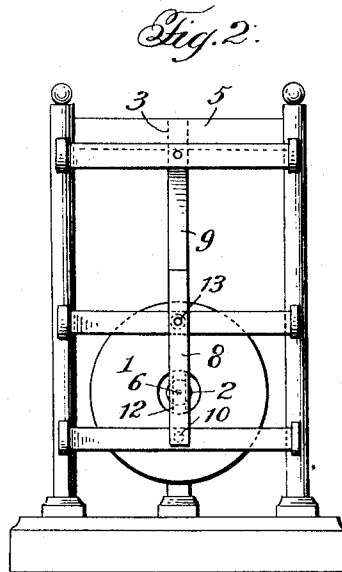
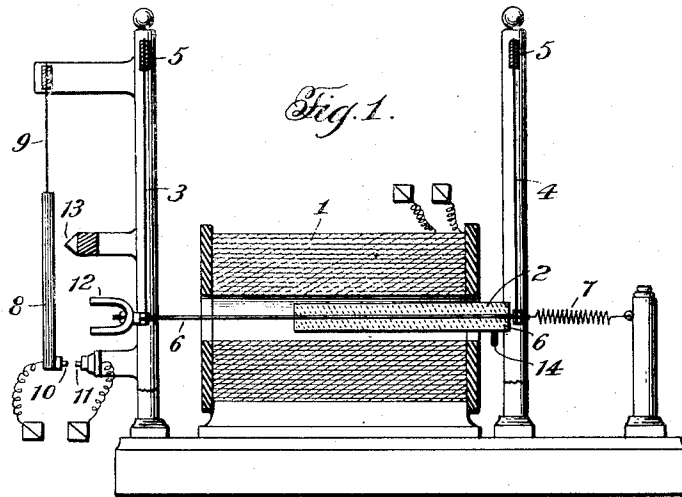


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ELECTRIC RELAY OR CIRCUIT CLOSING DEVICE.
APPLICATION FILED MAR. 18, 1918.

1,348,842.

Patented Aug. 10, 1920.

2 SHEETS—SHEET 1.



Witness:

Jas. Hutchinson

Inventor:

William N. Barlow

By *Foster Sullivan Watson & Co.*

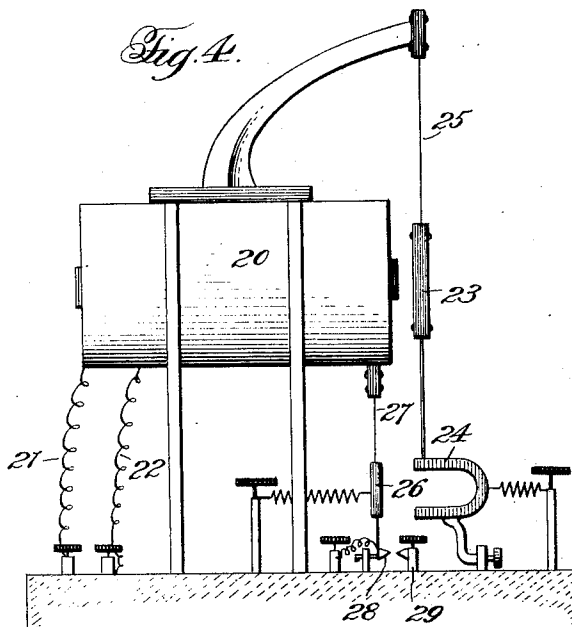
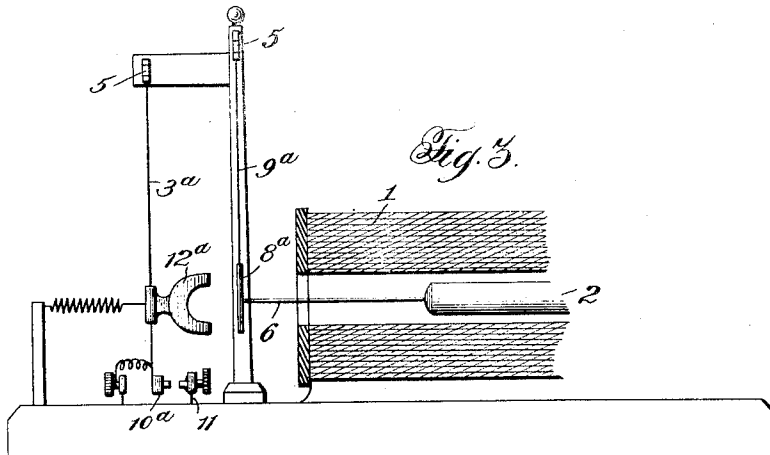
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

WILLIAM N. BARLOW, OF YONKERS, NEW YORK.

ELECTRIC RELAY OR CIRCUIT-CLOSING DEVICE.

1,348,842.

Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed March 18, 1918. Serial No. 223,151.

To all whom it may concern:

Be it known that I, WILLIAM N. BARLOW, a citizen of the United States, and residing at Yonkers, county of Westchester, State of New York, have invented certain new and useful Improvements in Electric Relays or Circuit-Closing Devices, of which the following is a specification.

The present invention relates to an improvement in electric relays or circuit closing devices and has for its object to provide a simple and inexpensive device which, while sensitive to appreciable changes in the electric current passing through it, will effectively maintain an armature or switch in operative position notwithstanding variations in the primary circuit or slight physical movement of the several parts.

In the accompanying drawing Figure 1 is an elevation, and partial section of a relay constructed in accordance with the invention;

Fig. 2 is an end elevation of the parts shown in Fig. 1;

Fig. 3 illustrates a modified form of the invention;

Fig. 4 illustrates another slight modification.

Referring to the drawing, and particularly to Figs. 1 and 2, it will be seen that the main body of the improved device is formed as a solenoid 1, the core 2 of which is of such diameter as to be freely movable within the bore or central passage.

The core 2 is suspended and supported by two flexible members, preferably leaf springs 3, 4, which extend perpendicular to the axis of the core and have their outer, upper, ends secured to cross bars 5 of frames rising from the base on which the solenoid body 1 is mounted. As shown the core 2 is provided at each end with an axially projecting threaded rod 6 of brass which rods extend into suitable apertures formed in the spring arms 3, 4, suitable lock nuts being provided to hold the rods and spring arms in proper relation.

The core 2 is thus supported out of contact with the wall of the bore in the body 1 and the spring arms permit a free movement thereof without any friction between moving parts.

Normally, when the coil 1 is deenergized, or subjected only to the action of a current of predetermined voltage, the core will be held in its retracted position by a coil

spring 7 but on a slight increase in the voltage of such current the core will be moved longitudinally against the action of the spring 7 and such movement is utilized to effect movement of an armature or switch bar 8, which, in the embodiment of the invention illustrated, is adapted to close a secondary electric circuit.

As shown the armature 8 is made of a flat bar of soft iron which is supported at one end of a leaf spring 9 and is provided on one face with a contact 10 adapted to cooperate with a relatively stationary contact 11 with which one of the line wires of the secondary circuit is connected. The other line wire of such secondary circuit is connected with the armature 8 or the contact 10 thereon.

A magnet, preferably a permanent magnet 12, is secured to the rod 6 projecting from the end of the coil 1 adjacent to the armature 8 and when the core 2 is drawn into the bore of said coil sufficiently the bar or armature 8 will be attracted by the magnet 12 and moved to bring the contact 10 against the contact 11. A stop 13 is provided to limit such movement of the armature 8 and a stop 14 is also provided on the core 2 to limit movement of said core and its attached permanent magnet toward the armature.

When the coil of the solenoid body 1 is deenergized or the voltage of the current passing therethrough restored to its normal condition the spring 7 will retract said core and move the magnet 12 to such a distance from the armature 8 that the latter will no longer be attracted thereby and the slight strain exerted by the spring arm 9 will be sufficient to shift said armature and separate the contacts 10, 11.

As shown the solenoid core is positioned horizontally. It may however be arranged vertically or in an inclined position without affecting the operation.

It will be seen that the core is suspended by the flexible members or spring arms 3, 4 so that movement thereof within the coil 1 is absolutely frictionless; and the magnet 12 will act to positively hold the armature 8 in position to close the secondary circuit notwithstanding slight movement of the core 2 due to variations in the current traversing the coil or to physical vibration, resulting, for example, from the device being mounted on a train or vehicle.

It is not necessary to connect the magnet with the solenoid core and support the armature by a leaf spring arm. As shown in Fig. 3, the relative positions of these parts may be reversed, that is, the armature 8^a suspended by the spring 9^a may be directly attached by the rod 6 to the core 2 and the magnet 12^a supported by leaf spring 3^a which is extended beyond said magnet and carries the movable member 10^a of the circuit closing device. Instead of employing a solenoid as in the forms shown in Figs. 1 to 3, an electromagnet 20 may be used to effect the relative movement between the armature and body of the magnet. In this embodiment of the invention current is supplied to the electromagnet 20 by the conveyers 21, 22 and the armature 23 of such magnet is supported by a leaf spring 25 which also is connected with the permanent magnet 24. The armature 26 of the permanent magnet is supported by a leaf spring 27 and also carries the movable contact 28 adapted to cooperate with the relatively stationary contact 29 of the circuit closing means.

The manner of operating and advantages of the improved relay or circuit closing device will be evident from the foregoing description in connection with the drawings. The device is particularly adapted for use under conditions where the coil 1 or electromagnet 20 is constantly energized, as for example where such coil or magnet is included in circuit with an arc light, and the secondary circuit is adapted to be intermittently closed, as for causing operation of means for restoring normal conditions of the carbons. Under such conditions a slight increase in the current voltage in the coil or electromagnet will move the core or armature against the action of the spring 7, 25 and carry the magnet 12, 26, into position to attract its armature and close the secondary circuit. The armature will be held in this position until the solenoid or electromagnet is restored to normal voltage, when said armature and permanent magnet will be separated by the springs connected thereto.

When alternating current is used, whereby the current changes cause a constant vibration or chatter of the solenoid core or armature of the electromagnet the magnet 12 or 12^a will hold the contacts of the secondary circuit in closed relation until the coil or magnet is restored to normal voltage.

Having thus described the invention what is claimed is:—

1. In an electric relay or circuit closing device, the combination with a solenoid coil,

of a plunger or core arranged axially of and out of contact with said coil, and two leaf springs each connected with one end of the core and with a suitable support, said springs extending perpendicular to the axis of the core and suspending the core so that it may move freely axially of the coil.

2. In an electric relay or circuit closing device, the combination with a solenoid coil, of two leaf springs extending perpendicular to the axis of the coil and having the ends thereof remote from the coil secured to a suitable support, a core or plunger suspended at its ends by said leaf springs and extending into the coil, said core being out of contact with the coil throughout its length, and an electric circuit controlling device adapted to be actuated by the core at the limit of its movement in one direction.

3. In an electric relay or circuit closing device, the combination of a solenoid coil, a plunger or core movable axially of said coil, and an electric circuit controlling means comprising a permanent magnet and armature, one of said parts being secured to the solenoid core.

4. In an electric relay or circuit closing device, the combination of a solenoid coil, a plunger or core movable axially of said coil, a permanent electric magnet connected with one end of the core, and an armature adapted to be moved by said permanent magnet to control an electric circuit.

5. In an electric relay or circuit closing device, the combination of a solenoid coil, a core or plunger extending into and movable axially of the coil, a permanent magnet arranged outside of the coil and connected with one end of the core or plunger, and an armature for said magnet provided with an electric circuit closing contact.

6. In an electric relay or circuit closing device, the combination of a solenoid, two leaf springs extending perpendicular to the axis of the coil beyond the ends thereof, a core or plunger supported by said spring arm and freely movable axially of the coil, a permanent magnet connected with one end of the plunger, and an armature for said magnet adapted to control an electric circuit.

7. In an electric relay or circuit closing device, the combination of a solenoid having its core provided with an extension projecting beyond one end of the coil, a permanent magnet mounted on said extension and an armature for said magnet adapted to control an electric circuit.

In testimony whereof I affix my signature.
WILLIAM N. BARLOW.