No. 819,082. PATENTED MAY 1, 1906.

M. SETTER.

ELECTRIC RELAY.

APPLICATION FILED OCT. 31, 1904.

Fig. 2.

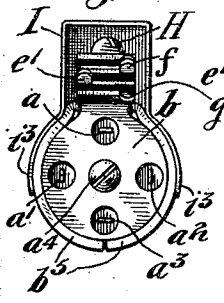


Fig. 1.

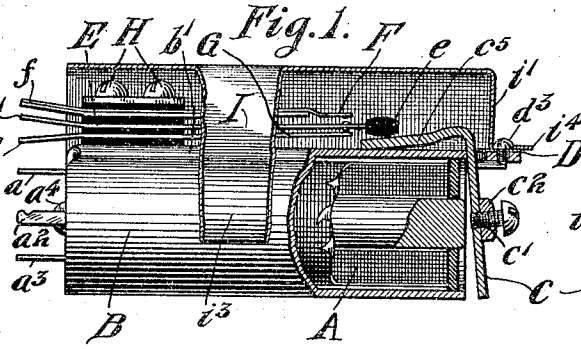


Fig. 3.

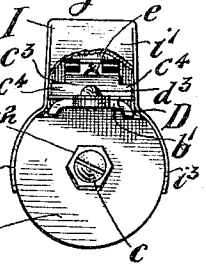


Fig. 4.

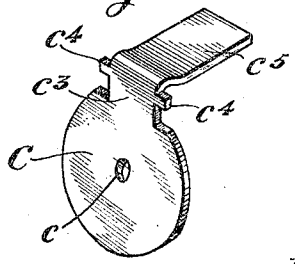


Fig. 5.

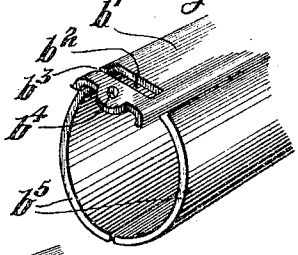


Fig. 6.

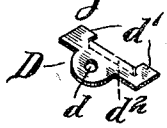
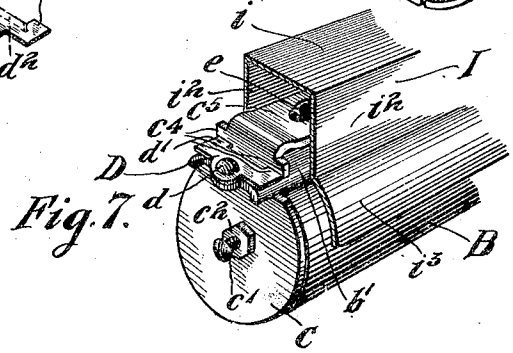


Fig. 7.



Witnesses:
P. L. Bonfinds
A. Andersen.

Inventor:
Michael Setter
By Bulkley & Durand
Attorneys.

UNITED STATES PATENT OFFICE.

MICHAEL SETTER, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

ELECTRIC RELAY.

No. 819,082. Specification of Letters Patent. Patented May 1, 1906.

Application filed October 31, 1904. Serial No. 230,757.

To all whom it may concern:

Be it known that I, MICHAEL SETTER, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electric Relays, of which the following is a specification.

My invention relates to relays for use in connection with electrical circuits in general, but adapted more particularly for use in electrical signaling systems, and adapted more especially for use in telephone systems.

Generally stated, the object of my invention is the provision of an improved, simplified, and highly-efficient relay; and a special object is to provide an improved construction and arrangement of the armature relatively to the switch-springs or circuit opening and closing contacts; and another object is to provide improved means for inclosing the magnet and also for inclosing the switch springs or contacts and the upper portion of the armature; and it is also an object, of course, to provide certain details and features of improvement tending to increase the general efficiency and serviceability of a relay of this particular character.

To the foregoing and other useful ends my invention consists in the matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a relay embodying the principles of my invention, certain portions thereof being shown in longitudinal section. Fig. 2 is a rear end view of the same. Fig. 3 is a view of the forward end of the said relay, a portion of the removable cover being shown broken away. Fig. 4 is a perspective of the armature of the said relay. Fig. 5 is a perspective of the forward end portion of the magnet-shell. Fig. 6 is a perspective of the locking-plate for holding the armature in place. Fig. 7 is a perspective of the forward end portion of the relay, showing the forward portion of the removable cover broken away.

As thus illustrated, my improved electric relay comprises an electromagnet A, provided, preferably, with terminals a, a', a^2, and a^3, as shown in Figs. 1 and 2. The magnet-shell B is preferably made from a sheet-metal blank or stamping. When folded into shape, the said blank or stamping provides the shell with a rear end wall b, the same having openings through which the said terminals project. To this end wall the core of the electromagnet is secured by means of a screw a^4. Furthermore, the said blank or stamping is so folded as to provide the shell with a flat top portion b'. This top portion projects slightly at the forward end of the relay, so as to overhang the forward end of the magnet. The said overhanging portion of the magnet-shell is provided with a transverse slot or opening b^2 and is also provided at its edge with a somewhat narrower opening b^3, leading inward to the end of said transverse slot. In addition the said overhanging end of the magnet-shell is provided with a threaded opening b^4, which is located just outside of the said slot. When properly folded, the said blank or stamping also provides the magnet-shell with curved side portions b^5, the lower edges of which meet at the bottom of the shell. (See Figs. 2 and 5.) The armature C is preferably disk-like in form, so as to practically close the forward end of the magnet-shell. As shown, the armature is provided with a threaded opening c, adapted to receive an adjusting-screw c', the latter being locked in place by a lock-nut c^2. In this way the distance between the armature and the core of the magnet can be adjusted to suit requirements. The said armature is also provided at its upper edge with a neck portion c^3, having laterally-projecting lugs c^4. It will be seen that the said neck portion c^3 is extended upwardly and thence rearwardly and horizontally to provide an operating-arm c^5.

When adjusted in place, the lugs c^4 of the armature rest upon the top of the shell at each end of the slot b^2. With the provision of the opening b^3 it is obvious that the neck of the said armature can be easily inserted edgewise into the said slot. When this has been done, the armature is then held in place by the locking-plate D. This locking-plate is formed with an opening d and also shoulder portions d', and in addition it is provided with a downwardly-projecting lip d^2. The screw d^3 passes through the opening d and engages the threaded opening b^4 in the magnet-shell. When secured in place, the shoulders d' of the said locking-plate engage the lugs c^4, while the lip d^2 extends downwardly against the forward edge of the slot b^2. Normally the said armature is held away from the core

of the magnet by means of a spring E, provided at its end with a piece of insulation *e*, adapted to bear upon the arm c^5 of the armature. The said spring is a switch-spring and is, together with the interposed strips of insulation and the other two springs F and G, secured upon the rear end portion of the flat top of the magnet-shell. This can be accomplished by inserting screws H through the said springs and strips of insulation and into the top of the magnet-shell. Normally the springs E and G engage each other, while the springs E and F are out of contact with each other. (See Fig. 1.) The said switch-springs are provided, respectively, with terminals e', *f*, and *g*, which project from the rear end of the relay structure as a whole. Thus constructed the switch-springs and the upper portion of the armature are protected by a removable cover I. This cover, it will be seen, is provided with a flat top wall i and an end wall i' and also with side walls i^2, extending downwardly and provided with lower curved portions i^3. These curved portions i^3 are adapted to fit upon the sides of the magnet-shell, and thereby retain the cover in place. (See Figs. 2 and 3.) The forward horizontal portion i^4 of the said cover is provided with an opening for the screw d^3.

The operation is as follows: Normally the armature retains the position shown in Fig. 1, the springs E and G being in electrical contact with each other. However, as soon as the magnet is energized by the passage of electric current through its coils the armature is then attracted and drawn toward the end of the magnet-core. In thus responding to the magnetic influence of the magnet the armature lifts its arm c^5. This of course in turn lifts the forward end of the spring E, and thereby brings the said spring into contact with the spring F. This action it will be readily understood, can be so regulated as to either permit the springs E and G to remain in contact with each other or to break contact with each other. In other words, the switch-springs or circuit opening and closing contacts can be arranged and operated in accordance with the particular circuits to be controlled.

A relay of the foregoing character is obviously simple and comparatively economical to manufacture. Its parts are easily removed for repair or substitution. Furthermore, with the simple construction shown the relay is less liable to get out of order. The armature is easily removed and when removed permits the magnet to be easily removed from the forward end of the magnet-shell. Also, as explained, a single blank or stamping is employed for making the magnet-shell, and this blank when folded provides both the armature-mounting and the inclosure for the magnet. In other words, the blank when folded constitutes a combined armature-mounting and magnet-shell. The armature itself can obviously be made from a single blank or stamping. This is also true of the cover.

What I claim as my invention is—

1. A relay comprising a magnet, a combined magnet-shell and armature-mounting made from a single sheet-metal blank, an armature suitably mounted on the said combined magnet-shell and armature-mounting, switch-springs also carried by the said combined magnet-shell and armature-mounting, the said armature being provided with an arm for operating said springs, and a removable sheet-metal cover for said switch-springs and the arm of said armature.

2. A relay comprising a magnet, a shell for said magnet, switch-springs mounted on said shell, an armature mounted on said shell and provided with a rearwardly-extending arm for operating the forward end of said springs, and a removable cover inclosing said springs and arm.

3. A relay comprising a combined magnet-shell and armature-mounting made from a single sheet-metal blank or stamping, and circuit-controlling contacts, together with an L-shaped armature having lateral bearing portions at its elbow.

4. A relay comprising a magnet-shell made from a sheet-metal blank or stamping, and circuit-controlling contacts, together with an L-shaped armature having lateral bearing portions at its elbow.

5. A relay comprising a magnet-shell made from a sheet-metal blank or stamping, and provided with an end wall and curved side walls meeting at their lower edges, and circuit-controlling contacts, together with an L-shaped armature having lateral bearing portions at its elbow.

6. A relay comprising an armature-mounting made from a sheet-metal blank or stamping, a magnet encircled by a portion of said armature-mounting, and circuit-controlling contacts, together with an L-shaped armature having lateral bearing portions at its elbow.

7. A relay comprising a combined magnet-shell and armature-mounting made from a single sheet-metal blank or stamping, an armature carried by said mounting, said armature being also made from a single sheet-metal blank or stamping, and circuit-controlling contacts, said sheet-metal blank or stamping having a slot or recess in which the armature is hung.

8. A relay comprising a magnet, a shell for said magnet, said shell having a flat upper portion overhanging its forward end, said overhanging portion being provided with a transverse slot, and having also an opening leading from its edge and communicating with one end of said slot, an armature adapted to be inserted into said slot through said opening

and provided with laterally-projecting lugs adapted to rest upon the shell at each end of said slot, switch-springs operated by said armature, and a locking-plate for holding the said armature within said slot.

9. A relay comprising a magnet, an armature-mounting provided with a transverse slot, and having an opening leading from its edge to one end of said slot, an armature having a neck portion adapted to be inserted in said slot by way of said opening, said neck portion being provided with laterally-projecting lugs adapted to rest upon the armature-mounting at each end of said slot, means for holding the armature within said slot, and circuit-controlling contacts.

10. A relay comprising a magnet, a magnet-shell inclosing said magnet, said shell having a flat top, switch-springs with interposed layers of insulation secured in a superimposed condition upon the rear portion of said top portion of the shell, an armature hung upon the forward end portion of said shell and provided at its upper end with a rearwardly-extending arm, and a piece of insulation on the forward end of one of said springs adapted to engage the upper surface of said arm, and thereby hold the armature normally away from the magnet.

11. A relay comprising a magnet, a magnet-shell formed from a sheet-metal blank or stamping, said blank having side portions bent downwardly and adapted to meet at their lower edges, and provided also with a rear portion bent downwardly to form the end wall of the magnet-shell, a screw inserted through said end wall and into the core of the magnet, and terminals for the magnet extending rearwardly through the said end wall, together with an armature, and switch-contacts operated by said armature.

Signed by me at Chicago, Cook county, Illinois, this 25th day of October, 1904.

MICHAEL SETTER.

Witnesses:
A. E. KEITH,
R. C. GIFFORD.