

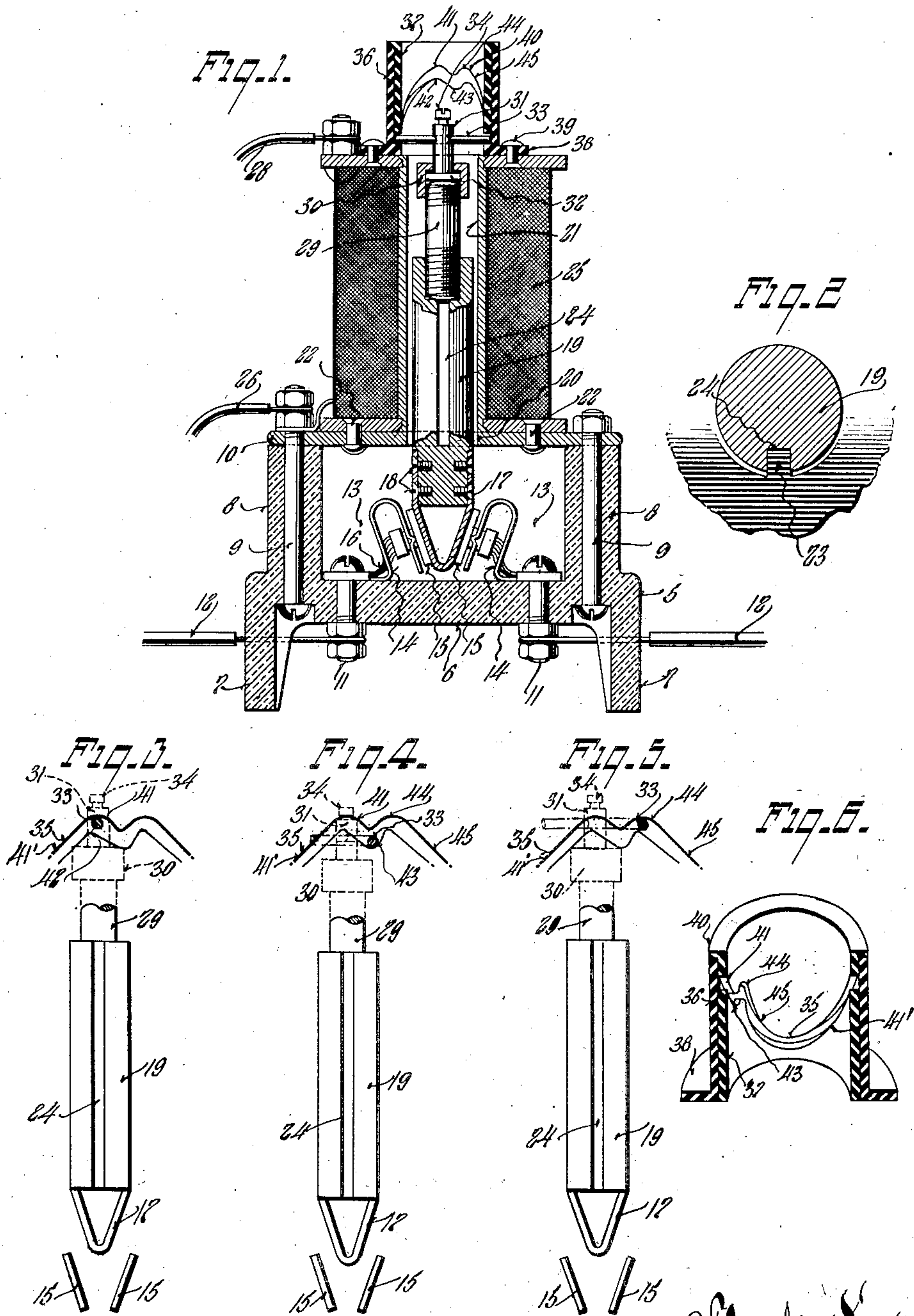
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CIRCUIT MAKING AND BREAKING DEVICE

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CIRCUIT MAKING AND BREAKING DEVICE

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This invention relates to improvements in circuit making and breaking devices of the magnetically actuated type and has as an object to provide a device of this character in which the solenoid is energized to break the circuit and in which means are provided to maintain the circuit open until the solenoid is again energized and deenergized.

Another object of this invention resides in the provision of a circuit making and breaking device of the character described having a contactor carried by a movable armature and having means for releasably maintaining the armature in its raised position to break the circuit.

And a further object of this invention is to improve and simplify the construction of circuit making and breaking devices of the character described.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawing, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a transverse sectional view through a circuit making and breaking device embodying my invention;

Figure 2 is a fragmentary view illustrating the means for preventing rotation of the armature;

Figure 3 is a diagrammatic view illustrating the armature at the end of its initial upward movement, with the solenoid energized;

Figure 4 is a view similar to Figure 3 il-

lustrating the armature in the position it is held after the solenoid becomes deenergized;

Figure 5 is a view similar to Figures 3 and 4 illustrating the armature in the position it assumes when the solenoid is reenergized from where it is permitted to move to its original circuit making position, and

Figure 6 is a perspective view of the means for maintaining the armature in its several raised positions.

Referring now more particularly to the accompanying drawing, in which like numerals designate like parts throughout the several views, 5 represents the base of a circuit making and breaking device of porcelain or any other suitable material and having a bottom wall 6 provided with legs 7. Extended upwardly from the bottom 6 is a pair of supporting members 8 which are longitudinally bored to receive bolts 9 to mount a shelf member 10 on the base.

The bottom wall of the base has a pair of terminal screws 11 passing therethrough, the lower ends of which have the adjacent ends of conductors 12 connected therewith and the upper ends of which secure a pair of contact members 13 in position. The contact members consist preferably of members 14 formed of spring metal which have a portion of substantially inverted U shape and disposed at an angle, and the outer free ends of which normally yieldably urge contacts 15 toward each other. Flexible conductors 16 soldered or otherwise connected with the contacts electrically connect the contacts with the terminal screws 11.

The contacts 15 are adapted to be bridged by a substantially V shaped contactor 17, the ends of which are secured by screws 18 or the like to the lower end of an armature 19 which extends upwardly through an aperture 20 in the shelf 10 and is vertically slidable in the bore of a spool 21, the lower flange of which is riveted or otherwise secured to the shelf, as at 22. A projection 23 extended into the

aperture in the shelf 10 is slidable in a longitudinal groove 24 in the armature to maintain the same against rotation so that the V shaped contactor 17 is at all times in position to properly engage the contacts 15.

A solenoid 25 wound on the spool 20 has one end connected with one of the screws 9 which secure the shelf 10 in position to be electrically connected therethrough with a conductor 26 and the other end is suitably connected, through a terminal screw 27, with a conductor 28. Energization of the solenoid thus attracts the armature 19 upwardly to move the contactor 17 out of engagement with the contacts 15 to break the circuit therebetween.

Threaded in the upper end of the armature 19 is a stud 29 the upper end of which is threaded to receive a cap member 30 which freely rotatably secured a pin 31 to the stud 29, the pin having a flange 32 which is confined between the inner wall of the cap 30 and the upper end of the stud 29. The outer end of the pin 31 is transversely apertured to receive a cross bar 33 which is secured therein by a set screw 34 threaded in the outer end of the pin. The ends of the cross bar 33 are engaged in a trackway 35 formed by a pair of tubular members 36 and 37 telescoped, the latter within the former and preferably formed of insulating material.

The outer tubular member 36 has a peripheral flange 38 extended from its lower edge by which it is secured to the upper flange to the spool 21 by rivets or other means 39 and has its inner wall provided with a counter-bore, the upper edge of which is cam shaped as illustrated to provide the bottom of the groove 35. The other tubular member 37 has its lower edge correspondingly shaped and is provided with a peripheral flange 40 extended from its upper edge which limits downward movement of the member 37 to properly space the lower edge thereof from the upper edge of the counter-bore to provide the desired width for the track 35, the member 37 being assembled with the member 36 after the armature has been lowered into the bore of the spool 21 and the cross bar is in position in the bottom of the track and the members 37 and 36 are maintained assembled in any suitable manner, preferably having a force fit.

As the solenoid 25 is energized, the armature 19 is raised to break the circuit between the contact 15 and due to the shape of the track 35 the cross bar 33 rides upwardly therein turning the pin 31 as it goes until it reaches the top 41 of its initial upward stretch 41' where further upward movement is restrained. This is the position of the parts as illustrated in Figure 3 and as the solenoid is then deenergized, the armature by its weight drops downwardly, but as the nose 42 below the point 41 is spaced rear-

wardly thereof the ends of the cross bar 33 drop to a position illustrated in Figure 4 resting in the recess 43 and maintaining the contactor 17 out of engagement with the contacts 15.

The parts maintain this position until the solenoid is again energized at which time the ends of the cross bar 33 follow the track in a clockwise direction to the top point 44 of the downward stretch 45, where the armature is held until the solenoid is again deenergized, the weight thereof then causing the same to drop, engaging its contactor 17 with the contacts 15 and bringing the cross bar 33 in position to begin another cycle of movement having turned the pin and the cross bar through 180 degrees.

From the foregoing description, taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which an invention of this character appertains, that I provide a circuit making and breaking device of the character described which is positive in its function and in which but momentary energization of the solenoid is required to actuate the same to break the circuit, mechanical means holding the device in circuit breaking position until the solenoid is again energized.

What I claim as my invention is:

1. In a circuit making and breaking device, contacts, a contactor adapted to bridge the contacts, an armature connected with the contactor, the combined weight of the contactor and armature tending to maintain the contactor in its contact bridging position, a solenoid which, when energized, attracts the armature to lift the contactor from the contacts, means for holding the armature in its elevated position disengaging the contactor from the contacts after the solenoid is deenergized, and means whereby energization of the solenoid again engages the contactor with the contacts.

2. In a circuit making and breaking device having an armature and a solenoid which, when energized, moves the armature to a position breaking a circuit, a cam member, and means carried by the armature and engaged with the cam member, said cam member having a depression engageable by said armature carried means upon movement of the armature to its position breaking the circuit, whereby the armature is maintained in its circuit breaking position after the solenoid becomes deenergized.

3. In a circuit making and breaking device having an armature and a solenoid which, when energized, moves the armature to a position breaking a circuit, a cam member, means carried by the armature and engaged with the cam member, said cam member having a depression engageable by said armature carried means upon movement of the armature to its position breaking the cir-

cuit whereby the armature is maintained in its circuit breaking position after the solenoid becomes deenergized, and means on said cam member for guiding the armature carried means out of the depression upon reenergization of the solenoid whereby the armature is permitted to move to circuit making position when the armature is again de-energized.

4. In a circuit making and breaking device having an armature and a solenoid which, when energized, moves the armature to circuit breaking position, a cam track, and a member carried by the armature and engageable in the track whereby movement of the armature to circuit breaking position by the energization of the solenoid is arrested, and which maintains the armature in a circuit breaking position after the solenoid becomes deenergized.

5. In a circuit making and breaking device, contacts, a contactor adapted to bridge the contacts, an armature for moving the contactor, a solenoid which, when energized, moves the armature to disengage the contactor from its contacts, a member having a cam track, and a member carried by the armature and engageable in the cam track whereby movement of the armature to its position disengaging the contactor from its contacts raises the member to a point from which as the armature is dropped upon deenergization of the solenoid, the member assumes a position to hold the armature disengaging the contactor from its contacts and whereby reenergization of the solenoid moves the armature carried means to a position from which deenergization of the solenoid permits the armature to move to a position again engaging the contactor with the contacts.

6. In a circuit making and breaking device, contacts, a contactor adapted to bridge the contacts, an armature carrying the contactor, a solenoid which when energized attracts the armature to disengage the contactor from the contacts, a member mounted above the solenoid in axial alignment with the armature and having a substantially spiral cam track, and means carried by the armature and engaged in said cam track whereby energization of the solenoid to disengage the contactor from the contacts moves said means to an elevated position in the cam track at which the armature is held in circuit breaking position independent of the solenoid and from which position it is movable to again bridge the contacts upon a succeeding energization of the solenoid.

7. A circuit making and breaking device of the character described, comprising spaced contacts, a contactor adapted to electrically bridge the contacts, an armature carrying the contactor, the weight of the armature maintaining the contactor in electrical engagement with the contacts, a solenoid which

when energized attracts the armature to raise the same and disengage the contactor from the contacts, means preventing rotation of the armature, a substantially cylindrical member mounted above the solenoid in axial alignment with the armature and having a cam track, and a member freely rotatably connected with the armature and riding in said cam track whereby upward movement of the armature moves the member to a position in the cam track at which the armature is held against dropping independent of the solenoid and from which position the armature carried member is movable upon a succeeding energization of the solenoid to permit the same to move to its circuit making position.

8. In a circuit making and breaking device, contacts, a contactor adapted to bridge the contacts, an armature connected with the contactor, a solenoid which when energized attracts the armature to move the contactor with respect to the contacts, a member mounted in axial alignment with the armature and having a substantially spiral cam track provided with a depression, and means carried by the armature and engaged in the cam track, whereby movement of the armature upon energization of the solenoid engages said armature carried means with the depression of the cam track to hold the armature and the contactor in a predetermined elevated position with respect to the contacts independent of the solenoid and from which position the armature and the contactor connected therewith are movable to a lowered predetermined position with respect to the contacts upon a succeeding energization of the solenoid.

9. In a switch of the character described, a contact, a solenoid mounted in spaced relation to said contact, an armature freely axially movable within said solenoid, means to maintain said armature in fixed radial position with respect to said solenoid, a contactor at one end of said armature engageable in its lower position with said contact to complete a circuit, a cam supported from said solenoid, a cam follower mounted on said armature for rotation with respect thereto and engageable in said cam whereby energization of solenoid causes the contactor to disengage from the contact and said follower to engage a portion of the cam to hold the follower out of engagement and a second energization of the solenoid releases said follower from said portion of the cam to permit the reengagement of the contactor with the contact.

10. A circuit making and breaking device comprising a contact, a contactor urged to a position electrically engaging the contact, an armature connected with the contactor, a solenoid adapted upon energization to attract the armature and electrically discon-

nect the contactor from the contact, rotatable
means connected with the armature to move
therewith, and fixed means cooperating with
the rotatable means to maintain the armature
5 in a position electrically disengaging the con-
tactor and contact when the solenoid is de-
energized after the contactor and contact
have been disconnected, but permitting move-
ment of the armature with the contactor to
10 electrically engage the contactor upon suc-
cessive energization and deenergization of
the solenoid.

In testimony whereof I have hereunto af-
fixed my signature.

15 ALWIN G. STEINMAYER.

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