the other end is provided with a vertical slot 33, through which passes a screw 32 for clamping the terminal board against plate 1. Thus by loosening screw 32 the position of the terminal board may be adjusted through an angle limited by the length of slot 32. The purpose of this I shall describe below.

A contact spring 28 is mounted on terminal board 30 in the manner shown in Fig. 3. A square block 65 is provided with a central hole through which is passed the shank of the terminal post 34^d. On opposite sides of block 65 are fastened a plate 67 and finger 28 by means of rivets 68, so that the edges of spring 68 and plate 67 extend beyond one side of the block. Terminal board 30 is provided with a square boss 66 of width equal to that of the block, so that when the block is brought up against boss 66 it is prevented from turning by plate 67 and finger 28. A relatively stiff finger 29 is fastened to the terminal board 30 at terminal post 34^c in a similar manner.

The upper end of finger 29 is bent into the shape shown in Fig. 4. A contact spring 72 is riveted to the extremity of finger 29, so that contact spring 72 makes a wiping contact with plate 28^a on spring 28, when spring 28 is moved toward and away from spring

72. Spring 28 is biased toward spring 72, its movement to the left being limited by a prong 73 integral with the rigid finger 29. Similarly, spring 72 is biased toward spring 28 and its movement in that direction is limited by a stop 74 riveted to finger 29. Contact 72—28[a] is operated by means of a hammer 11, preferably of insulating material, which is attached to armature 8 by means of a lever arm 10 fixed to armature 8 by rivets 9. Contact 72—28[a] I will herein term the "service" contact.

To secure uniform operation of a bell it is important that the controlling contacts in series with the bell magnet should maintain uniform resistance, as otherwise the current energizing the bell is liable to fluctuate seriously. But the inductance of the magnet windings causes considerable arcing at the contact points when the contact is broken, and this arcing seriously burns the contacts and so causes the development of high contact resistance and also destroys the adjustment of the contact pressure. To overcome the troubles thus caused by arcing, I preferably provide auxiliary removable contact tips 75 and 76 which are made preferably of a hard conducting material not easily burned by arcing, and which remain in engagement until after the service contacts 72—28[a] have been broken, so that all arcing takes place at tips 75 and 76. Contact tip 75 is in the shape of a stud, the shank of which slides in a hole through the stiff finger 29. A spring 77 is pivotally mounted on finger 29 by means of a rivet 78. The head of tip 75 is countersunk so that the end of spring 77 which is pointed for the purpose, can be inserted therein. Thus tip 75 is held in its support and is biased to the right so that its head normally bears against finger 29. In order to replace a worn or burned contact tip, the end of spring 77 is lifted so that the spring can be turned to one side; then the old contact tip is replaced by a new one, whereupon the end of spring 77 is inserted into the head of the new contact tip. Contact tip 76, which is shown enlarged in Fig. 6, is provided with two flexible fingers 79[a] and 79[b] which are passed through a hole in spring 28 and there bent in opposite directions so as to hold the tip in place, similar to the familiar paper fastener. In order to insure a good electrical contact between tip 76 and spring 28 I provide a spring 80 which tends to assume the position shown in broken lines. The upper end of this spring is clamped against finger 28 by the springs 79[a] and 79[b]. This is best shown in Fig. 5, which is a side elevation of Fig. 4. From the above it is apparent that tip 76 is also readily replaceable.

As shown in Fig. 1, the circuit for the bell is from a battery B, through a switch S, (which may be operated by hand or otherwise), through wire 70, terminal post 34[a], wire 50, coil 3[b], wire 51, terminal post 34[c], contact 72—28[a], terminal post 34[d], wire 52, magnet 3[a], wire 49, terminal post 34[b], and wire 70[a] to battery B. The operation of the bell will be so well understood that it is unnecessary to explain it here. Suffice it to point out that the time of breaking contact 72—28[a] by hammer 11 should be adjustable. I accomplish this in the following manner.

The contact springs 72 and 28 normally bear against each other with a predetermined pressure. They are separated by hammer 11 before clapper 14 strikes gong 2. The length of the shank of contact tip 75 is such that contact 75—76 breaks immediately after contact 72—28[a] has broken, so that the arcing is shifted from the service contact to contact 75—76, but the actual time of contact is not appreciably lengthened. The final adjustment of the time of contact is best secured while the bell is operating. Screws 32 and 31 are loosened sufficiently to allow the terminal board 30 to be turned angularly about screw 31 as a pivot, so that the contacts may be moved with respect to the hammer 11, and the time of opening the circuit is varied until the bell operates smoothly and with the desired periodicity.

This manner of mounting the contacts is very advantageous. For example, railway crossing bells are generally subjected to severe duty and require frequent attention, due to the wear of the contacts caused by arcing. These bells are generally mounted on posts where it is inconvenient and difficult to make delicate adjustments. In the case of crossing bells embodying my improvements, the bell maintainer would carry with him auxiliary contact tips which he can readily substitute for the worn tips in the manner described hereinbefore. The maintainer would also carry with him terminal boards already equipped with contact springs adjusted to the desired contact pressure, so that if the service contacts 72—28[a] of a bell are worn and need replacing he would simply remove the old terminal board and substitute therefor the new one, then adjust the new one to such angular position that the bell operates as desired. Thus all bending of contact fingers is avoided and the contact pressure adjustment is not disturbed.

If desired, the contacts can be mounted on a board which is movable laterally with respect to the hammer. This I have shown in Fig. 7, wherein the terminal board 30[a] is attached to plate 1 by means of screws 32 and 31 passing through horizontal slots 75 and 76 respectively. Adjustment is obtained by moving terminal board 30[a] laterally until satisfactory operation of the bell

is secured, whereupon the terminal board is clamped in place by tightening screws 32 and 31.

Although I have herein shown and described only certain forms of apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claim without departing from the spirit and scope of my invention.

Having thus described my invention what I claim is:

In combination, a base, a relatively stiff supporting member mounted thereon, a contact finger mounted on said member, a second contact finger mounted on said base and biased to make contact with the first-mentioned contact finger, a contact tip removably attached to said second contact finger, a second contact tip in the shape of a stud the shank of which is adapted to reciprocate in a hole through said supporting member, a spring for holding said stud in said hole so that said stud is easily replaceable, said tips forming a shunt contact for the contact fingers, which shunt contact remains closed an interval of time after the contact fingers have broken contact.

In testimony whereof I affix my signature in presence of two witnesses.

CLINTON O. HARRINGTON.

Witnesses:

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A. C. NOLTE.