H. C. RICE.

RELAY.

APPLICATION FILED JUNE 5, 1908.

922,192.

Patented May 18, 1909.

2 SHEETS—SHEET 1

Fig. 1.

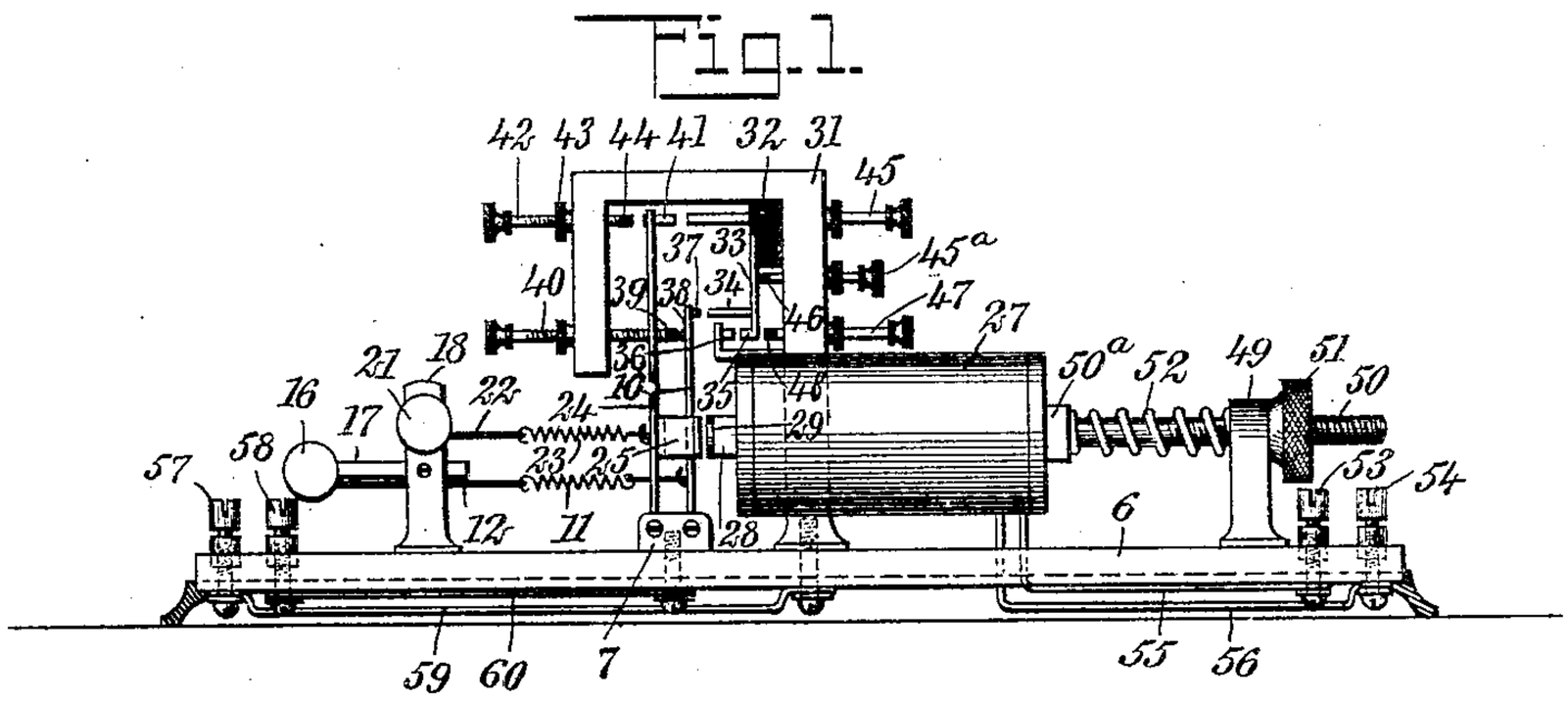
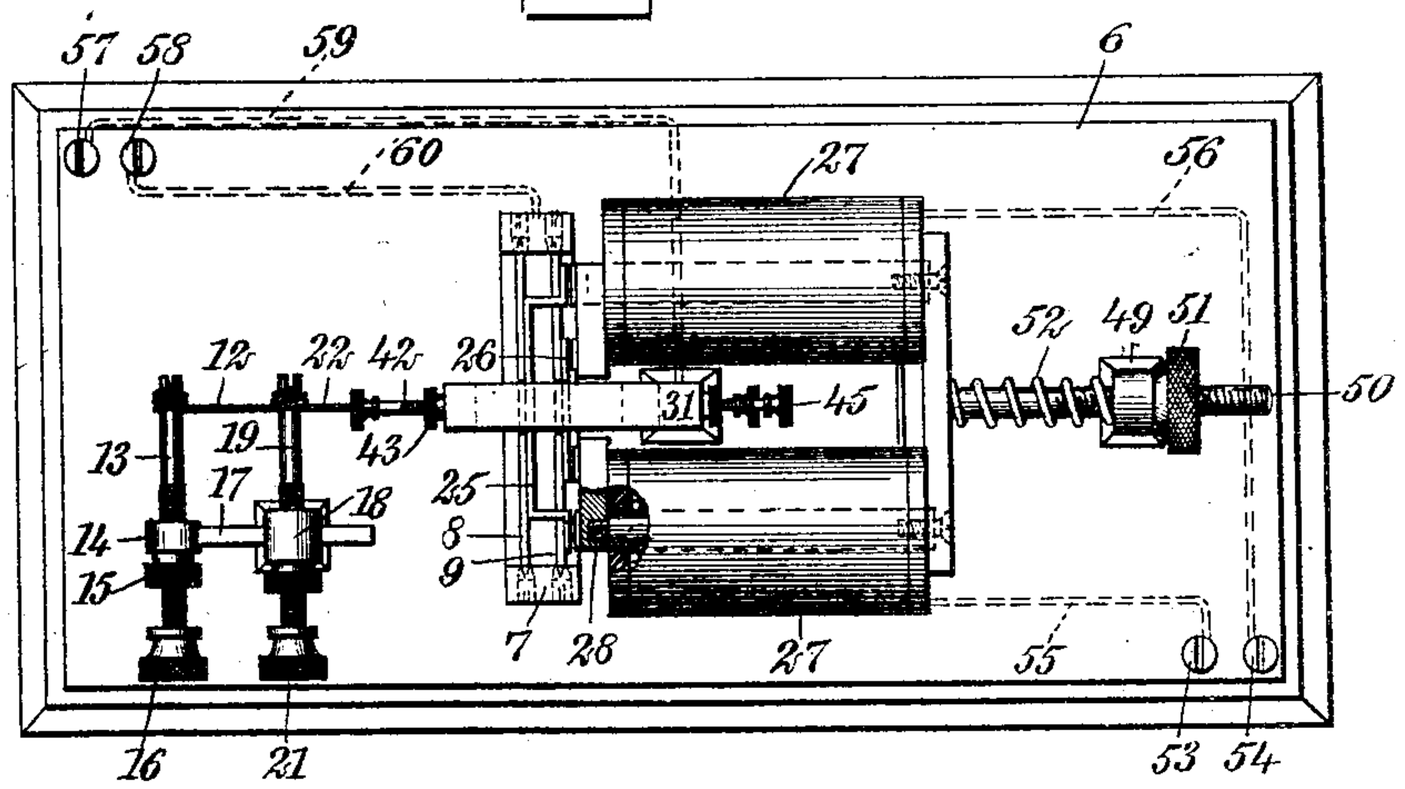


Fig. 2.



WITNESSES

L. Almquist.

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INVENTOR

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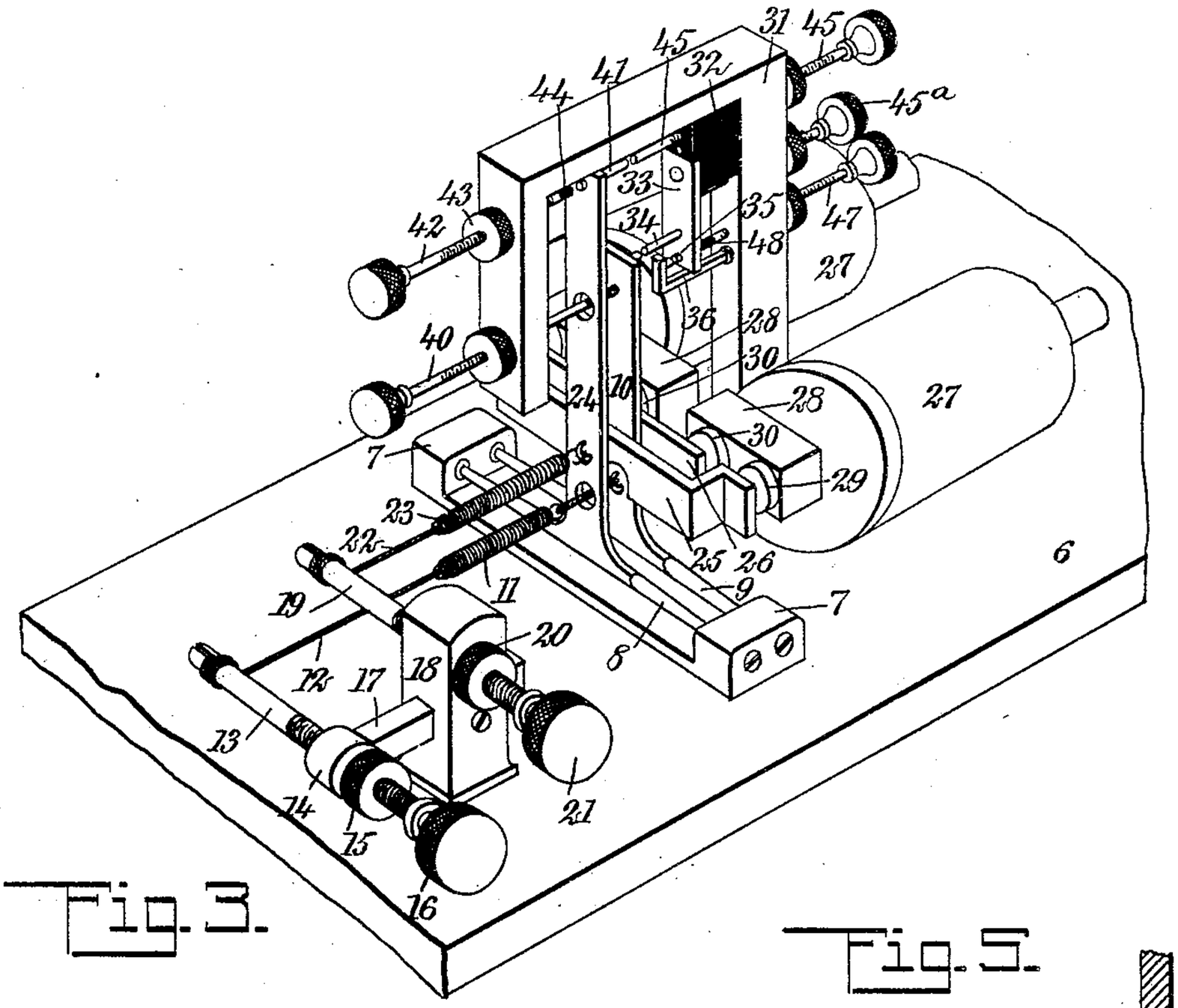


Fig. 3.

Fig. 5.

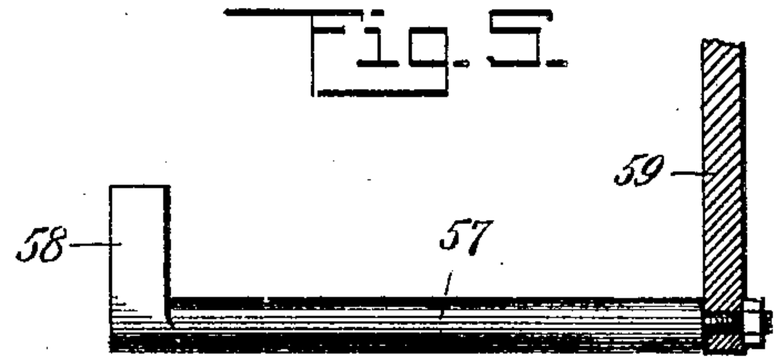
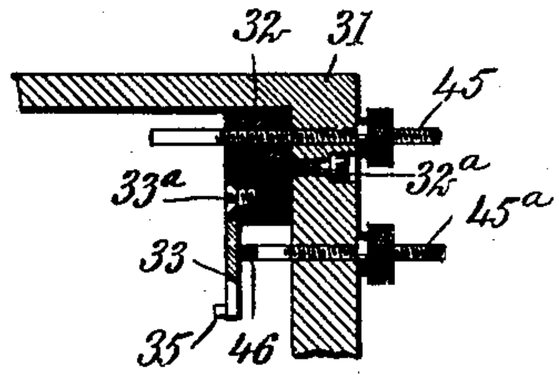


Fig. 4.



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UNITED STATES PATENT OFFICE.

HUGH C. RICE, OF DENISON, TEXAS, ASSIGNOR OF ONE-HALF TO ABRAHAM LINCOLN KNAUR, OF DENISON, TEXAS.

RELAY.

No. 922,192. Specification of Letters Patent. Patented May 18, 1909.

Application filed June 5, 1908. Serial No. 436,775.

To all whom it may concern:

Be it known that I, HUGH C. RICE, a citizen of the United States, and a resident of Denison, in the county of Grayson and State of Texas, have invented a new and Improved Relay, of which the following is a full, clear, and exact description.

My invention relates to electrically operated relays, my idea being more particularly to produce a relay normally actuated by weak currents, and adapted when abnormally energized by heavier currents to shift the local circuit from one connection to another in order to prevent the relay armature from "sticking".

My invention further contemplates the use of two separate armatures, one being sensitive and used under normal conditions, the other being comparatively insensitive and being substituted automatically for the sensitive armature whenever the current in the main circuit from any cause becomes abnormally powerful.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the relay complete, showing two armatures of different sensitiveness, this view further showing the contacts to be opened and closed by the respective armatures in order to shift the current of the local circuit normally controlled by the sensitive armature, so as to render this current controllable by means of the less sensitive armature; Fig. 2 is a plan view of the relay partly broken away, so as to show more particularly one type of pole piece, this view further showing the separate adjustment for the two armature levers; Fig. 3 is a fragmentary respective of the relay; Fig. 4 is a detail, showing in section the center post and a portion of the contact mechanism used for occasionally shifting the current through the local circuit; and Fig. 5 is a detail showing, partly in section and partly in elevation, another form of pole piece, which in this instance is integral with a magnet, the latter being connected with the back plate by a screw bolt.

A base is shown at 6, and rigidly mounted upon it are bearings 7 supporting armature shafts 8, 9. Integral with the armature shaft 9 and extending upwardly therefrom is an armature lever 10. A spiral spring 11 and a cord 12 are used for the purpose of retracting the armature lever 10. A windlass 13 having the form of a threaded bolt, is mounted in a bearing 14 and fitted with a jam nut 15 for holding it rigidly in various predetermined positions. This windlass is provided with a milled head 16 to be turned by hand in order to adjust the tension of the spiral spring 11. The bearing 14 is supported upon a bar 17, the latter extending through a post 18. Another windlass 19, having also the form of a threaded bolt, extends through the post 18 and is fitted with a jam nut 20 and with a milled head 21. A cord 22 is connected with the windlass 19 and is partially wound around the same, this cord being also connected with a spiral spring 23. Mounted upon the armature shaft 8 and extending upwardly from the same is an armature lever 24, to which the spring 23 is secured. An armature 25 is mounted upon the armature lever 24, and upon the armature lever 10 is mounted a smaller armature 26. This smaller armature is inherently more sensitive than the armature 25, and can be made more so by a relative adjustment of the tension of the springs 11, 23. A relay magnet 27 is provided with pole pieces 28, each having two poles 29, 30. The two poles 30 are disposed adjacent to the sensitive armature 26, while the two poles 29 are used in connection with the armature 25. A center post 31 is mounted upon the base and extends upwardly therefrom, bending to the left and downwardly, according to Fig. 1. A block 32, of insulating material is secured to this post by aid of a screw 32^a. A contact spring 33 is mounted upon the block 32 by aid of a screw 33^a. This contact spring 33 is provided with two contact points 34, 35. Another contact point 36 is supported upon the center post 31 and is in electrical communication with the same. The armature lever 10 is provided with a contact point 37 which may engage the contact point 34, and is further provided with a lug 38. In alinement with this lug is a screw 40, having its end 39 insulated, and used for adjusting the

play of the armature lever 10. The armature lever 24 is provided at its upper end with a contact point 41. An adjusting screw 42 provided with a jam nut 43 extends through a portion of the center post 31 and is provided with an end 44 of insulating material. This screw is for the purpose of adjusting the play of the armature 24. A contact screw 45 extends through the center post 31 and through the block 32 of insulating material, and serves as a contact member mating the contact member 41. An adjusting screw 45[a], insulated at its end 46, extends through the center post 31 and is used for regulating the tension of the contact spring 33. An adjusting screw 47, having an insulated end 48, is employed as a limiting stop for the contact spring 33 and also as an adjustment for regulating the play within certain limits of the lower end of this contact spring, as will be understood from Fig. 1.

A post 49 is mounted upon the base 6. Extending through this post is a threaded bolt 50 which is connected with the back plate 50[a] of the magnet 27. A jam nut 51 is mounted upon the threaded bolt 50 and adapted to engage the post 49. A spiral spring 52 encircles the bolt 50 and presses the magnet to the left, according to Figs. 1 and 2. This part of the mechanism is old and is used merely to adjust the position of the magnet 27. The binding posts 53, 54 are connected with the magnet 27 by wires 55, 56, these wires and binding posts being a part of the main circuit for controlling the magnet 27. The binding posts 57, 58 are connected by wires 59, 60 with the center post 31 and the bearing 7. The parts last mentioned constitute a part of the local circuit.

The operation of my device is as follows: The several parts being in the position indicated in Fig. 1, the springs 11, 23 are adjusted so as to insure that the armature 25 is less sensitive than the armature 26. The binding posts 53 and 54 are connected with the main line and the binding posts 57, 58 are connected up with other parts of a local circuit. The magnet 27 is energized in the usual manner directly from the main line. The currents used by the main line are normally weak, so that the armature 26 and the armature lever 10 are in motion under ordinary conditions of transmission, the armature lever 24 and the armature 25 carried by it being usually stationary. The main circuit is always as follows: binding post 53, wire 55, magnet 27, wire 56, post 54 to the main line and thence returning through earth or through a metallic return wire to binding post 53. The local circuit under ordinary conditions is as follows: binding post 58, wire 60, bearing 7, armature lever 10, contact points 37, 34, contact spring 33, contact points 35, 36 (normally in engagement), center post 31, wire 59, contact post 57, and other parts of the local circuit, back to the contact post 58. The action thus far does not differ essentially from that of an ordinary relay. Suppose, however, that for some reason the current in the main line becomes stronger than usual; the insensitive armature 25 is now attracted so that the armature lever 24 moves to the right according to Fig. 1. This causes the contact point 41 to engage the contact screw 45 and completes the following circuit: binding post 58, wire 60, bearing 7, contact lever 24, contact members 41, 45, center post 31, wire 59, binding post 57, and other parts (not shown) of the local circuit back to the binding post 58. The increased pull of the magnet 27, however, does more than move the insensitive armature 25. It pulls the armature 26 harder than usual, the result being that the contact member 37 engages the contact point 34 quite forcibly, so as to carry the contact spring 33 to the right and thereby force the contact point 35 out of engagement with the contact point 36. No current can therefore pass through the contact point 36, and the only current that can pass at all is that which goes through the armature lever 24 and contact points 41, 45, as above described. As the spring 23 has a high tension, the armature lever 24 is easily withdrawn when the magnet 27 is deënergized, and hence there can be no "sticking" of the armature. It matters not if the armature lever 10 remains for a short time in its position to the right, for the reason that the armature lever 24 is so tensioned as to always return to its normal position whenever the magnet 27 is deënergized. My invention is of like service in connection with leaky lines, because of which the strength of the current passing through the magnet 27 is a matter of some uncertainty.

In actual practice, the armature lever 10 moves like the armature lever of an ordinary relay, until the current becomes strong enough to cause this armature lever to stick, and then the armature lever in question ceases to work altogether, its task being taken up by the armature lever 24. The latter then works after the manner of an armature lever in an ordinary relay until the current again becomes weak, when the task is shifted back to the armature lever 10. Only one armature works at a time, so far as the control of the local circuit is concerned.

For convenience, I designate the electric path through the armature lever 10 as a low tension circuit, and that through the armature lever 24 as a high tension circuit.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

In a relay, the combination of a magnetic member, a comparatively insensitive arma-

ture for said magnetic member, a sensitive armature for said magnetic member, said sensitive armature being disposed intermediate said magnetic member and said insensitive armature, and a local circuit connected with both armatures and controllable by the joint action of the same.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HUGH C. RICE.

Witnesses:
A. S. KNAUR,
W. E. BROWN.