E. E. CLEMENT.

ELECTRICAL RELAY.

APPLICATION FILED AUG. 22, 1906.

928,360. Patented July 20, 1909.

Fig. 1.

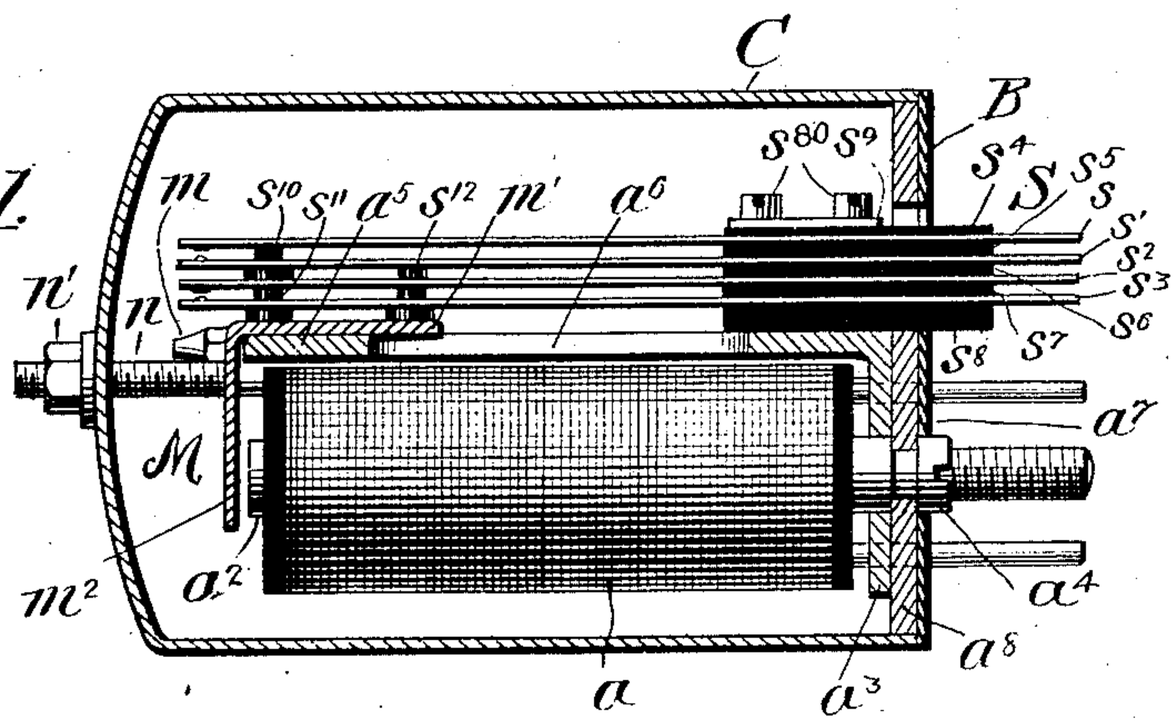


Fig. 2.

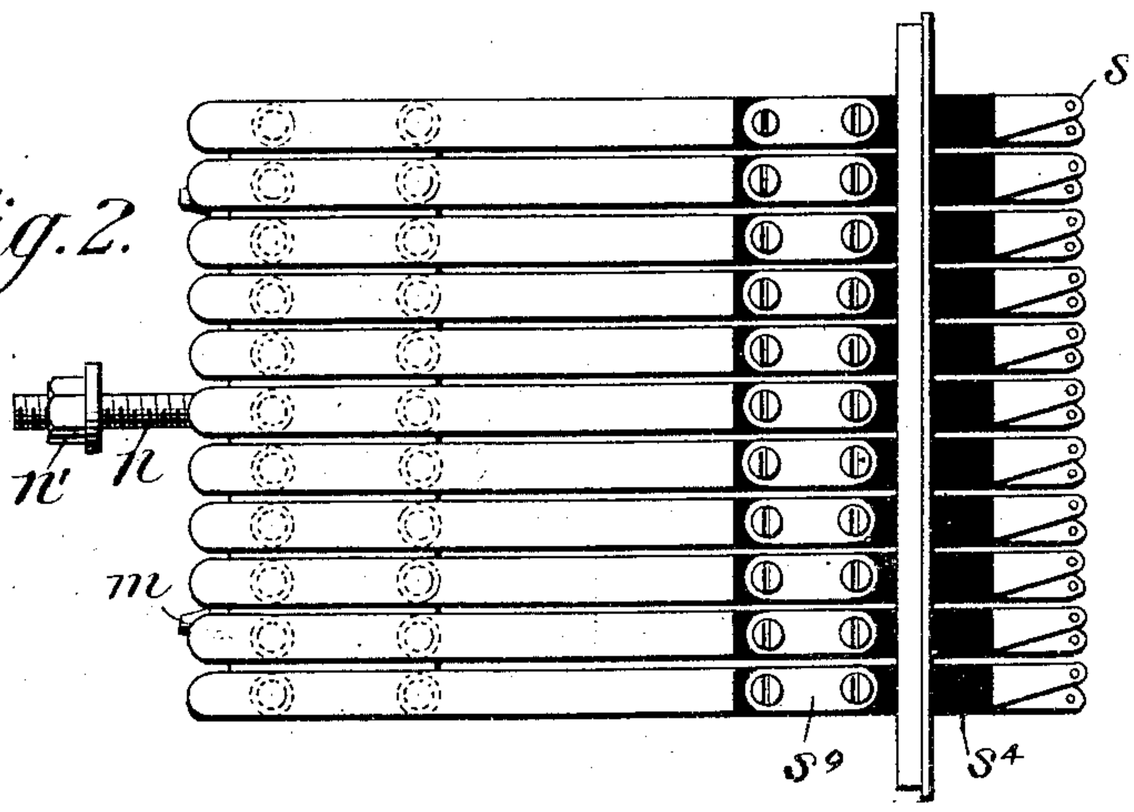
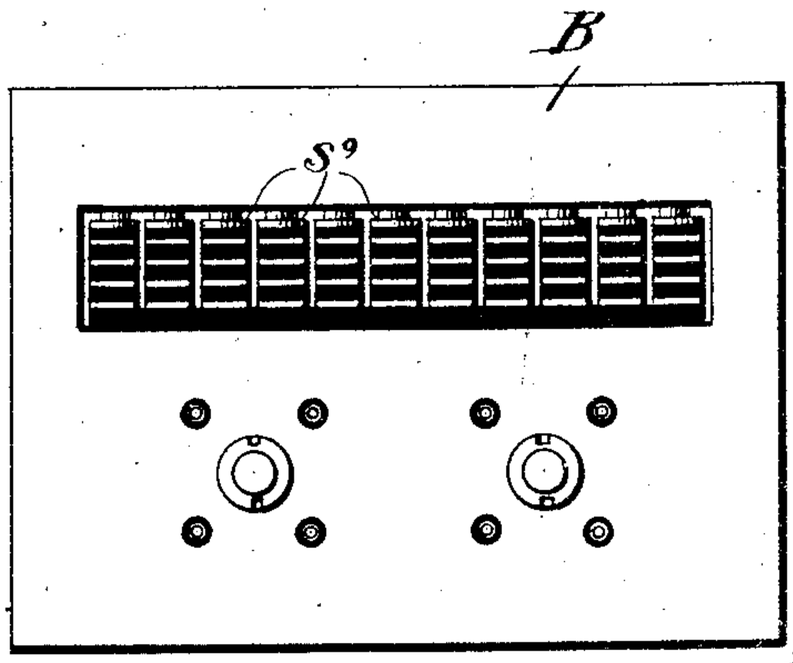


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL RELAY.

No. 928,360. Specification of Letters Patent. Patented July 20, 1909.

Application filed August 22, 1906. Serial No. 331,564.

To all whom it may concern:

Be it known that I, EDWARD E. CLEMENT, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Electrical Relays, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to electrical relays and has for its object the provision of a relay suitable for use in certain types of telephone exchange systems as well as in other systems, requiring a multiplicity of contacts to be made and broken.

Heretofore it has been difficult to design a relay which would make and break more than one or two pairs of contacts satisfactorily, and so far as I know it has never been possible to have an ordinary relay, working in the ordinary way as such, directly control a considerable number of circuits. The principal reason for this has lain in the difficulty of adjusting many contacts so that one movement of a common part would make or break them all satisfactorily. Some might make and others not, and vice versa.

According to the present invention I make all the contacts self-adjusting, so that the armature which is common to and operates them all need not be adjusted to them, but they adjust themselves individually to it as well as to each other.

Certain advantages will appear in details of construction, as I proceed with my description, and in the claims appended thereto.

My invention is illustrated in the accompanying drawings in which:

Figure 1 is a longitudinal sectional view with the casing in place. Fig. 2 is a top plan view with the case removed, and Fig. 3 is a rear view showing the back plate in position.

Referring to the figures, A is an electromagnet comprising a pair of spools a (only one of which is shown), whose cores a^2 are secured to the rear yoke piece a^3, of brass or other non-magnetic material, in any suitable manner. This rear yoke a^3 has a longitudinally extending portion or flange a^5 which lies over the top of the magnet windings and reaches a point approximately flush with the projecting ends of the cores a^2. This projecting portion or flange a^5 is partly cut away at a^6 so as to lighten the structure, and upon the rear end of the flange are supported the sets of contact springs S. The ends of the cores are reduced so as to form shoulders a^7 which abut against the back plate a^8 of iron or other magnetic material. Covering the back plate and entire rear of the structure is an insulating shield B which is of somewhat larger area than the back plate so as to form a flange against which the edge of the inclosing shell or cover C can rest. This shell incloses the entire structure in a dust and moisture-proof chamber and is preferably formed or drawn up out of sheet metal continuous except for the open mouth, and is slid over the relay from the outer end until its edges engage the back plate B. A threaded rod n extends between the windings of the electromagnet A and is secured in any suitable manner to the rear yoke pieces a^3 and to the back plate a^8 and nut n' engages the threaded forward end of the rod and is adapted to hold the casing in position.

Mounted to rock upon the flange a^5 is an angular armature M which is provided with two perforations through which threaded lugs are adapted to pass to receive nuts m which hold the armature in operative position. One leg or portion m' of the armature M extends rearwardly over the flange a^5 and the other leg or member m^2 depends at right angles thereto so as to be located in proper relation to the projecting cores a^2.

Each set of springs S, mounted upon the rear of the flange a^5, comprises the individual members s, s', s^2, s^3, which are separated by strips of insulating material s^4, s^5, s^6, s^7, and s^8. All of the sets are separately secured to the flange a^5 by means of the screws s^{80}, whose heads rest upon the metal strips s^9. In the use to which I apply this relay at present, that of cutting on a metallic circuit to its extensions, it is requisite to have two pairs of contacts, one pair for each side of the metallic circuit in each set. Both of these are made and broken at once, and there may be as many sets as there are circuits to be controlled. In each set the springs s^3, and s' are the movable or working springs and the springs s, s^2, are the fixed or anvil springs. As shown in Fig. 1, I make all these springs self adjusting by a very simple expedient, that is, by the use of two little studs s^{10}, s^{11}, one for each pair. The stud s^{11} rests with its base upon the forward end of the leg m' of the armature

M as nearly as possible over the pivotal point of said armature. Its reduced portion or stem extends through a hole in the spring s^3 and abuts against the under side and supports the spring s^2. The stud s^{10} has its base resting upon the spring s^2 and its reduced portion or stem extending through a hole in the spring s' and supporting the spring s. The bases of all the studs s^{11} rest upon the flange m' thereof and thus hold it against the return flange a^5 of the rear yoke piece a^3. At a point near the rear of the leg m' rest the bases of the operating studs s^{12}. Each stud is shouldered and its stem or reduced portion passes up through holes in the springs s^3, s^2 and rests upon the underside of the spring s' so as to support it. The springs s^3 and s' rest therefore upon the shoulder and the top respectively of the studs s^{12}, and when the armature is tilted by having its leg or flange m^2 drawn to the poles of the magnet, all the studs s^{12} are lifted, lifting up the springs s^3 and s'. By noting the shape and arrangement of the studs, it will be observed that each set of springs is self-adjusting, all the springs having a downward set or tendency toward the windings of the magnet. All the sets of springs have their contact points visible and accessible from the front of the relay so as to permit inspection and repairs.

It is not absolutely necessary to use a pair of electromagnets in the manner described as a single spool might do the work. I prefer the pair of windings however, as the operation is much more certain and the magnetic circuit is shorter.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. An electrical relay comprising a pair of electromagnets having their cores magnetically united at their rear end, a yoke piece carried by the rear end of the core, armature supporting means carried by said yoke piece, an angular armature having a depending portion extending in front of and across the ends of the cores and a substantially horizontal portion extending over the tops of the magnet spools, and a plurality of sets of contact springs, each comprising a plurality of pairs, upon said yoke piece and extending forward with the ends of the corresponding anvil springs in each set supported at one point, and those of the movable springs at another point on the horizontal portion of the armature, the point of support of the anvil springs being that of minimum motion.

2. An electrical relay comprising a pair of electromagnets having their cores magnetically united at their rear end, a rear yoke piece carried by the rear end of the cores, armature supporting means integral with said yoke piece and extending forward over the windings of the electromagnets, a bent armature having a depending portion extending in front of and across the ends of the cores and provided with a substantially horizontal portion extending from the tops of the magnet spools, and a plurality of sets of contact springs each comprising a plurality of pairs secured upon said yoke piece and extending forward with their bodies overlying the horizontal portion of the armature, the bodies of the movable springs in each set resting upon the inner extremity of the armature, and the ends of the anvil springs being supported thereon at the point of least motion.

3. An electrical relay structure comprising the following instrumentalities: a pair of cores carrying windings, a magnetic yoke plate across the rear ends of the said cores, a yoke piece of non-magnetic material also across the rear end of said cores; non-magnetic armature supporting means integral with said yoke piece, a broad angular armature pivoted upon the end of said supporting means so as to have a depending portion extending across and in front of both cores and a horizontal operating portion extending completely across the top of the magnet windings, a plurality of sets of contact springs having movable and anvil members in each set, individual means carried by the armature for maintaining the relative adjustment in each set and for maintaining individual engagement of the working members and the armature, and means to retain the armature from displacement.

4. An electrical relay comprising the following instrumentalities: a pair of cores carrying windings, a magnetic connection between said cores, a rear yoke piece of non-magnetic material connecting said cores and abutting the magnetic connection, a non-magnetic return portion or flange carried by said yoke piece, extending over the tops of the windings to a point approximately flush with the forward end of the cores, a broad angular armature bent so as to have a depending portion extending across and in front of both cores and provided with a horizontal operating portion extending completely across and overlying the magnetic windings and normally resting upon the return portion or flange, a plurality of sets of contact springs having relatively fixed and movable members in each set, individual means for maintaining the relative adjustment in each set and for maintaining individual engagement of the working members and the armature, the sets of springs extending forward beyond the operating and adjusting means so as to have their contact points entirely unobstructed and visible from the front of the relay, and means for retaining the armature against displacement.

5. An electrical relay comprising a pair of parallel cores united at their rear ends by a magnetic plate, windings upon said cores, a non-magnetic yoke piece connecting said cores and having a return portion extending over the cores to the forward end thereof, an armature supported upon said return portion and extending across the front ends of said cores, operating members connected to said armature, a plurality of sets of contact springs secured upon the return portion of said yoke piece, and extending forward parallel therewith into position to be engaged and actuated by said operating members, and means for holding the armature against displacement.

6. An electrical relay comprising an electromagnet, a non-magnetic rear yoke piece, an extension integral with said yoke piece, a plurality of sets of contact springs, each comprising a plurality of pairs carried upon said extension at the rear end thereof and extending forwardly to the front part of said relay so as to have their contacts visible and accessible from the front of the relay, an armature carried by said extension, operative connections between the armature and the corresponding springs in each pair of each set, and spacing means carried by the armature for maintaining the individual adjustment of each spring in the sets.

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

EDWARD E. CLEMENT.

Witnesses:
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