

1,180,692.

Patented Apr. 25, 1916.

Fig. 1

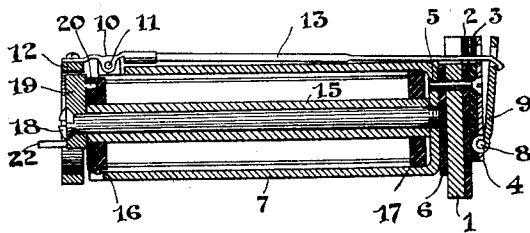


Fig. 2

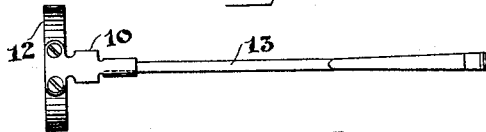


Fig. 3

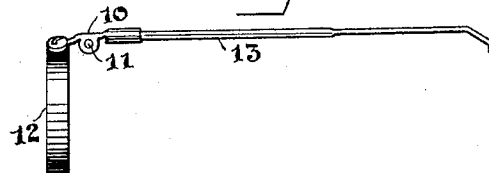


Fig. 4

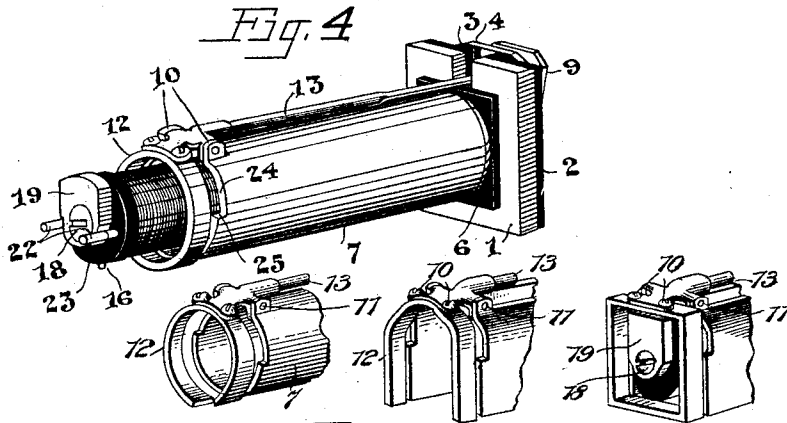


Fig. 5

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UNITED STATES PATENT OFFICE.

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TELEPHONE-DROP.

1,180,692.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CLIFFORD C. BRADBURY, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone-Drops, of which the following is a specification.

My invention relates to telephone drops or annunciators of the character used at the central office of a telephone system for signaling purposes. Drops of this character are usually mounted in compact relation to one another such that the shutters are visible from the face of the switch-board and the shells and armatures are accessible only from the rear of the switchboard. The coils of drops used in this manner are usually normally connected in a bridge between the line conductors extending from the subscriber's station and are subject to lightning discharges and other electrical disturbances caused by crossing of line wires with power wires so that ruptures occasionally occur in the windings of the drop coils. The relative adjustment of the movable parts of the drop, namely, the shutter, the drop catch and the armature must be maintained if these parts are to perform their functions effectively, as it is apparent that a slight disarrangement of the adjustment of these parts would render the drop inoperative or cause it to perform its work in a defective manner. When ruptures occur in the coils as above stated or when for other reasons it becomes necessary to inspect the coils it is of great advantage to be able to remove and replace the coils promptly without in any manner disturbing the fixed working positions of these movable parts. In practice, in removing the coils for inspection anything that disturbs the relative normal positions of these working parts is objectionable as it tends to disturb their permanent adjustment.

It is the object of this invention to provide a drop which shall permit the removal of the coil of the drop without in any way disturbing the normal relative positions or adjustment of the moving parts, whereby a higher degree of efficiency and durability is originally secured and maintained. Other objects of my invention arise from the construction of the armature and pole piece by means of which I cause the magnetic lines of force to attract the armature in two direc-

tions, each substantially parallel with the path of movement of the armature at the point of attraction, whereby the greatest utility is made of the magnet lines. Other objects of my invention will appear from the following description and claims.

My invention is illustrated in the accompanying drawing in which,

Figure 1 is a sectional elevation of the assembled drop; Fig. 2 is a plan of the armature and lever disassembled; Fig. 3 is an elevation of the armature and lever shown in Fig. 2, and Fig. 4 is an isometric drawing of the drop showing the coil in its partially removed position. Fig. 5 shows isometric views of three modifications of the armature of my invention.

A number of drops of the character here shown are preferably mounted upon a mounting plate 1 which extends in a horizontal position across the front of the switchboard. On the face of this strip the rubber insulating strips 2 and 3 and the plate 4 are secured by the screw 5 which extends through the rubber insulating sheet 6 into the drop shell 7. The lower portion of plate 4 is formed into a hinge and supports the pin 8 which in turn supports the drop plate 9 so pivoted thereto that it may readily swing downwardly to a position at substantially right angles to the position shown in Fig. 1.

At the rear of the shell 7 two armature supporting ears 10 are formed of the shell 7 and have holes drilled therein through which the pivot 11 passes to support the armature 12 and catch lever 13. The catch lever 13 is made of brass or other suitable non-magnetic material. The armature 12 is preferably in the form of a continuous ring of soft annealed iron and may be secured to the lever 13 in the manner here shown or in any other manner which is a mechanical equivalent of that shown in the drawing.

The electromagnet for the drop has the hollow core 15 upon either end of which the fiber heads 16 and 17 are secured and about which is wound the magnet wire. Through the center of the core 15 the screw 18 passes and threads into the base of the shell 7. This screw also passes through the pole piece 19 which is of soft iron and which is held tightly pressed against the end of the core 15. The pin 20 is secured in the pole

piece 19 and extends into the fiber spool head 16 to prevent the pole piece from rotating while screw 18 is being driven home.

The winding terminals 22 and 23 are secured in the fiber head 16 and are the means for making electrical connection with the coil. These terminals may be of the form shown or of any other desired form and may be provided with screws or clips for engaging the line terminals so that soldering will not be necessary.

When the core of this drop is energized the magnetic lines of force pass between the pole piece 19 and inside face at the top of the armature 12, thus pulling down upon the top of the armature and causing a torque about the pivot 11 which tends to cause the catch lever to be raised to release the drop 9. The rear end of the shell 7 is slightly cut away at the point 24 so that the air gap between the armature and the shell is quite large at all points above the shoulder 25. The lines of force therefore which pass into the armature 12 will travel through the iron to a point near the bottom of the ring and will then pass from the ring 12 into the shell 7. At this point the passage will be between the right hand face of the ring and the end of the shell 7 and the pull upon the lower part of the armature will be in a direction at substantially right angles to the pull upon the upper part of the armature. This pull is, however, very nearly in the direction of the movement of that part of the armature and adds to the torque about the pivot 11, thus aiding in the lifting of the catch lever 13.

The pole piece 19 is not necessarily of the shape here shown in the drawing but may be completely cylindrical in form so that the lines of force will pass from the pole piece into the ring equally in all directions, whereby no torque about the pivot 11 will be felt due to the passage of the lines of force from the pole piece into the armature. The passage of the lines of force from the lower part of the armature into the shell, however, will cause sufficient torque about the pivot 11 to raise the lever 13, though to so construct the pole piece a part of the efficiency of the drop is sacrificed.

While I have shown and described my invention with reference to a drop it is to be understood that the same form of armature may be applied to relays or other magnetically operated devices where it is desirable to have the coil removable without disturbing the mechanical adjustment of the moving parts. It is further possible to construct the armature in other forms than in the form of a closed ring. The armature might, for example, be left open at the bottom, might be made square or of a substantially U shape. It is also to be understood that the shell may not necessarily be formed of one

piece, but may be formed in any other convenient manner. Forming the shell of a single piece of tubing is not essential. Other changes in the form of the invention could be readily made without departing in any way from the spirit or scope of my invention.

I claim:

1. In a drop, the combination with a shell, of a laterally supported armature pivoted thereon and adapted to be attracted thereby, a coil within the shell having a pole piece adapted by its attraction to move the top of the armature in a downward direction about the pivot, substantially as described.

2. In a drop, the combination with a shell, of a coil within the shell, a pole piece for said coil, a laterally supported armature adapted to be attracted in one direction by said pole piece and in another direction by said shell, substantially as described.

3. In a signaling device, the combination with a shell, of a coil within the shell, an armature having an opening therein pivoted at the end of the shell, a pole piece for said coil located wholly within the opening in said armature, said armature being adapted to be downwardly attracted by the pole piece and horizontally attracted by the shell, substantially as described.

4. In a drop, the combination with a coil, of a core and pole piece for said coil, a laterally pivoted armature adapted to be attracted by said pole piece, means for completing the magnetic circuit of the drop, said means attracting the armature in a different direction from the attraction between said pole piece and armature, substantially as described.

5. In a drop, the combination with a shell, of a shutter actuating armature supported by said shell and adapted to be horizontally attracted by the end of the shell, a core adapted to be moved in and out of the rear end of the shell without disturbing the armature and having a pole piece adapted to attract the armature, substantially as described.

6. In a drop, the combination with a shell, of an armature supported at the top of the shell and adapted to be attracted by the bottom portion of the shell, said armature having an opening therein of substantially the same size as the opening in the shell, and a coil adapted to be moved in and out of the shell through the opening in the armature, substantially as described.

7. In a drop, the combination with a cylindrical shell, of an armature therefor of substantially the same diameter as the shell, said armature having an opening therein and a coil adapted to be readily moved into and out of the shell through the opening in said armature substantially as described.

8. In a drop, the combination with a cylindrical shell, of a cylindrical armature supported near the open end of the shell, said shell having a portion cut away whereby the gap between the armature and the shell is less on one side of the shell than on the other, said armature having an opening therein and a coil adapted to be moved into and out of the shell through the opening in said armature, substantially as described.

9. In a magnetic device an electromagnet and associated armature having a magnetic circuit having two gaps therein, said gaps being at substantially right angles to each other and each being adapted to be made smaller by the energization of the device, said electromagnet having a coil adapted to be readily removed through an opening in said armature, substantially as described.

10. In a magnetic device, the combination with a removable coil, of a shell completely inclosing said coil, a disk-like pole piece for the coil, an armature adapted to be attracted in one direction by said pole piece, and in another direction by the shell, substantially as described.

11. In a magnetic device, the combination with a shell, of a coil removably mounted within said shell, a pole piece for the coil, a laterally pivoted armature adapted to be attracted in one direction by said pole piece and in another by the shell, said armature permitting the removal of the coil from the shell without disturbing the position of the armature, substantially as described.

12. In a magnetic device, the combination with a shell, of a ring armature supported near the end of the shell, a coil adapted to be placed within the shell through the opening in the armature, a pole piece for said coil inside of the armature, the magnetic circuit of the device being from said pole piece to the inside face of the ring armature, and from the armature to the end of the shell, substantially as described.

13. In a magnetic device, the combination with a shell, of an armature supported in position to be attracted by the end of the shell, a portion of the end of the shell being cut away so that the armature will be attracted only by one side of the shell, a coil adapted to be placed within the shell without disturbing the position of the armature, and a pole piece for the coil adapted to attract the armature in a direction substantially at right angles to the attraction between the shell and the armature, said armature being pivoted at a point whereby said attractions in two directions cause a torque about the pivot in the same direction, substantially as described.

14. In a drop, the combination with a shell, of an armature supported parallel to the rear opening of the shell and a coil adapted to be removed from the rear of

the shell through an opening in said armature without disturbing the position of the armature, substantially as described.

15. In a drop, the combination with a shell, of a shutter controlling armature pivotally supported at the rear of said shell, said armature being adapted to be horizontally attracted by the rear of said shell, and a coil within the shell adapted to be rearwardly removed from said shell through an opening in said armature without disturbing the position of said armature, substantially as described.

16. In a drop, the combination with a coil, of a core for said coil, magnetic material attached to the forward end of said core and extending along the outside of the coil to the rear end of the coil, a vertically disposed shutter controlling armature adapted to be horizontally attracted by said magnetic material, said coil being removable through an opening in said armature without in any way disturbing the position or adjustment of said armature, substantially as described.

17. In a drop, the combination with a shell, of a shutter controlling armature supported by said shell and adapted to be horizontally attracted by the end of the shell, and a core adapted to be moved in and out of the rear of the shell without disturbing the working relation between said armature and said shell, substantially as described.

18. In a drop, the combination with a shell having the upper portion at its rear opening slightly cut away, of a ring armature pivoted at a point slightly forward of the rear opening in the shell, a coil adapted to be inserted and removed through the opening in the ring armature, a disk-like pole piece secured to the end of the core of said coil and located within the opening of said ring armature, the lower portion of said pole piece being cut away, whereby the magnetic lines of force are caused to flow from the pole piece into the upper portion of the armature and from the lower portion of the armature into the shell, whereby torque will be exerted about the pivot at each air gap, substantially as described.

19. The combination with a shell, of an electromagnet removably carried within said shell, and an armature having an opening through which said electromagnet may be withdrawn from said shell.

20. The combination with a magnetic shell, of an electromagnet removably carried within said shell, a cylindrical pole piece for said electromagnet, and an armature embracing said pole piece.

21. In an electromagnet the combination of a suitable coil, means for removably supporting said coil, an armature for said magnet having an opening through which said coil may be passed, movably supported in proximity to a pole piece of said magnet.

22. In an electromagnet the combination of a suitable coil, a support therefor, and an armature supported independently at the end of the coil having an opening through which said coil may be passed.

23. In an electromagnet the combination of a suitable coil, a support therefor, and a ring-shaped armature supported independently at the end of the coil having an opening through which said coil may be passed.

24. In an electromagnet the combination of a suitable coil, a shell of magnetic metal forming a support therefor, an armature having an opening through which said coil may be passed and completely separated from said support, and means for pivotally supporting said armature at the end of the coil.

25. In an electromagnet the combination

of a suitable coil, a cylindrical shell of magnetic metal forming a support for said coil, an armature having an opening through which said coil may be passed, and means for supporting said armature at the end of the coil.

26. In an electromagnet the combination of a coil of wire, a core therefor, a magnetic shell therefor, a circular pole piece, and a pivoted armature having a circular opening loosely fitting the exterior of said pole piece.

Signed by me at Chicago, county of Cook, and State of Illinois, in the presence of two witnesses.

CLIFFORD C. BRADBURY.

Witnesses:

MARJORIE E. GRIER,
EDITH F. GRIER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."