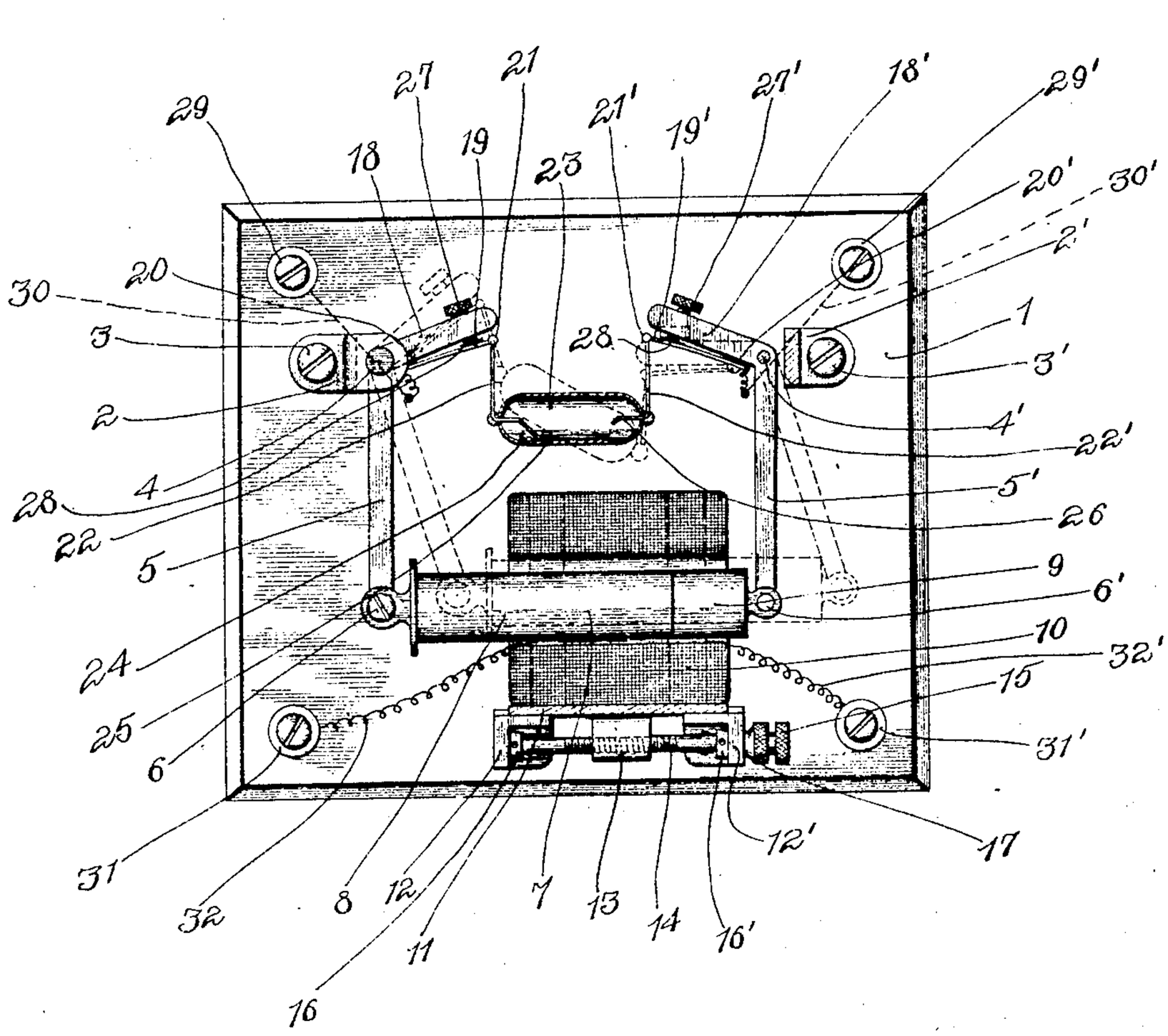
G. BABCOCK.

ELECTROMAGNETIC RELAY.

APPLICATION FILED MAY 31, 1906.

907,714. Patented Dec. 29, 1908.



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ELECTROMAGNETIC RELAY.

No. 907,714. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed May 31, 1906. Serial No. 319,431.

To all whom it may concern:

Be it known that I, GARRISON BABCOCK, citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Electromagnetic Relays, (Case 18,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electrical relays, and has for its object the provision of a relay in which the various parts are so constructed and arranged that they may be easily assembled and adjusted, and it is further the object of my invention to provide a relay in which there is but little friction and consequently little wear on the operating parts.

One of the important features of my invention is that the relay is so constructed that it may be adjusted to require a larger current to operate it than to hold it in its operative position. I provide means whereby the relay may be adjusted to the strength of the current so that it may operate with proper precision whenever a circuit through it is closed.

In general, the relay of my invention consists of a solenoid provided with a movable core, the movement of the core effecting, as will be hereinafter described, the tilting of a mercury bulb provided with contacts in order to close or open the circuit, whichever may be desired.

My invention will be more clearly understood by reference to the accompanying drawing.

I have shown a base, 1, to which are secured the supports 2—2′ by means of the screws 3—3′. Pivoted to these supports at 4—4′ are the bell crank levers 5—5′ respectively. Pivotally connected at 6—6′ to the downwardly extending arms of the bell crank levers 5—5′ respectively, I have shown the core 7, consisting of the iron portion 8 and the brass portion 9. About the core is disposed the solenoid winding 10, which is mounted upon a sliding base 11 adapted to slide upon the supports 12—12′ secured to the base 1. The base 11 is provided with the downward extending lug 13 with which the screw 14 has threaded engagement. The screw 14 is provided at its outer end with the thumb screw 15 and is also provided with the collars 16—16′ secured thereto and engaging the inner surfaces of the supports 12—12′ thus preventing any longitudinal movement of the screw 14. A lock nut 17 is provided upon the screw 14 whereby the same may be held in any desired position. It is evident that the revolution of the thumb screw 15 in the proper direction effects the movement of the coil 10, whereby it may be adjusted in any desired position.

Upon the arms 18—18′ of the bell crank levers 5—5′, respectively, are securely mounted the springs 19—19′ respectively, these springs being insulated, however, from the bell crank levers by the insulating blocks 20—20′. Suspended from the springs and fastened thereto at 21—21′ are the strands 22—22′ respectively. These strands may be of tinsel or other suitable conductive material. These strands support and extend into a glass bulb 23 containing a predetermined amount of mercury or other electrical conductive liquid 24.

In the drawings the relay is shown in its normal position and the contact pieces 25—26 forming a part of the strands 22—22′ respectively may be disposed within the bulb so as to be engaged by the mercury simultaneously in its normal or abnormal position, that is, the position in which the relay is drawn when the circuit containing the winding 10 is closed, as shown in dotted lines.

In the drawing the contacts are shown to be in such a position that a circuit terminating in the contacts is normally open, and it is evident from the drawing that when the relay is energized so as to draw the iron portion 8 of the core into the winding, that is, into the position shown in dotted lines in the drawing, the mercury bulb will be tilted as shown and cause the mercury to engage both the contacts 25 and 26, thereby electrically uniting them.

The proper movement of the core 7 may be obtained by the proper adjustment of the coil 10 and the entire relay may be adjusted with reference to the strength of the current by tilting the entire relay so that the effect of gravity upon the core 7 may be so proportioned with reference to the strength of the current that the most efficient operation of the relay may be obtained. In order that the mercury bulb may be adjusted so that it may be properly disposed in both the nor-

mal and abnormal positions, I provide the thumb screws 27—27′ in the arms 18—18′, respectively, of the bell crank levers. The thumb screws engage the insulating pieces 28—28′ upon the springs and it is evident that by this construction the springs may be adjusted in any desired position to secure the proper operation of the bulb. The strands 22—22′ and the springs 19—19′ are composed of electrical conductive material and I connect these springs with the binding posts 29—29′, respectively, by means of the conductors 30—30′, these binding posts then, of course, forming the controlled terminals of the relay. The terminals of the winding 10 are connected to the binding posts 31—31′ by means of the flexible conductors 32—32′ respectively.

It is evident from the foregoing that in the operation of the relay the only friction takes place at the pivots 4—4′, the actuating bulb operating upon an imaginary axis. I find this form of relay very advantageous in circuits where it is desirable to employ a relay requiring a comparatively large current to operate and a comparatively small current to hold it in operative condition. It is evident that this result may be secured by a proper adjusting of the relay of my invention. A comparatively large current could be required to draw the core 7 into the solenoid thereby tilting the actuating bulb 23. It is evident that if the bulb is thus tilted, the mercury will be disposed at one end thereof, thereby assisting, by virtue of gravity, to hold the core 7 within the winding 10. It is thus seen that a comparatively small current could retain the relay in this operative position. The relay, of course, by the proper manipulation of the thumb screws 18—18′, and the proper adjustment of the other parts thereof, could be made to properly respond to any desired difference in current strength. It is evident from the foregoing description that there is but little friction in the operation of the relay, and that it can be adjusted to be operated by a current of any strength.

Although I have herein shown but one embodiment of my invention, it is evident that changes and modifications within the spirit and scope of my invention could be made by those skilled in the art, and I do not wish to be limited, therefore, to the precise construction herein shown.

I claim as new, and desire to secure by Letters Patent:

1. In an electrical relay, a movable core, a bulb containing an electrically conductive liquid controlled by said core, spring mechanism for adjusting the position of said bulb, a winding disposed about said core, and means whereby said winding may be adjusted with reference to said core.

2. In an electrical relay, a core pivotally secured at either end to an arm of a bell crank lever, a bulb containing a quantity of electrically conductive liquid suspended from the other arms of said bell crank levers, contacts within said bulb adapted to be electrically united by their simultaneous engagement of the conductive liquid, and a winding disposed about said core and adapted to affect the core upon its energization.

3. In an electrical relay, a movable core supported at either end by an arm of a bell crank lever, a bulb supported by the other arms of said bell crank levers, said bulb containing a quantity of electrically conductive liquid, contacts extending into said bulb, and a winding disposed about said core, the energization of said winding causing the movement of said core whereby said bulb is tilted, whereby said conductive fluid engages simultaneously said contacts.

4. In an electrical relay, a core pivotally connected at either end to an arm of a bell crank lever, a bulb containing a quantity of electrically conductive liquid suspended from the other arms of said bell crank levers, means whereby said bulb may be adjusted with reference to said bell crank levers and said core, contacts extending into said bulb, a winding disposed about said core the energization of which secures the movement of said core and consequently of said bulb whereby said contacts are simultaneously engaged by said conductive liquid, and means whereby said winding may be adjusted with reference to said core.

5. In an electrical relay, pivoted bell crank levers, an armature core suspended upon respective arms of said bell crank levers, a contact piece on the other arm of each bell crank lever, movement of said armature core by reason of the creation of a magnetic field about said core, causing opposing action of said contact pieces.

6. In an electrical relay, a receptacle containing conductive fluid, contacts associated with said fluid, flexible cords from which the receptacle is suspended, and electromagnetically controlled movable supports for the flexible cords adapted upon actuation to cause tilting of the receptacle and a change of position of the conductive fluid with respect to the contacts.

7. In an electrical relay, the combination of a receptacle containing conductive fluid, contacts associated with the fluid, supporting levers, suspension cords connecting the levers with the ends of the receptacle, and electromagnetic mechanism for operating the levers to cause tilting of the receptacle.

8. In an electrical relay, the combination of a receptacle containing conductive fluid, contacts associated with the fluid, supporting levers, suspension cords connecting the levers with the ends of the receptacle, and electromagnetic means for actuating the levers to

cause downward motion of one cord and upward motion of the other whereby to tilt the receptacle.

9. In an electrical relay, two bell crank levers pivoted at their elbows, a solenoid core connecting at its ends with one arm of the levers, a receptacle suspended from the other arms of the levers, contacts associated with conductive material within the receptacle and a solenoid winding for actuating the core to cause movement of the levers to tilt the receptacle.

10. In an electrical relay, the combination of two levers, each pivoted at an intermediary point, a magnetic member connecting one end of the levers, movement of said magnetic member causing the other ends of the levers to move in opposite directions, electrical means controlling the movement of the magnetic member, and coöperating contact terminals carried by the levers.

11. In an electrical relay, the combination with a solenoid core, a bell crank lever pivoted at its elbow and having one arm connected with one end of the core, a second bell crank lever pivoted at its elbow and having an arm connected with the other end of the core, a solenoid winding controlling the movement of said core, and contact mechanism associated with and controlled by the other arms of the levers.

12. In an electrical relay, two levers pivoted at an intermediary point, a solenoid core pivoted at its ends to and between one end of the levers, a receptacle suspended from the other ends of the levers by means of flexible cords, contacts associated with conductive material in the receptacle, movement of the solenoid core causing movement of the levers to tilt the receptacle, thereby to change the position of the conductive fluid with respect to the contacts, a solenoid winding for controlling the movement of the core, and means for affecting relative adjustment between the core and the solenoid winding whereby to adjust the degree of tilt of the receptacle upon actuation of the core.

13. In an electrical relay, the combination of a core, a winding for the core, contact mechanism connected with one end of the core, and associate contact mechanism connected with the other end of the core, movement of the core causing relative movement of the contact mechanisms to effect changes in circuits connected therewith.

14. In an electrical relay, the combination of a core, an energizing winding therefor, a contact point connected with one end of the core, an associate contact point connected with the other end of the core, and a connecting medium for said contact points, movement of said core causing movement of the contact points with respect to the connecting medium.

15. In an electrical relay, the combination of a core, an energizing winding for the core, a contact point connected with one end of the core, an associate contact point connected with the other end of the core, and a connecting medium associated with the contact points and connected with the core, movement of the core causing movement of the contact points and of the connecting medium.

16. In an electrical relay, the combination of a movable armature core, a winding for the core, a contact point connected with one end of the core, an associate contact point connected with the other end of the core, a receptacle, conductive fluid in said receptacle, said contacts being disposed within the receptacle, movement of said core causing displacement of the contacts with respect to the conductive fluid.

17. In an electrical relay, the combination with a magnetic core, an actuating winding for the core, a contact point connected with one end of the core, an associate contact point connected with the other end of the core, a receptacle connected with both ends of the core, and conductive fluid within the receptacle and associated with the contact points, movement of the core causing movement of the receptacle, and contact points to cause relative displacement between said points and the conductive fluid.

In witness whereof, I hereunto subscribe my name this 5th day of April A. D., 1906.

GARRISON BABCOCK.

Witnesses:
GEO. S. MCMILLAN,
C. N. QUINBY.