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ELECTRICAL RELAY

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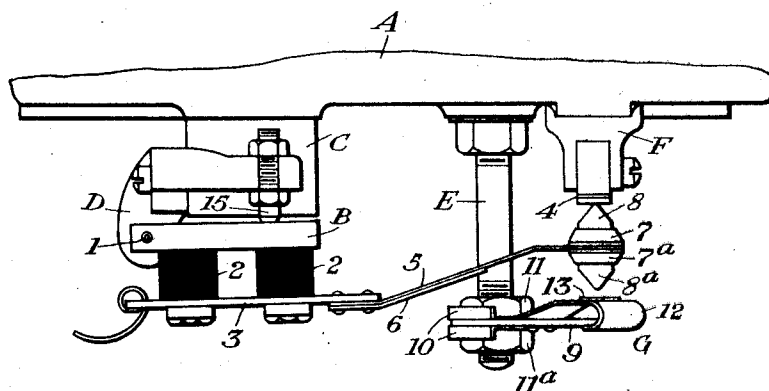


Fig. 1.

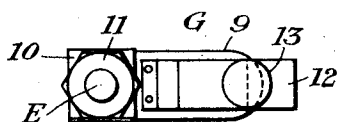


Fig. 3.

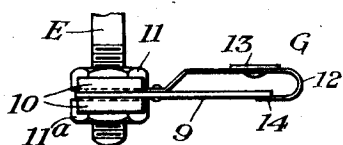


Fig. 4.

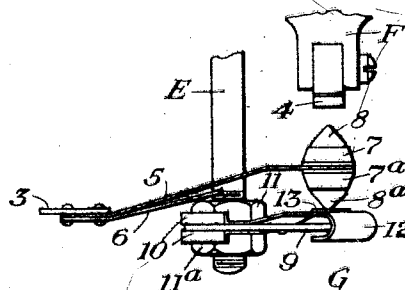


Fig. 2.

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UNITED STATES PATENT OFFICE.

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ELECTRICAL RELAY.

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Our invention relates to electrical relays, and particularly to contact mechanisms for such relays.

We will describe one form and arrangement of contact mechanism embodying our invention, and will then point out the novel features thereof in claims.

In the accompanying drawings Fig. 1 is a view showing, in front elevation, one form of contact mechanism embodying our invention. Fig. 2 is a fragmental view showing the contact mechanism of Fig. 1 when the back contact is closed. Fig. 3 is a top plan view of the back contact G of Figs. 1 and 2. Fig. 4 is a view showing in front elevation the back contact G of Fig. 3.

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

Referring first to Fig. 1, the reference character A designates the usual insulating top plate of a relay. Passing through this top plate is the core C of an electro-magnet which forms no part of the present invention and which has been omitted from the drawing for the sake of simplicity. A hanger D of non-magnetic material is fastened to core C and in turn supports a magnetizable armature B which is pivoted at point 1. When core C is de-energized armature B is swung downwardly under the influence of gravity, and when core C is magnetized armature B is swung upwardly. Armature B is prevented from actually touching the face of the core C by an adjustable stop 15.

A bar 3 of electrical conducting material is fastened to the under side of armature B by means of insulating studs 2. Attached by means of rivets to the right hand end of bar 3 are two superposed fingers 5 and 6, the upper finger being the longer and comparatively flexible, and the lower finger 6 being comparatively rigid. The free end of the flexible finger 5 carries two oppositely disposed contact tips 8 and 8^a secured to the finger by means of ferrules 7 and 7^a respectively.

A contact block 4 is carried in a suitable socket F fastened to the under side of plate A. The contact block 4 is so disposed that when armature B is swung upwardly to close the front contact, tip 8 engages the block 4 and flexes finger 5. It will be noticed that under these conditions the axis about which

finger 5 bends is near the free end of rigid finger 6.

A supporting post E is fastened to top plate A and carries at its lower end a back contact G shown in detail in Figs. 3 and 4. The lower end of post E is threaded to receive two nuts 11 and 11^a between which a lug 9 is clamped. Riveted to lug 9 near the left hand end is an ear 12 which is bent to such shape that the ear is spaced from the lug throughout the greater portion of its length. The free end of ear 12 is bent over to engage the under side of lug 9. Normally the tip 14 of ear 12 engages the lug 9 by virtue of the resiliency of the ear. Fastened to the upper side of ear 12 is a contact button 13.

The parts are so proportioned that when the armature swings downwardly under the influence of gravity as shown in Fig. 2, contact tip 8^a engages button 13. Under these conditions finger 5 is flexed away from finger 6 and it will be noticed that the axis of flexure of finger 5 is then near the point where this finger is fastened to bar 3. At the same time the pressure exerted upon the back contact G causes ear 12 to bend downward so that the tip 14 of the ear no longer engages lug 9.

The back contact G may be adjusted up or down to any desired position by nuts 11 and 11^a and the nuts are then locked in the adjusted position by means of the lock washers 10.

Contact mechanisms embodying our invention are particularly well adapted for use in electrical relays which are installed where a large amount of vibration is encountered, such, for example, as on railway trains or on elevated structures. One important feature of our invention is that such vibration will not cause chattering of the relay at the back contact, while at the same time maximum contact pressure at the front contact is still maintained. To properly understand the feature just referred to, the following fundamental facts should be kept in mind:

(a) Due to the magnetic torque characteristics of a simple tractive armature type of relay, the available movement of the armature is very limited. Excessive movement of the armature interferes seriously with the calibration values required for a relay in railroad service.

(b) The contact pressure of the back con-

tacts must be developed entirely by the weight of the armature. For this reason the back contact pressure must necessarily be very limited, because if the weight of the armature is excessive it will interfere with proper operation of the instrument.

(c) The full magnetic torque of the relay is available for obtaining contact pressure at the front contacts, and, consequently, considerably higher pressure may be used on the front contacts than on the back contacts.

In the contact mechanism embodying our invention, a differential pressure action is obtained from a simple contact finger 5 by the use of the auxiliary rigid finger 6. The short effective length of the flexible finger 5 used in compressing the front contact gives heavy pressure with minimum stroke; on the other hand, the greater effective length of the contact finger 5 used for the back contact results in considerably more stroke for a given back contact pressure. The additional compression of the flexible finger when the back contact is closed that can be obtained with this arrangement, is advantageous in preventing the back contact from opening due to vibration. Thus, with this arrangement the combined advantages of a fairly long stroke for the back contact in order to keep this contact closed during vibration, light pressure on the back contact, and short stroke and relatively high pressure on the front contacts, are all obtained from a single flexible contact finger with the addition of the rigid stop finger 6. Heretofore it has been necessary to provide two separate and distinct spring members of different compression characteristics in order to obtain these advantages.

Although we have herein shown and described only one form of contact mechanism embodying our invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of our invention.

Having thus described our invention, what we claim is:

1. A contact mechanism comprising a pivoted armature having a rigid finger and a flexible finger each having one end fastened to said armature, a first fixed contact member arranged to be engaged at times by the free end of said flexible finger and to bend such flexible finger against the rigid finger, and a second fixed contact member arranged to be engaged at other times by the free end of said flexible finger to bend the flexible finger away from the rigid finger.

2. A contact mechanism comprising a movable armature, and a rigid finger and a flexible finger each having one end secured to said armature so that when said flexible finger is bent in one direction it is flexed away from said rigid finger but that when the flexible finger is bent in the other direction it is flexed against said rigid finger.

3. A contact mechanism comprising a fixed post, a lug secured to said post, a contact ear supported on said lug and normally biased by its own resiliency to a given position, a movable contact finger arranged to be biased by gravity to engage said ear under which condition said finger is flexed about one axis and said ear is flexed away from said given position, a fixed contact block, and means for at times causing said flexible contact finger to engage said block under which condition the finger is flexed about a second axis.

4. A contact mechanism comprising a pivoted armature having a rigid finger and a flexible finger each having one end fastened to said armature, a fixed contact member arranged to be engaged at times by the free end of said flexible finger to bend said flexible finger against the rigid finger, a fixed post, a lug secured to said post, a contact ear supported on said lug and normally biased by its own resiliency to a given position and arranged at times to be engaged by the free end of said flexible finger to bend the flexible finger away from said rigid finger and to bend said ear away from said given position.

In testimony whereof we affix our signatures.

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