A. S. CUBITT.

RELAY.

APPLICATION FILED JUNE 24, 1908.

957,870. **Patented May 17, 1910.**

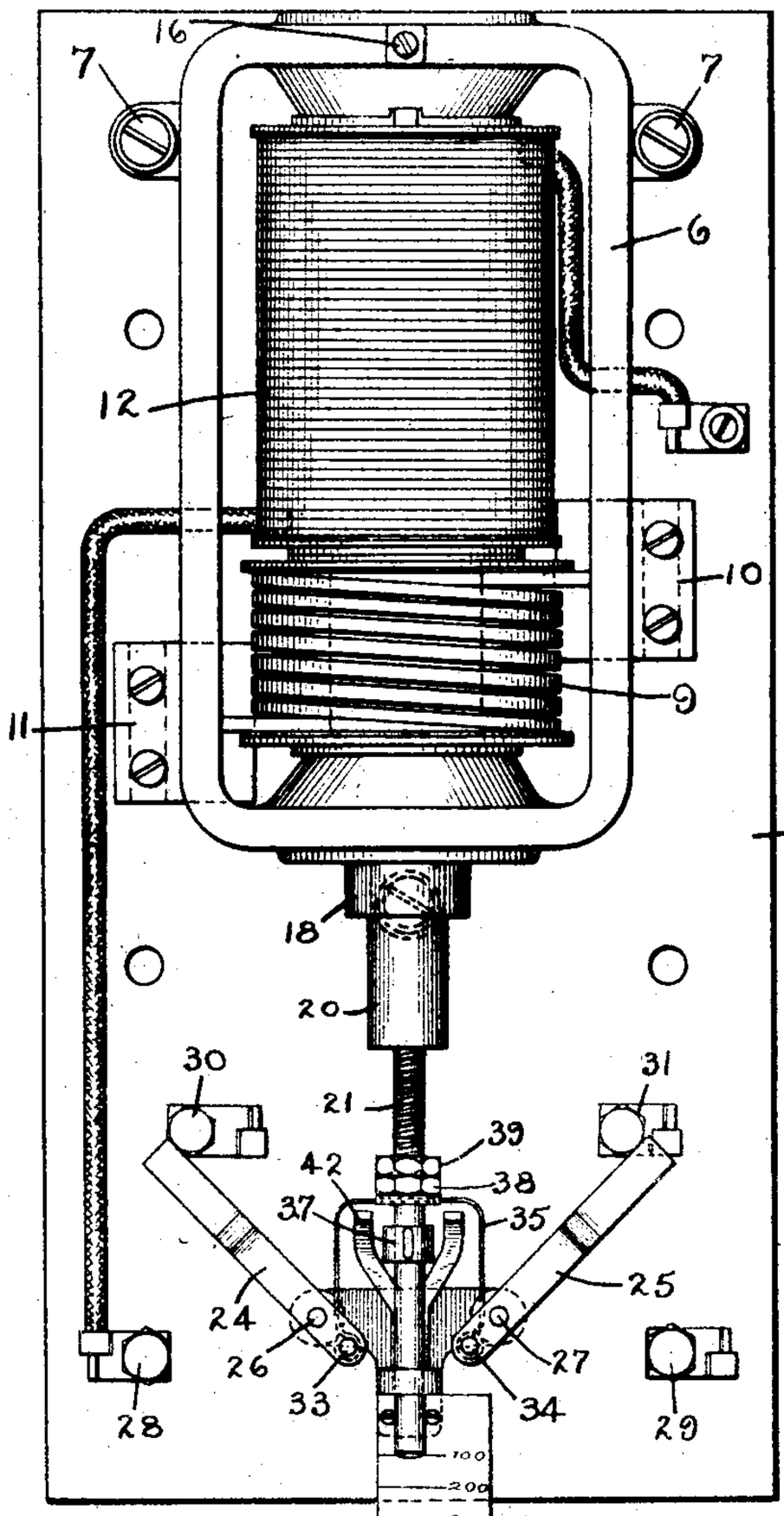

Fig. 1

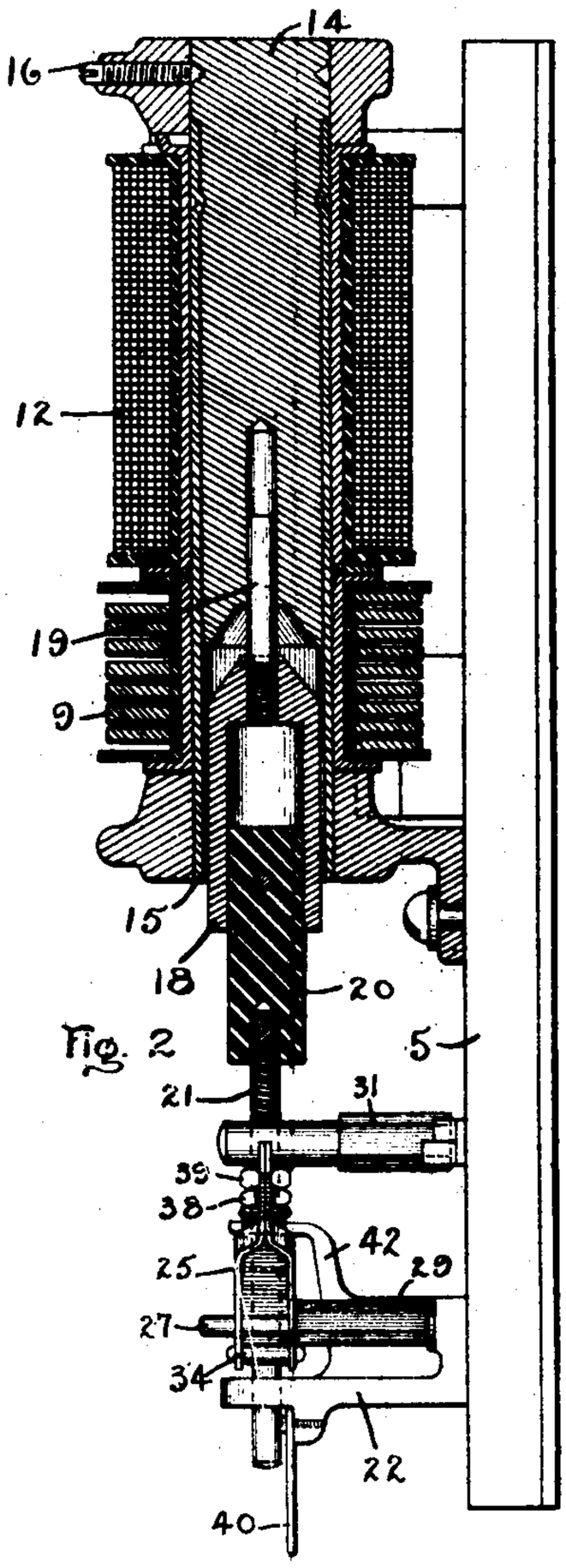

Fig. 2

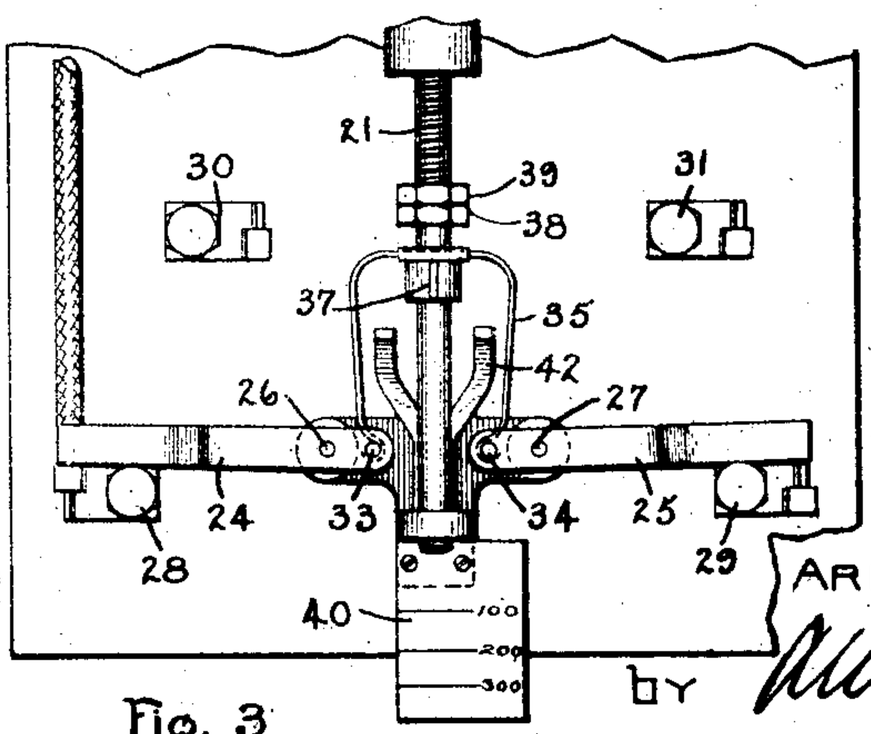

Fig. 3

WITNESSES:

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ATTY

UNITED STATES PATENT OFFICE.

ARCHIBALD S. CUBITT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

RELAY.

957,870. Specification of Letters Patent. Patented May 17, 1910.

Application filed June 24, 1908. Serial No. 440,081.

To all whom it may concern:

Be it known that I, ARCHIBALD S. CUBITT, a subject of the King of Great Britain, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Relays, of which the following is a specification.

My invention relates to electro-magnetically operated switches, and particularly to the class of switches known as relays and used in the control of dynamo-electric machinery.

The well-known form of relay comprises an actuating coil, a core of magnetic material movable in the field thereof, one or a plurality of contact disks carried by said core and arranged to coöperate with fixed contacts located above or below, or both above and below, said disks, spring connections being often employed between these disks and the movable core. Where relays of this form are subjected to considerable jarring, as, for example, in railway work, it has been found that the contacts controlled by them are not held firmly closed but are liable to open slightly, thereby interrupting the circuit or circuits controlled by the relay. It has been found also, that with relays provided with contact disks considerable care is necessary in their construction and assembling to insure the disks making good electrical connection with the fixed contacts.

It is an object of my invention to provide a simple, inexpensive and improved form of relay in which the contacts are effectively held in close engagement with one another in spite of any jarring to which the relay may be subjected.

Other objects of my invention will appear from the following description of one embodiment thereof and from the appended claims.

For purposes of illustration I have shown my invention as applied to a so-called overload relay intended for use in connection with systems of motor control of the separately-actuated contact type. It is obvious, however, that the invention is in no way limited to relays used for this purpose. It may be applied equally well to relays having any number of actuating and maintaining coils and to relays which make and break any number of circuits as will be at once obvious to those skilled in this art.

Referring to the drawing, Figure 1 is a front elevation of a relay having my invention embodied therein; Fig. 2 is a side elevation, partly in section, of the relay shown in Fig. 1; and Fig. 3 is a front elevation of the lower part of the relay shown in Fig. 1, the movable contact members being in the position to which they are moved by the lifting of the movable core.

Like parts are referred to throughout the several views by the same reference characters.

The various parts of the relay are mounted upon a baseboard 5 made preferably of some insulating material. The iron field frame of the relay is shown at 6, of any suitable and well-known form, being secured to the base 5, in any suitable manner, as by the screws or bolts 7. The particular form of relay shown is provided with an actuating coil 9 composed of a few turns of heavy conductor, the ends of which are secured to terminals 10 and 11 mounted upon the base 5, and a holding coil 12 of finer conductor. The coils 9 and 12 are wound in a well known manner upon spools from which they are insulated. A fixed core 14, having secured thereon a brass sleeve 15, is secured in the top of the frame 6 in any suitable manner, as by a set screw 16, and projects downwardly through the coil 12 and into the coil 9, as best shown in Fig. 2. The movable core of magnetic material is indicated at 18 and in the present construction is provided at its upper end with a rod 19 of non-magnetic material which projects into a hole in the bottom of the fixed core 14 and serves as a guide for the movable core. Embedded and secured in the movable core is a cylindrical piece of insulating material 20, from the bottom of which projects a rod 21, the lower end of which projects through a hole in the guiding bracket 22 secured to the baseboard 5, as clearly shown in the drawings. The movable contact members 24 and 25, which may be of any suitable form, are pivoted at 26 and 27 upon pins which may conveniently be mounted in the bracket 22, as clearly shown in the drawings. The contact members 24 and 25

coöperate with fixed contacts 28 and 29, 30 and 31, and when in the position shown in Fig. 1 electrically connect the contacts 30 and 31, and in the position shown in Fig. 3 electrically connect the contacts 28 and 29. The contact members 24 and 25 are provided, as shown, with pins 33 and 34 with which engage the ends of a U-shaped spring 35, through a hole near the middle of which the rod 21 freely passes. A collar 37 secured to the rod 21 engages with the spring 35 in the upward movement of the movable core, and by lifting the spring rotates the contact members 24 and 25 on their pivots from the position shown in Fig. 1 to that illustrated in Fig. 3. On a threaded portion of the rod 21 above the spring 35 is a nut 38 and a lock nut 39 which serve as an adjustable stop on the rod to engage the spring 35 in the downward movement of the core and thereby rotate the movable contact members from the position shown in Fig. 3 to that shown in Fig. 1. By adjusting the position of the nuts 38 and 39 the air gap existing between the top of the movable core 18 and the bottom of the fixed core 14, when the movable core is in its lower position, may be adjusted and the value of current in the coil 9 required to pull up the relay thereby regulated. A plate 40 may be secured to the bracket 22 behind the lower end of the rod 21 as shown, and upon it may be marked a scale indicating the different current settings of the relay. In order to somewhat relieve the spring 35 from the hammer blow exerted by the movable core in falling, a Y-shaped bracket 42 may be provided, as shown, being conveniently made integral with the bracket 22. The arms of the bracket 42, as shown, extend outwardly under the spring 35 and when the movable core is in its lower position, as shown in Fig. 1, the arms of the bracket are slightly below the upper stretch of the spring 35, but when the core drops the spring 35 may yield enough to bring it into engagement with the fixed member or bracket 42 upon which the force of the hammer blow is largely expended. It is obvious, however, that under certain conditions the bracket 42 might be omitted. With the spring 35 made in the form shown, it will be clear that the movable contact members 24 and 25 are held in yielding engagement with either the fixed contacts 30 and 31 or 28 and 29, depending whether the core of the relay is in its lower or its upper position. This spring connection, therefore, between the core of the relay and the movable contact members insures the latter being firmly held in engagement with their coöperating fixed contacts, even though the relay is subjected to considerable jarring. It is obvious that with this construction the movable contact members 24 and 25 may be easily renewed by withdrawing the pins 33 and 34, thus providing for easy replacement of the movable contact members when the same become worn.

While I have shown but one form in which my invention may be embodied, I do not wish to be understood as limiting it thereto, except as called for by the following claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a relay, an actuating coil, a core of magnetic material movable in the field thereof, pivotally supported movable contact members, stationary contacts coöperating therewith, and a U-shaped spring connection between said movable contact members and said movable core whereby the core in its movement moves said movable contact members into and out of engagement with the stationary contacts.

2. In a relay, an actuating coil, a core of magnetic material movable in the field thereof, pivotally supported contact members arranged on opposite sides of said core, stationary contacts with which said contact members coöperate, and a U-shaped spring connection between said core and said contact members whereby said core in its movement rotates said contact members into and out of engagement with said fixed contacts.

3. In a relay, a supporting back, a field frame of magnetic material secured thereto, an actuating coil coöperating with said field frame, a core of magnetic material movable in the field of said coil, movable contact members pivotally supported on said base, stationary contacts with which said contact members coöperate, and a U-shaped spring connection between said core and said movable contact members whereby said core in its movement rotates said contact members into and out of engagement with said fixed contacts.

4. In a relay, an actuating coil, a core of magnetic material movable in the field thereof, pivotally supported contact members arranged on opposite sides of said core, stationary contacts with which said contact members coöperate, and a U-shaped spring connected at each end to one of said movable contact members and at its middle to said core whereby said core in its movement rotates said contact members into and out of engagement with said fixed contacts.

5. In a relay, an actuating coil, a core of magnetic material movable in the field thereof, pivotally supported contact members arranged on opposite sides of said core, stationary contacts with which said contact members coöperate, and a U-shaped spring connection between said contact members and said movable core whereby said core in its movement rotates said contact members into and out of engagement with said sta-

tionary contacts and holds said contact members in yielding engagement with said stationary contacts.

6. In a relay, an actuating coil, a core of magnetic material movable in the field thereof, pivotally supported contact members arranged on opposite sides of said core, stationary contacts with which each of said contact members coöperate in both of their extreme positions of movement, and a U-shaped spring connection between said core and said contact members whereby said core in its movement rotates said contact members into engagement with one or the other of said fixed contacts and holds the former in yielding engagement with the latter.

7. In a relay, an actuating coil, a core of magnetic material movable in the field thereof, pivotally supported contact members, stationary contacts with which said contact members coöperate, a spring connection between said contact members and said movable core, and a fixed member coöperating with said spring connection and arranged to receive the impact of the core when the latter drops.

In witness whereof, I have hereunto set my hand this 22nd day of June, 1908.

ARCHIBALD S. CUBITT.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.