

J. F. D. HOGE.  
ELECTROMAGNETIC RELAY.  
APPLICATION FILED JAN. 11, 1913.

1,085,810.

Patented Feb. 3, 1914.  
2 SHEETS—SHEET 1.

Fig. 1.

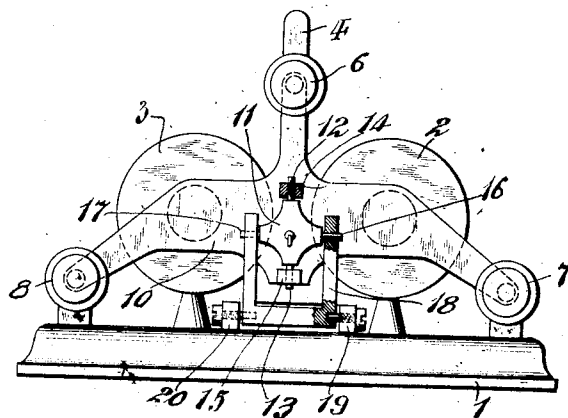
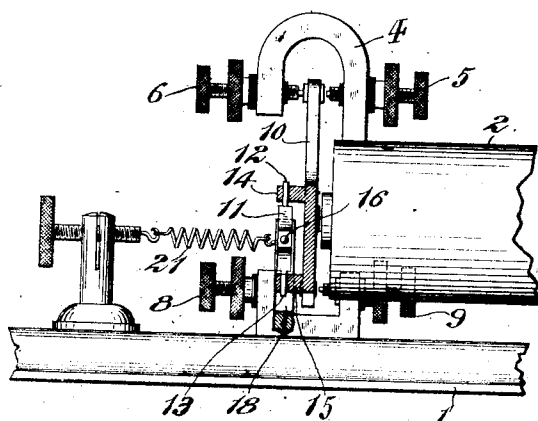


Fig. 2.



WITNESSES  
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2 SHEETS—SHEET 2.

Fig. 3.

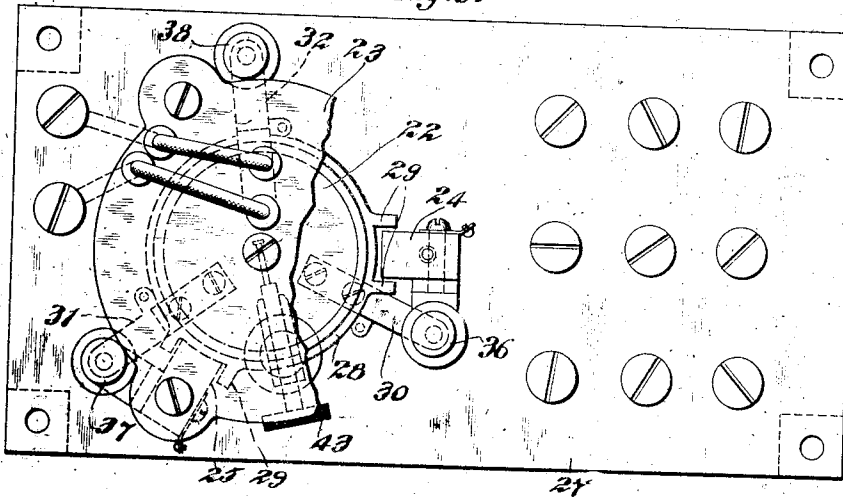


Fig. 4.

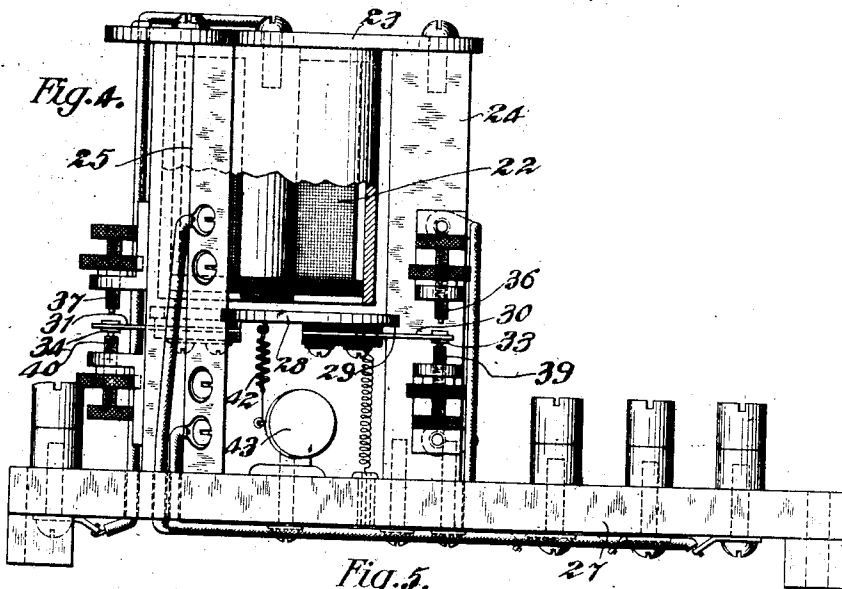
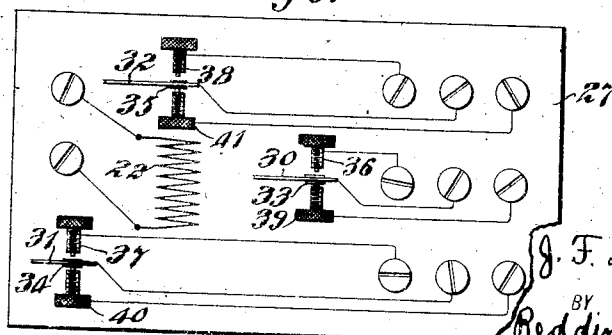


Fig. 5.



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# UNITED STATES PATENT OFFICE.

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## ELECTROMAGNETIC RELAY.

1,085,810.

Specification of Letters Patent.

Patented Feb. 3, 1914.

Application filed January 11, 1913. Serial No. 741,426.

*To all whom it may concern:*

Be it known that I, JOSEPH F. D. HOGE, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Electromagnetic Relays, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

This invention relates to improvements in electromagnetic relays.

The invention seeks to provide a special mounting of the relay armature whereby it is enabled to make reliable electrical connection with three stationary contacts located on the same side of the armature even though such contacts may be adjusted at different distances from the magnet coil or coils or at different distances from the stops or contacts on the opposite side of the armature.

The invention also seeks to embody the arrangement just specified in a relay in which the contact operating parts shall be strong and durable in structure and not easily subject to injury or derangement from rough handling. For this purpose springs are dispensed with in constructing the contact parts and unyielding, rigidly fixed contacts are employed.

In the accompanying drawings forming part of this specification, and in which like reference numerals designate corresponding parts in the several figures, the invention is shown in its preferred form and in a modification.

Figure 1 is an end elevation partly in section of a relay embodying the invention and having three front and three back contacts. Fig. 2 is a side elevation partly in section showing part of the relay illustrated in Fig. 1. Fig. 3 is a plan view showing the invention embodied in a relay of another form and having a floating armature cooperating with three front and three back contacts. Fig. 4 is an elevation, partly in section, of the relay shown in Fig. 3. Fig. 5 is a diagram showing the circuit connections of the relay shown in Figs. 3 and 4.

Referring now to the invention as shown in Figs. 1 and 2, the relay is shown as provided with three front and three back contacts, stationary and unyielding, the armature having the capacity, when in its back

position, to make reliable connection with all three back contacts, and when in its front position, to make reliable connection with all three front contacts. Fixed to the base 1 and projecting upward between the magnet coils 2 and 3 is an arched post 4 carrying front and back contacts 5 and 6. Supported on the base and at the sides of the magnet coils are two back contacts 7 and 8 and two corresponding front contacts 9 of which only contact 9 is shown. These contacts are in the form of rigid screw studs and are held firmly in place by check nuts. The armature 10 has a rigid body portion and is provided with three rigid contact carrying fingers which project between the pairs of front and back contacts. 11 is a double trunnion having two vertically aligned journals 12 and 13 which turn in bearings 14 and 15, fixed to the armature, and two horizontally aligned journals 16 and 17 which turn in bearings carried by a U-shaped bracket 18. This bracket is pivotally supported at its lower end by bearings 19 and 20. 21 is a retractile spring for the armature.

By the construction described, it will be seen that the armature is free to carry its contacts separately and in turn, in any sequence, against their stationary contacts on the same side and that the armature, therefore, readily adjusts itself to coincide with the plane defined by the three front contacts or with the plane defined by the three back contacts, even though these planes may be variously inclined to each other. The bracket 18, with its horizontal journals, provides one horizontal axis and the trunnion 11 with its horizontal journals 16 and 17 provides another horizontal axis and with its vertical journals 12 and 13 provides a vertical axis upon all of which axes the armature may move to adjust itself in the manner described. In so adjusting itself the armature is free to fulcrum on the first contact it meets and so tilt to meet the other two contacts. If one of these latter two contacts is nearer than the other, then it fulcrums again on the first two contacts it meets and so tilts to meet the third contact and rests against them all. Thus, although the armature may meet the contacts on the same side successively, its movement is not stopped by the first or second contact it meets but such movement continues until

the armature rests against all of said contacts. Thus, the armature contacts are sure to come to rest against all of the back contacts or against all of the front contacts.

5 In Figs. 3 and 4 the magnet 22 is secured to a plate 23 supported by three similar posts, of insulating material, 24, 25 and 26 (the latter not shown) which are secured to the base 27. The magnet is held between 10 the posts with its lower end sufficiently above the base to afford room for the armature and the front and back contacts. The armature is in the form of a rigid circular plate 28 having peripheral guides 29 which em- 15 brace the posts and keep the armature axially in place. Rigidly secured to the armature are three rigid fingers 30, 31 and 32, which project outward therefrom and carry contacts 33, 34 and 35 working be- 20 tween the corresponding pairs of front and back contacts 36, 37 and 38, and 39, 40 and 41. The armature is retracted by a spring 42 secured to an adjusting screw 43. As 25 thus constructed, the armature floats between the front and back contacts, being guided in its to and fro movement by the posts 24, 25 and 26, and is devoid of all pivotal supports. It has the same capacity to adjust itself 30 against all of its front contacts and all of its back contacts as has the armature of the other relay described in the foregoing. Although the armature 28 has no pivotal support or trunnion it, nevertheless, is free to 35 turn or work on an infinite number of axes lying in its own plane and is free to carry its contacts separately and in turn, in any sequence, against the stationary contacts located on the same side of the armature. The 40 armature contacts are sure, therefore, to come to rest against all of the stationary contacts on the same side.

The circuits for the relay are clearly indicated in Fig. 5 and need not be particularly 45 described.

It will be seen that the invention does not depend for its successful operation upon a magnet whose resultant magneto-motive

force acts along lines of varying location in order to cause the armature to assume its required position. On the contrary, in the applicant's invention, the resultant magneto-motive force acts along a line which has a fixed location relative to the relay, yet the action is such that the armature is enabled 50 to meet a plurality of contacts located on the same side of the armature successively, in any sequences, so as to rest against them all simultaneously; or, if it meets one of such contacts first, it is able to continue its movement till it meets the others—one or more— 55 and so rests against them all on the same side. Thus, the invention is adapted to work successfully upon the mere make and break of a simple energizing circuit for the magnet coils and a polarized magnet is not 60 required to operate the armature.

The invention is not to be restricted to the particular forms in which it is shown in the drawings inasmuch as it may be variously 65 modified without departing from the scope of the invention.

What I claim is:

1. A relay comprising an electro-magnet, an armature operated thereby, and three stationary unyielding contacts located on the 70 same side of the armature, the armature being free to rest simultaneously against said contacts irrespective of the plane determined by said contacts.
2. A relay comprising an electro-magnet, 80 an armature operated thereby and mounted on three trunnions, and three stationary unyielding contacts located on the same side of the armature, the armature being free to rest simultaneously against said contacts irre- 85 spectively of the plane determined by said contacts.

This specification signed and witnessed this 10th day of January, A. D., 1913.

JOSEPH F. D. HOGE.

Signed in the presence of—  
HELEN M. DAMES,  
WORTHINGTON CAMPBELL.