

1,012,081

Patented Dec. 19, 1911.

2 SHEETS-SHEET 2.

FIG. II.

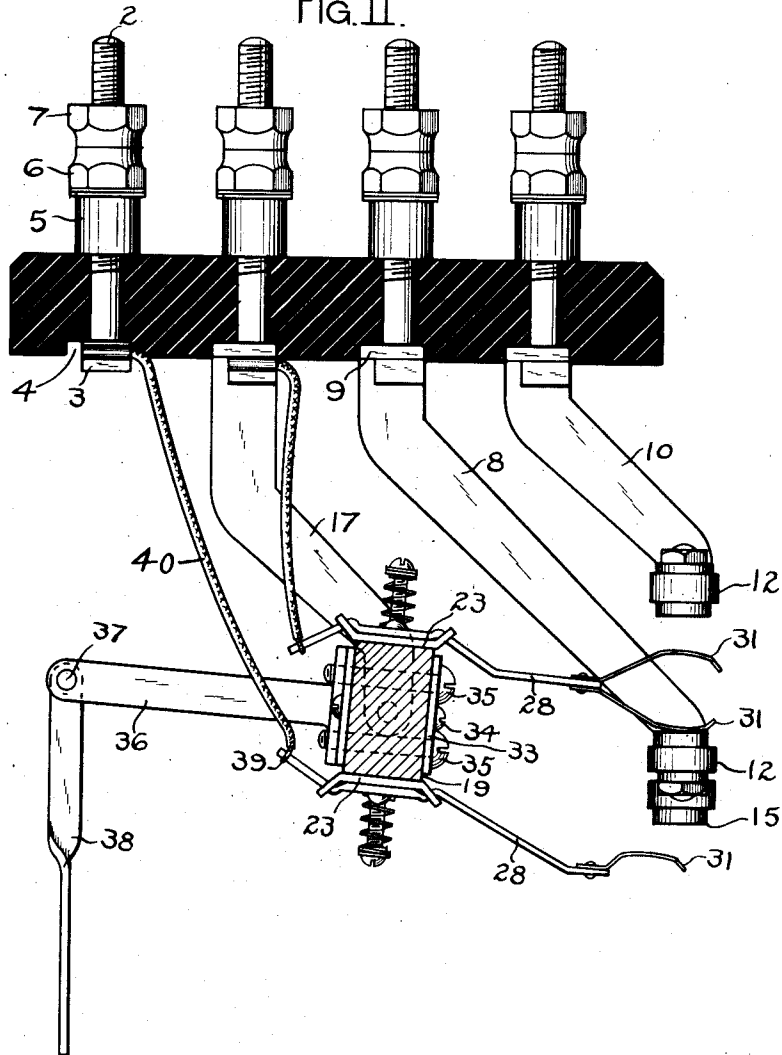
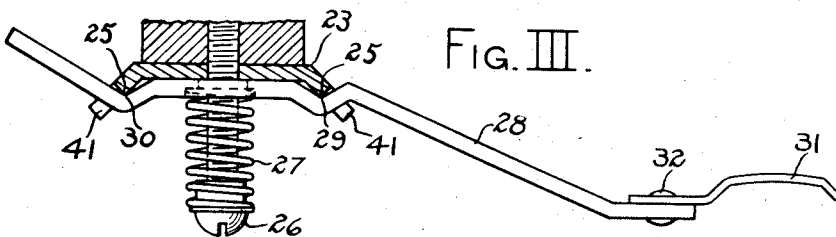


FIG. III.



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RELAY-CONTACT MOVEMENT.

1,012,081.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, and resident of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful Relay-Contact Movement, of which the following is a specification.

This invention relates to a relay, and particularly to the mechanism of a relay used for making and breaking the electrical circuits controlled by the relay.

The primary object of the invention is to so support the rigid contacts in a relay, that they may be easily reversed so that a "back" contact can be readily transformed into a "front" contact.

A further object of the invention is to so construct the parts constituting the means for making and breaking electrical circuits in a relay, that a very decided wiping contact will be obtained between the contacting parts.

A further object of this invention is to construct a relay in such manner that all of the parts having to do with the making and breaking of the electrical circuits controlled by the relay, shall be strong and substantial.

A further object of the invention is to so construct and arrange the contacting parts that they are capable of action as the contacts of a "two position" relay or a "three position" relay.

The invention consists in the idea of means of which the form hereafter described constitutes a preferred form of mechanism embodying the principle of the invention.

In describing the invention in detail reference will be had to the accompanying drawings wherein like characters of reference correspond to similar parts, of which:

Figure 1 is a front elevation of the contact mechanism. Fig. 2 is a section on the line *a-b* of Fig. 1. Fig. 3 is a cross section of the bearing on the line *c-d* of Fig. 1, showing the finger in full lines. Fig. 4 is a view similar to Fig. 3 but with the parts in the operated position.

Construction.—1, designates a plate of insulating material, through which pass bolts 2 having square heads 3, one side of which bears against the edge of the grooves 4, in the underside of the insulating plate

so as to prevent turning movement thereof; 5 designates screw threaded sleeves which are screwed upon the bolts 2 so as to bind the plate 1 of insulating material firmly between the head 3 of the bolt and the sleeve 5; above the sleeve 5 are lock nuts 6, which, when screwed down firmly upon sleeves 5, prevent the latter from turning and thereby allowing the bolt 2 to become loose; 7 designates a nut screwed upon the bolt 2 above nut 6, for the purpose of holding a wire terminal firmly in contact with nut 6 and so with bolt 2; 8 designates a support which has its upper end bent at right angles as shown at 9 and has passing therethrough one of the bolts 2, the upper right angled extension 9 of the support 8 resting in a groove in the insulating plate so that by means of said groove and the bolt 2, the support 8 is held firmly in place; 10 designates a support similar to 8 and held firmly to the insulating plate 1, in the same manner; 11 designates a right angled extension on the lower end of the support 8; 12 designates a cup which has a screw threaded reduced end 13 passing through a hole in the right angled extension 11 and is clamped firmly to said extension by means of the nut 14; 15 designates a body of contact carbon inserted in the cup 12. It will be observed that each and every one of the supporting members 8 and 10 have a right angled extension on the lower end, and that each and every one of the said supports bears a cup 12, having therein the carbon contact body 15. It will further be observed that due to the greater length of the right angled extensions on the supports 8, the cups attached to supports 2 may be reversed so that instead of pointing downward as in the case of those attached to the two middle supports 8 in Fig. 1, they may point upwardly as shown in the two other supports 8 in Fig. 1, the direction in which they point being a mere matter of volition.

The plate 1 bears the bearing brackets 16 and 17, the same being held firmly to the plate 1 in a manner similar to that in which the supports 8 and 10 are held and being bound thereto by the nuts 18; 19 designates a wooden block and fastened thereto on either end by means of screws 21 are trunnion bearings 20, the said trunnion bearings having the rounded portions 22 which pass

through holes in the ends of the supports 16 and 17, thereby holding the block 19 rotatably in place; 23 designates knife edge bearing members which are fastened to the upper and lower faces of the block 19 by means of screws 24; the said knife edge bearings having two knife edges as shown most clearly in Fig. 3, the same being designated by 25; 26 designates a screw which is threaded into the knife edge bearing 23 and has a spring 27 bearing against the underside of its head, the other end of the spring bearing against a finger 28 which has two knife edge grooves 29 and 30 formed thereon which bear against the knife edges 25; the pressure with which they bear against the same being adjusted by means of the screw 26 in an obvious manner. On the end of the finger 28 is the peculiarly bent contact finger 31, fastened thereto by means of the rivet 32. It will be observed that the finger 28 bearing against the knife edge bearing 23 on the upper side of the block 19 has two contact fingers 31 attached to its end, one pointing upwardly, the other pointing downwardly, whereas the finger 28 bearing against the knife edge bearing on the lower side of the block 19 has only one contact finger 31 attached thereto.

The front side of the block 19 bears the plate 33 attached thereto by means of screws 34, and having passing therethrough the screws 35, which extend entirely through the block 19 and are screw threaded into the right angled ends of the bar lever 36, to the other end of which by means of pin 37 is attached the link 38.

Each of the fingers 28 are connected to one of the bolts 2 by means of a wire 39 inclosed in an insulating material 40. The knife edge bearings 23 have arms 41 extending upwardly from the knife edges 25, thus holding fingers 28 from moving laterally. It is of course to be understood that contact fingers 31 attached to finger 28 are shown in Fig. 2 in the position they would assume under the action of gravity alone.

Operation.—The mechanism as shown in Fig. 2 may be said to be in its deenergized position, the contact finger 31 of the upper finger 28 making contact with the upwardly directed cups 12 attached to the outside supports 8 as shown in Fig. 1, this contact may be called a back contact. It will be observed that in this position of the parts, with the cups 12 fastened to the two middle supports 8 and pointing downwardly as shown in Fig. 1, that the fingers 31 which move up and down directly over them, would not contact therewith.

If the link 38 is moved downwardly by the application of power, then through the pin 37 and the lever 36, the block 19 will be oscillated on its trunnion 22 and fingers 28 will move upwardly, in which case the con-

tact finger 31 on upper finger 28 will bear against the carbon contacts held by the supports 10 and the lower finger 28 will, through its contact finger 31, bear against the downwardly pointing carbon contacts held by supports 8. The amount of movement given to link 38, should be more than sufficient to bring the contact finger 31 in contact with the carbon contacts 15, for, in all such electrical contacts a "rubbing" contact is desired and in this device a very decided rubbing contact is obtained, for after contact finger 31 contacts with a carbon contact 15, a further oscillation of the block 19 causing a further oscillation of the knife edges 25, will cause in the case of the upper finger 28 a movement of the left hand knife edge of Fig. 2, away from the groove 30 of the finger 28, so that the finger 28 then rests entirely upon the right hand knife edge 25, so that the finger 28 by virtue of the fact that it rests upon a single knife edge, is then given a decided longitudinal movement and at the same time the spring 27 is compressed by the movement of one knife edge 25, away from one knife edge groove 30, the consequence of which is, a good rubbing contact is obtained on the carbon contact 15 and besides a good pressure is obtained by the compression of the spring 27. At the same time that the above described movement of upper finger 28 is taking place, lower finger 28 is having an almost identical movement except that, instead of pivoting on the right hand knife edge 25 of Fig. 2, it pivots on the left hand knife edge 25 of Fig. 2. This movement is most clearly shown in Fig. 4, and by reference to said figure the final position of finger 28 will be seen in full lines, the point of contact of contact finger 31, with block 15 being indicated by line $m-n$ and the position of finger 31 when first contacting with block 15 being shown by dotted lines and the point of contact by line $g-h$.

In order to obtain a good contact between a rigid carbon contact block such as 15 and a finger such as 31, it is necessary to have the finger 31 spring pressed and heretofore in order to do this in such devices as herein illustrated and described, the fingers 31 have been made of a very light flexible spring material which, in practice, has been found objectionable in those cases where it was desired to break the continuity of large currents by means of these contacts, for, it has been found that in time such thin flexible material crystallizes and breaks and, also, becomes quickly eaten away by the arc which is formed upon breaking the circuit at the contacts. In applicant's device, however, contact fingers 31 can be made thick and heavy so that they do not tend to become crystallized and would never eat away in the ordinary life time of a relay and the finger 28 can be made stout and stiff because the

spring contact pressure is obtained by means of spring 27 and the rubbing contact by means of knife edge 25, and knife edge grooves 29 and 30. It is to be observed that

5 whether upper finger 28 causes contact finger 31 to contact with the carbon members above or below it, the finger is, during the final movement supported by a knife edge, when moving upwardly it is supported by
10 the right hand knife edge, when moving downwardly it is supported by the left hand knife edge. It is also to be observed that in the device as shown with four supporting members 10, and four supporting members
15 8, a very decided variation of front and back contacts may be obtained, and as a general proposition more front contacts are needed than back ones, so that in this device provision is made for 8 front contacts, if necessary, which could be obtained by simply reversing the cups 12 attached to the two outer supports 8 as shown in Fig. 1, and adding
20 fingers 28 to the block 19 to co-act therewith, or by suitably shifting the cups 12 attached to supports 8 any desired combination of front and back contacts can be obtained, the greatest number of back contacts, of course, obtainable being 4, in which condition there would be an equal number of front contacts.
30 The above description was based upon the supposition that link 38 would be in the position shown in Fig. 2 when the relay coils actuating the armature to which link 38 is connected are deenergized, but it may
35 be easily arranged to have link 38 pull downwardly when the relay coils governing the armature to which it is attached are deenergized in which case all of the contacts could be the so-called "back" contacts, meaning thereby the contacts made by the relay
40 when the same is deenergized. It is also to be observed that the same movement can be used as a 3 position movement for if link 38 is connected to the armature of any of the well known 3 position relays, and it is
45 so connected that in the neutral position the contact fingers 31 fastened to upper finger 28 are held midway between the upper and lower contact blocks 15 as shown by Fig. 1, then a movement of the 3 position relay in one direction would close one set of contacts and a movement in the other direction would close another set.

Having thus fully disclosed the principle
55 of my invention and having illustrated and described a preferred physical embodiment thereof, what I claim as new and desire to secure by Letters Patent, is:

1. In a relay contact movement, an oscillatable block, means to oscillate the block, means to support the block, a double knife edge bearing carried by the block, a finger formed with double knife edge grooves adapted to contact with both said knife
60 edges, a contact finger carried by the finger,

a rigid contact block adapted to be contacted by the contact finger, a spring bearing against the finger normally pressing the grooves into contact with the knife edges.

2. In a relay contact movement, an insulating block, trunnions attached to the block in line with its longitudinal axis, supports for the trunnions, connections from the block to a source of motion, a support bearing a cup, adjacent the block, a carbon contact block in the cup, a member attached to the side of the insulating block and having two knife edges, arms on the member adjacent the knife edges, a finger having two knife edge grooves resting on the said member, an adjustable member screwed into said member and having a shoulder, an expansion spring between the said shoulder and the finger tending to force the knife edge grooves into engagement with the knife edges, a contact finger attached to the finger, binding posts, connections between the finger and a binding post, and a connection between the cup support and a binding post.

3. In a relay contact movement, an insulating block, trunnions attached to the block in line with its longitudinal axis, supports for the trunnions, connections from the block to a source of motion, a support bearing a cup adjacent the block, a carbon contact block in the cup, a member attached to the side of the insulating block and having two knife edges, arms on the member adjacent the knife edges, a finger having two knife edge grooves resting on the said member, an adjustable member screwed into said member and having a shoulder, an expansion spring between the said shoulder and the finger tending to force the knife edge grooves into engagement with the knife edges, a contact finger attached to the finger, binding posts, a connection between the finger and a binding post, and a connection between the cup support and a binding post, a plate of insulating material to which are attached the binding posts, the cup support and the trunnion support.

4. In a relay contact movement, an insulating block, trunnions attached to the block in line with its longitudinal axis, supports for the trunnions, connections from the block to a source of motion, supports bearing reversible cups adjacent the block, carbon contact blocks in the cups, members attached to the upper and lower sides of the insulating block having each two knife edges, arms on the members, a finger having two knife edge grooves resting on each of said members, an adjustable member screwed into each of said members and having a shoulder, an expansion spring between the said shoulder and the finger tending to force the knife edge grooves into engagement with the knife edges, a contact finger attached to each finger, binding posts,

connections between the fingers and the binding posts, and connections between the cup supports and the binding posts.

5. In a relay contact movement, an insulating lock, trunnions attached to the block in line with its longitudinal axis, supports for the trunnions, connections from the block to a source of motion, supports bearing reversible cups adjacent the block, carbon contact blocks in the cups, members attached to the upper and lower sides of the insulating block having each two knife edges, arms on the members, a finger having two knife edge grooves resting on each of said members, an adjustable member screwed into each of said members and having a shoulder, an expansion spring between each of said shoulders and the fingers tending to force the knife edge grooves into engagement with the knife edges, contact fingers attached to the fingers, binding posts, connections between the fingers and the binding posts, and connections between the cup supports and the binding posts, a plate of insulating material to which are attached the binding posts, the cup supports, and the trunnion support.

6. In a relay contact movement, a pivoted member, means to oscillate the pivoted member, a knife edge bearing member having two knife edges formed thereon attached to said pivoted member, a spring pressed conducting member having two knife edge grooves formed therein resting on said knife edge bearing member, a contact member in the path of said conducting member.

7. In a relay contact movement, a double knife edge bearing member, capable of oscillation and a conducting member having double knife edge grooves supported thereon, and means for completing a circuit through said conducting member.

8. In a relay, a contact finger, a support for said contact finger consisting of a knife edge bearing upon which the contact finger rests at two points along its longitudinal axis, and means to oscillate the knife edge.

9. In a relay contact movement, a two knife edge bearing member capable of oscillation and a spring pressed conducting member having two knife edge grooves supported thereon, and means for completing a circuit through said conducting member.

10. In a relay, a rigid support, a contact reversibly borne by the support, contact fingers, one adapted to contact the contact in

one position of the contact, and the other adapted to contact the contact in its reverse position.

11. In a relay contact movement, conducting fingers, rigid contacts, adapted to be contacted by said fingers, knife edges supporting the fingers, pivoted means supporting the knife edges.

12. In a relay contact movement, a pivoted block, a conducting finger attached to the under side of the block and a conducting finger attached to the upper side of the block, contacts in the path of both said fingers, one of said contacts being reversibly mounted, so that it may be contacted by an upper or lower finger.

13. In a relay, a rigid upper contact and a rigid lower contact, a conducting member, a support for said conducting member, means to cause said member to resiliently contact with either of said contacts, said conducting member being rigid from the point of connection with its support to the point of contact with said contacts.

14. In a relay, an upper conducting member and a lower conducting member, an upper contact member adapted to be contacted by the conducting member, and a lower contact reversibly mounted so that it may be contacted by said upper conducting member or said lower conducting member.

15. In a relay contact movement, a rigid conducting member, rigid contacts adapted to be contacted by said member, means for holding said member resiliently in contact with said contacts and for causing said member to move bodily longitudinally while in contact with said contacts.

16. In a relay, a contact finger, knife edge bearings on said finger, knife edge bearings engaging said first mentioned knife edge bearings, and means to oscillate said last named knife edge bearings.

17. In a relay, a conducting member, means to move said member including an oscillatable member having a plurality of transverse supports, means on said conducting member to engage said transverse supports, resilient means acting upon said conducting member intermediate said transverse supports, and contacts adapted to be contacted by said conducting member.

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Witnesses:

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