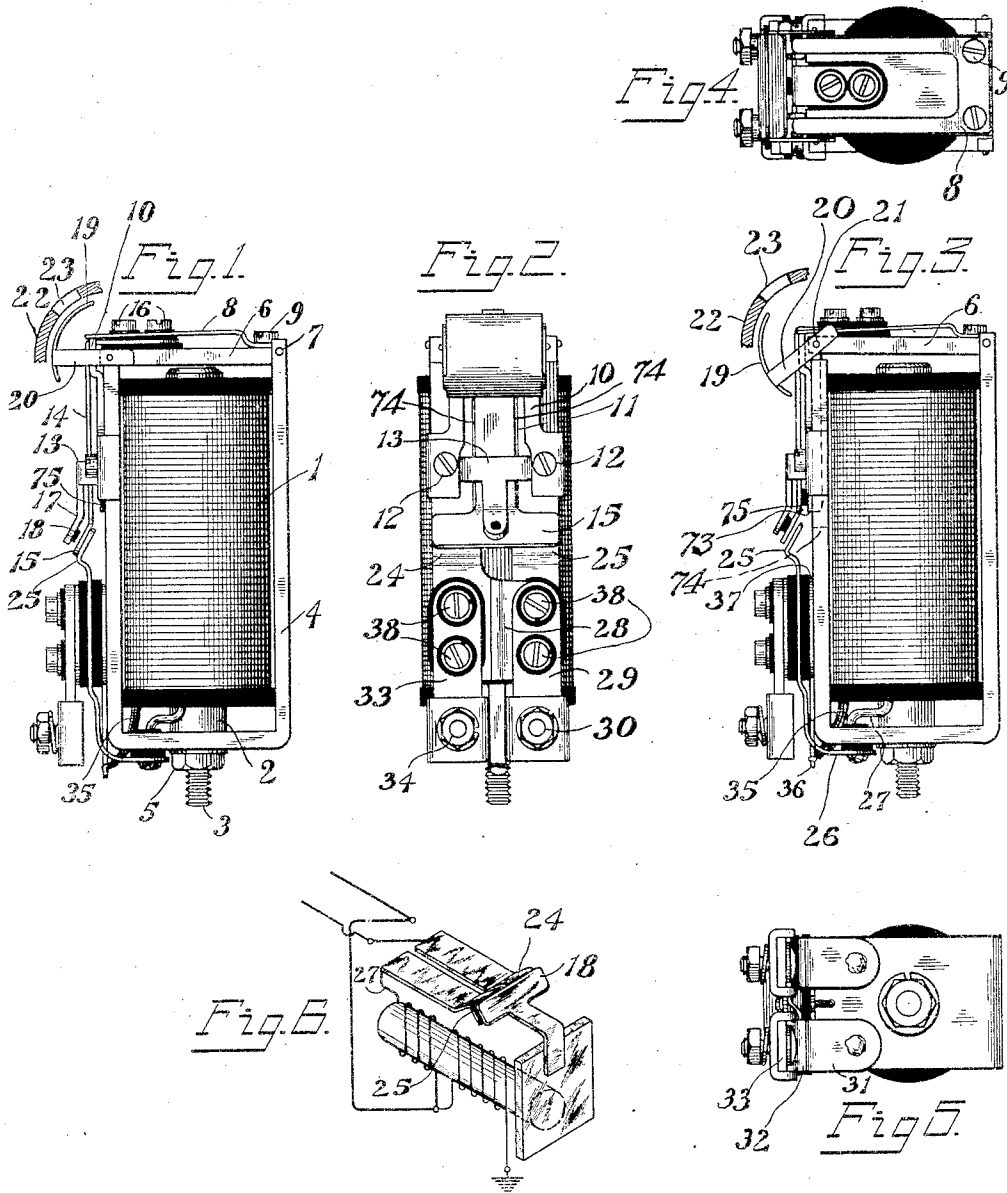


W. KAISLING.
INDICATING RELAY.
APPLICATION FILED JULY 5, 1913.

1,141,119.

Patented June 1, 1915.
2 SHEETS—SHEET 1.



Witnesses:

G. E. Mueller
Wm. Berghahn

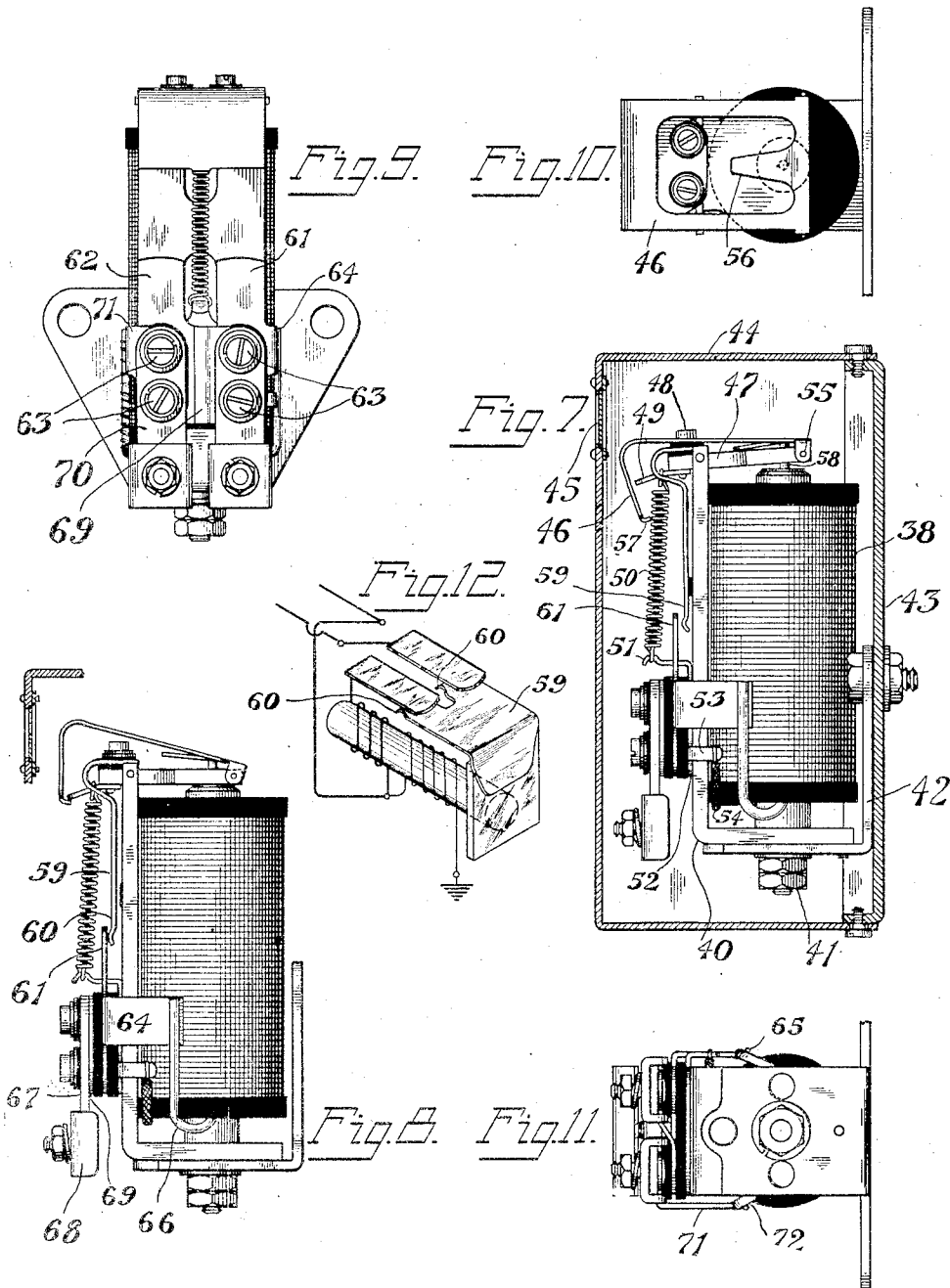
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD & SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

INDICATING-RELAY.

1,141,119.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Indicating-Relays, of which the following is a specification.

My invention relates to relays, and consists in the provision of an improved relay having means for indicating its condition of energization or deenergization. In the form herein illustrated I show visual means which may be of the shutter type for this indicating purpose, although it will of course be well understood that any suitable indicating means are within the purview of my invention. My improved structure also contemplates the provision of contact making devices controlled by the relay, which contact making devices are so arranged as to secure an efficient rubbing contact for circuit closure purposes.

In one form of the invention herein disclosed I provide two switch elements having oppositely inclined faces adapted for engagement, the engagement being such that after these faces have been brought into engagement they are further actuated so that they slide upon each other to establish the firm rubbing contact above referred to. The essential feature however is to bring two contacting elements together and then cause rubbing engagement between them irrespective of whether adjoining faces are oppositely inclined or not.

I will explain various embodiments of my invention in connection with the accompanying drawings illustrating said embodiments, in which—

Figure 1 is a side view of one form of my improved relay; Fig. 2 is a top view thereof; Fig. 3 is a side view showing the relay with its moving parts in alternative position; Fig. 4 is an end view; Fig. 5 is an end view looking at the opposite end of Fig. 4; Fig. 6 is a diagrammatic view of a form of circuit arrangement that may be employed; Fig. 7 is a side view of a modified form of relay embodying my invention; Fig. 8 is a side view showing the relay in its alternative position; Fig. 9 is a top view of the relay shown in Figs. 7 and 8; Figs. 10 and 11 are opposite end views respectively of said relay, and Fig. 12 is a diagrammatic circuit ar-

rangement that may be used in connection with the relay illustrated in Figs. 7 to 11 inclusive.

Referring more particularly to the relay illustrated in Figs. 1 to 6 inclusive, I set forth a relay having a coil structure 1 provided with a core 2 which through the agency of a restricted portion 3 is mounted within a U-shaped magnetic element 4 by means of the nut 5. An armature 6 is pivotally mounted at 7 on one extremity of the U-shaped element 4 and has secured to it a bifurcated spring 8 through the agency of screws 9. The extending legs of the bifurcated spring impinge against stop-arms 10 carried by a framework 11 secured to the U-shaped element 4 by means of the screws 12. This framework 11 has a bridge structure 13 passing over but not in contact with the backwardly extending spring 14 for the inclined switch element 15, which spring 14 after being bent is secured to the armature 6 but insulated therefrom through the agency of screws 16. The bridge 13 has a rearwardly extending arm 17 carrying an insulating button 18 against which the switch element 15 normally rests when the relay is in the retracted position as shown in Fig. 3. The armature likewise carries a target 19 having parallel arms 20 by means of which this target is pivotally mounted at 21 to the free extremity of the armature 6. A face plate 22 provided with an opening 23 through which the target may or may not be visible, depending upon the condition of the relay, is provided to work in conjunction with this target. Now whenever the armature is in the position shown in Fig. 3 the target, due to the force of gravity, occupies the position shown in said figure, and does not close the opening 23. When the armature 6 is attracted, however, the arms 20 are forced against the end face of the U-shaped element 4, thereby bringing the target into the position shown in Fig. 1 in front of the opening 23. The switch element 15 is adapted to cooperate with two stationary switch elements 24 and 25 which have an inclination opposite to that of the switch element 15. The switch element 25 is extended rearwardly so as to have a downwardly projecting portion 26 to which is soldered one terminal 27 of the winding of the relay. The other switch element 24 is extended rearwardly and then has a down-

wardly extending portion 28 which lies in contact with a conducting plate 29 carrying at its free extremity a connector 30. Another terminal of the winding is connected to a downwardly projecting apron 31 of a forwardly extending conducting plate 32 which has electrical contact with the conducting bar 33 carrying at its free end a connector 34. A third conductor 35 leads from the winding and is soldered to a rearwardly extending contact clip 36 carried by the conducting plate 37, which conducting plate rests against the U-shaped element 4 to thereby secure what might be a ground connection. The explanation just given has set forth how the various conducting elements are mounted one above the other. It may be stated that all of those elements mounted one above the other which it is not specifically stated are not in contact, are insulated from each other and likewise insulated from the mounting screws 38 which hold these elements all in place. The armature 6 carries a backwardly projecting arm 73 which is accommodated for by a slot 74 in the keeper 4, and this arm carries an insulating stop 75. When the armature is retracted, as shown in Fig. 3, this stop engages the spring 14 and holds it against its own spring action in the position shown in Fig. 3. When the switch element 15 of this spring, however, engages the contact spring 25, then in its further movement of the armature as the inclined faces of these two springs slide over each other, the spring action of the spring 14 is exerted against the spring 25, the arms 73 and button 75 continue in their movement to the position shown in Fig. 1 where the button 75 is out of engagement with the spring 14.

Referring more particularly to Figs. 7 to 12 inclusive I show another form which my improved indicating relay may take, in which the coil structure 38 is secured to a keeper 40 of magnetic material substantially L-shaped, by means of nuts 41, which nuts at the same time hold a mounting plate 42. The mounting plate may be secured within a suitable compartment consisting of the base plate 43 and the cover 44, which cover has a window 45 through which the target 46 of my relay may make its indications. The keeper 40 carries an armature 47 pivotally mounted at 48, to which armature is fixedly secured a projection 49 which in coöperation with a helical spring 50 causes a retraction of the armature to the position occupied in Fig. 7. The opposite extremity of the helical spring 50 is mounted in a stud 51 forming part of a conducting plate 52, which conducting plate has a downwardly extending arm 53 to which is soldered one of the conductors 54 leading from the winding structure 38. The target

46 is pivotally mounted at 55 and has an arm 56 to limit its downward movement. The target also has at its opposite extremity a prong 57 which in combination with the projection 49, as shown more clearly in Fig. 8, serves to limit the upward movement of the target. The arm 56 also serves another purpose, and that is the actuating of the target, and this is done by a non-magnetic projection 58 which is fastened in the core of the winding structure. Now, whenever the armature 47 is attracted (Fig. 7), that is, when its right hand extremity moves downwardly, then the pin 58 remaining stationary, the target 46 will be forced upwardly as shown in Fig. 8. The armature 47 carries a contact element 59 shown more clearly in Fig. 12 which has a pair of curved extending arms 60 adapted for contacting purposes with a pair of contact elements 61 and 62. Contact elements 61 and 62 are held in place by the screws 63, being however insulated from said screws and from the framework of the relay. The contact element 61 has a downwardly projecting apron 64 having a slightly curved indentation as shown at 65 to which is soldered a projecting terminal 66 of the winding. A conducting plate 67 carrying a connector 68 is in electrical connection with the element 62 through the agency of an upwardly bent sidewise extending portion 69. A second conducting plate 70 is also mounted on the structure by the screw 63 which has a downwardly projecting apron 71 in whose curved recess another terminal of the winding is soldered. Now when the armature is in its retracted position, the contact element 59 is not in engagement with the springs 61 and 62 as clearly apparent from Fig. 7, and when the armature is attracted the target moves up into the position occupied in Fig. 8 as already explained, but at the same time the contact element 59 carrying the fingers 60 moves upwardly into engagement with the springs 61 and 62, and thereafter is further drawn over the surfaces of the elements 61 and 62 into the final position shown in Fig. 8, thus obtaining a rubbing contact between the contacting switch elements.

It is thought from what has been described the nature of my invention will be clear, the two embodiments herein shown illustrating its versatility.

Many modifications and changes may of course be made from the structure herein disclosed without departing from the spirit of my invention.

Having however thus described two forms which my invention may take, what I claim as new and desire to secure by Letters Patent is:

1. A relay having an electromagnetic element, an armature therefor, a contact

spring, a second contact spring carried by said armature and adapted when said armature is actuated to establish wiping contact with said first aforesaid contact spring, a
 5 bridge member secured to said electromagnetic element having a projecting finger carrying a stop for said second aforesaid contact spring, a retractile spring for said armature, and a stop-arm forming part of
 10 said bridge member with which said retractile spring co-acts.

2. A relay having an electromagnetic element, an armature therefor, a keeper for said electromagnetic element with which
 15 said armature coöperates, and an indicator pivotally supported upon said armature and coöperating with said keeper to occupy different indicating positions.

3. A relay having an electromagnetic element, a core for said element, an armature for said element, a projection provided upon said core, and an indicator pivotally supported upon said armature and coöperating with said projection to occupy different indicating positions depending upon the energization or deenergization of said element.

4. A relay having an electromagnetic element, an armature for said element, and an indicator pivotally supported upon said armature having means for coöperating with a stationary portion of said electromagnetic element to occupy different indicating positions upon the energization or deenergization of said electromagnetic element.

5. A relay having an electromagnetic element, an armature therefor, a spring extended from said armature, an arm carried by said armature and provided with a stop against which said spring impinges, and a
 40 second spring with which said first spring is adapted for engagement upon actuation of said armature, the further movement of said armature after engagement of said springs

carrying said stop arm away from said first aforesaid spring.

6. A relay having an electromagnetic element, an armature therefor, a spring extended from said armature, an arm carried by said armature and provided with a stop against which said spring impinges, and a
 50 second spring with which said first spring is adapted for engagement upon actuation of said armature, the further movement of said armature after engagement of said springs carrying said stop arm away from
 55 said first aforesaid spring, and a bridge member mounted upon said electromagnetic element and having a stop for said first aforesaid spring, whereby said stop serves as a back stop for said armature.

7. An indicating relay comprising a U-shaped electromagnetic structure, an armature pivotally supported by one of the poles thereof, an indicating shutter pivotally attached to said armature, and means whereby
 65 said shutter coöperates with one of the pole extensions to indicate a normal or operated position of the armature.

8. An indicating relay comprising an electromagnetic structure having elongated
 70 parallelly disposed pole pieces, an electromagnetic winding upon one of said pole pieces, an armature pivotally supported by another one of said pole pieces, an indicating shutter pivotally attached to the armature, and means whereby said shutter coöperates with one of said pole pieces to indicate a normal or operated position of the armature.

Signed by me at Chicago, county of Cook
 and State of Illinois, in the presence of
 two witnesses.

WILLIAM KAISLING.

Witnesses:

G. E. MUELLER,
 M. R. ROCKFORD.