W. WALZ.

ELECTRIC CIRCUIT BREAKER.

APPLICATION FILED MAR. 6, 1909.

**989,458.** Patented Apr. 11, 1911.

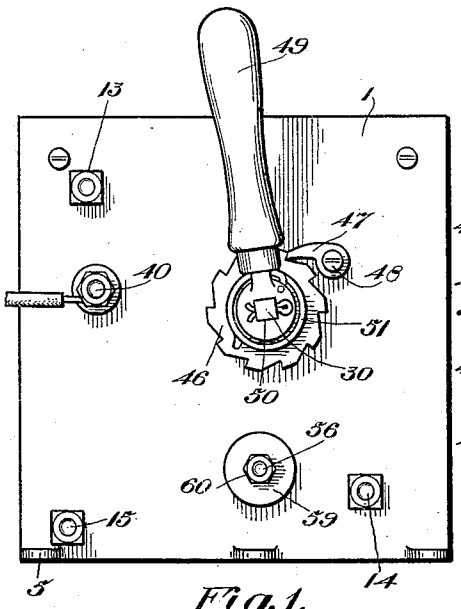

Fig. 1.

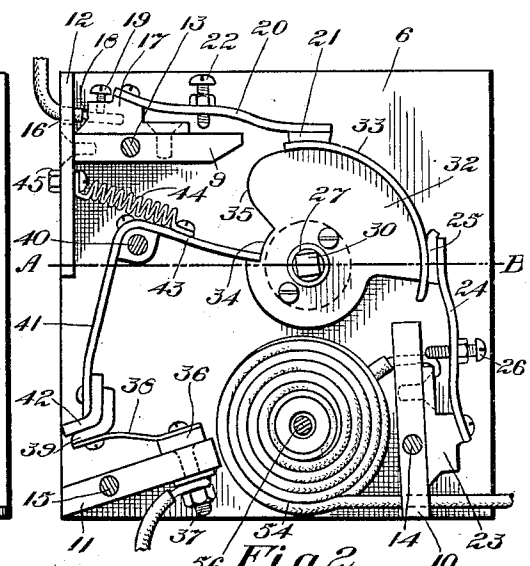

Fig. 2.

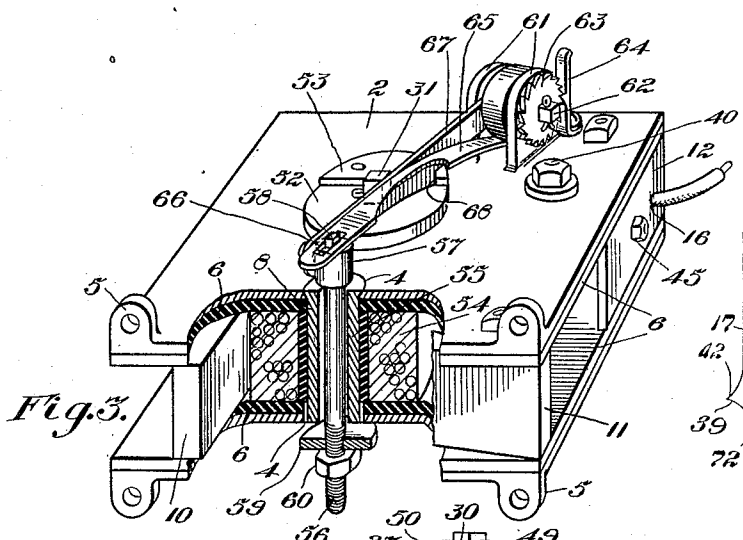

Fig. 3.

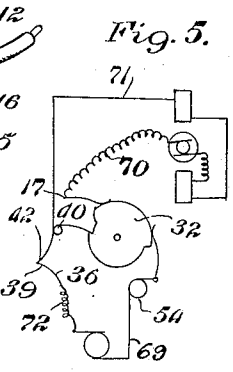

Fig. 5.

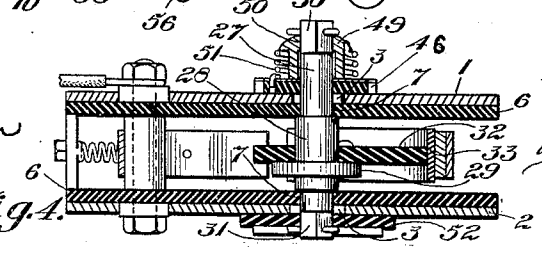

Fig. 4.

Witnesses

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# UNITED STATES PATENT OFFICE.

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## ELECTRIC-CIRCUIT BREAKER.

989,458. Specification of Letters Patent. Patented Apr. 11, 1911.

Application filed March 6, 1909. Serial No. 481,663.

*To all whom it may concern:*

Be it known that I, WILLIAM WALZ, a subject of the King of Great Britain, and resident of the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Electric-Circuit Breakers, of which the following is a specification.

The invention relates to improvements in electric circuit breakers, as described in the following specification and illustrated in the accompanying drawings that form part of the same.

The invention consists essentially in the novel construction and arrangement of parts, whereby a spring actuated electrical contact is held to a closed position by a spring held latch mechanism and said latch mechanism is released by suitable means.

The objects of the invention are, to obviate the difficulties incident to the fusing of the contacts through arcing, to break the contacts quickly and effectively and increase the air gap as fast as possible so as to minimize the arcing, to construct a circuit breaker wherein the actuating parts are thoroughly insulated from the contact parts and which cannot be affected by arcing between the parts, and generally to provide an efficient form of circuit breaker which in its detailed construction may be readily adapted to cut out a plurality of electric circuits simultaneously.

In the drawings, Figure 1 is an outside plan view of one side of the circuit breaker. Fig. 2 is a plan view of the circuit breaker, the cover being removed and disclosing the arrangement of the interior mechanism. Fig. 3 is a perspective view of the device shown partly in section and showing the latch mechanism, the view being the reverse of the view shown in Fig. 1. Fig. 4 is a horizontal sectional view through the line A—B Fig. 2. Fig. 5 is a diagrammatic view showing the wiring to the circuit breaker.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings 1 and 2 are plates, preferably of iron, forming the outer sides or casing of the circuit breaker and each having the circular orifices 3 oppositely arranged one to the other and near the center and the orifices 4 oppositely arranged one to the other near the bottom edge and the laterally extending fastening lugs 5 at said bottom edge.

6 are plates of insulating material suitably secured to the inner side of the plates 1 and 2, each having the circular orifices 7 of smaller diameter than the orifices 3 and centrally arranged in relation thereto, and the orifices 8 of the same size as the orifices 4 and oppositely arranged thereto.

9, 10, 11 and 12 are strips of insulating material extending between the plates 6 and holding said plates apart, the strips 9, 10 and 11 being held in place by the bolts 13, 14 and 15 extending therethrough, said bolts being secured by suitable nuts secured to their outwardly projecting threaded ends. The strip 12 is secured to the strip 9 with suitable screws and is provided with an orifice 16 toward its upper end and a bolt hole therethrough below the strip 9.

17 is a terminal fixedly secured to the strip 9 and having an orifice 18 therein arranged opposite to the orifice 16 in the plate 12 and a suitable binding screw 19 for securing the end of one of the wires leading to the circuit breaker in the orifice in said terminal.

20 is a spring contact arm secured to the terminal 17 and having the contact piece 21 at the outer end thereof and the set screw 22 threaded therein intermediate of its length, said screw being adapted to engage the upper surface of the strip 9 and having a suitable lock nut thereon.

23 is a terminal block suitably secured to the strip 10 and supporting the spring contact arm 24, said arm having the contact piece 25 at its outer end and the set screw 26 extending therethrough intermediate of its length, said set screw being provided with a suitable lock nut.

27 is a spindle journaled in the orifice 7 in the plates 6 and insulated from the plates 1 and 2 and having an enlarged central portion 28 and an annular flange 29 on said enlarged portion and squared ends 30 and 31.

32 is a rotary switch formed of a substantially segmental shaped piece of insulating material fixedly secured to the flange 29 on the spindle 27 and having the contact surface portion 33 of conducting material rigidly secured thereto and adapted to contact with the contact pieces 21 and 25 of the arms 20 and 24 respectively.

34 is a notch formed in the rotary switch 32 adjacent to one end of the arc-shaped contact portion 33, one side of said notch forming a shoulder 35.

36 is a terminal secured to the insulating strip 11 by the bolt 37, said bolt having a suitable nut threaded on its outer end and adapted to receive the terminal end of one of the wires leading to the circuit breaker.

38 is a spring arm secured to the terminal 36 having an L-shaped contact piece 39 fixedly secured to its outer end.

40 is a bolt extending through suitable bolt holes in the plates 6 and insulated from the plates 1 and 2 and forming the terminal of one of the wires leading to the circuit breaker.

41 is a rocker arm pivotally supported on the bolt 40 and having the L-shaped contact piece 42 rigidly secured at one end thereof and adapted to engage the contact 39. The other end 43 of the rocker arm 41 extends into the notch 34 in the rotary switch 32 and said arm is spring held with the contact 42 in engagement with the contact 39 by a spiral tension spring 44 secured to said arm and to a suitable bolt 45 secured in the bolt hole in the insulating strip 12.

46 is a ratchet disk formed of insulating material loosely mounted on one of the extending ends of the spindle 27 and abutting the face of the plate 1. 47 is a pawl mounted on the screw 48 secured in the plate 1 and engaging the teeth of said ratchet disk.

49 is a lever handle having a squared orifice 50 through which the squared end 30 of the spindle 27 extends.

51 is a spiral spring having one end secured to the ratchet disk 46 and the other end secured to the lever 49. The spring 51 is arranged so that when the contact portion of the switch 32 is in engagement with the contact pieces 21 and 25 of the arms 20 and 24, the said spring will be in tension and will, on the release of the spindle, turn it to throw the contact piece 33 out of contact with the contact 25. The tension of the spring may be regulated by turning the ratchet disk 46.

52 is a rotary latch member formed of a disk of insulating material secured to the squared end 31 of the spindle 27 and abutting the plate 2, said disk having a metal sector 53 fixedly secured to its outer face, said rotary latch forming a portion of the mechanism for holding the spring 51 in tension and the contact 33 in engagement with the contact arms 20 and 24.

It will be seen that an electrical connection is established between the terminals 17 and 23 through the contact piece 33 on the rotary switch 32 and an electrical connection is established between the terminal 36 and the wire connected to the bolt 40 through the contacts 39 and 42.

The extending end 43 of the rocker arm 41 is so arranged in relation to the shoulder 35 formed in the rotary switch 32, that the said shoulder engages the upper side of the said arm 43 simultaneously with the breaking of contact between the contact piece 25 on the arm 24 and the contact piece 33 on said switch, consequently tilting the arm 40 on its pivot and causing the separation of the contacts 39 and 42, thus breaking both circuits leading to the circuit breaker simultaneously. The shoulder 35 strikes the arm 43 sharply and throws the contacts 39 and 41 out of engagement very quickly and also a sufficient distance to insure perfect insulation. It will therefore be readily seen that if both sets of contacts are arranged in the same electrical circuit, the air gap between the contacts will increase with much greater speed than when only one break is made.

54 is an electro-magnet arranged between the plates 6 surrounding the hollow core 55 secured in said plates. One end of the winding of the electro-magnet is electrically connected to the terminal 23 and the other end leads to one of the wires leading to the circuit breaker.

56 is a spindle extending through the hollow core of the electro-magnet 54 and having a head 57 formed on the end projecting beyond the plate 2 and threaded on the opposite end, said head having a flattened pin 58 projecting from the top thereof.

59 is the armature of the electro-magnet 54 having a central threaded orifice and turning on the threaded end of the spindle 56 and locked by the lock nut 60.

61 are a pair of lugs secured to or forming part with the plate 2 and projecting outwardly therefrom having suitable journal orifices centrally arranged therein.

62 is a spindle journaled in the orifices in the lugs 61.

63 is a ratchet wheel fixedly secured to one end of the spindle 62.

64 is a spring dog secured to the plate 2 and engaging the ratchet wheel 63.

65 is a spring arm secured to the spindle 62 and coiled therearound and extending outwardly therefrom and over the head of the armature spindle 56, said spring having a longitudinal slot 66 through which the pin 58 extends.

67 is an arm pivotally supported at one end on the spindle 62 and pivotally secured at its opposite end to the head 57 of the armature spindle 56, said arm having the downwardly projecting lip 68 arranged intermediate of its length and adapted to engage the straight edge of the sector 53.

The tension of the spring arm 65 may be adjusted by turning the spindle 62, said spindle being held in an adjusted position by the spring dog 64 engaging the teeth of the ratchet wheel 63.

The spring arm 65 holds the head of the armature spindle in engagement with the end of the hollow core 55 of the electro-magnet 54, consequently holding the arma-

ture 59 away from the said core. The armature being threaded on the armature spindle 56 may be adjusted very accurately, so that it may be set to operate with a certain predetermined current flowing through the coils of the magnet, that is to say, it may be set so that a certain strength of current may flow through the magnet without attracting the armature but in the event of the current exceeding the normal flow, the armature will be attracted by the magnet and consequently operate the spindle 56 to raise the arm 67, withdrawing the lip 68 from engagement with the engaging edge of the sector 53. Immediately the sector 53 is released, the spiral spring 51 rotates the spindle 27 in its bearings and turns the rotary switch 32 breaking the electrical connection between the terminals 17 and 23. Simultaneously with the breaking of the circuit between the terminals 17 and 23, the shoulder 35 of the rotary switch 32 engages the extending end 43 of the rocker arm 41 and throws the contact pieces 39 and 42 out of contact, thus breaking the electrical connection between the terminals 36 and the terminal formed by the bolt 40.

When the rotary switch 32 and rocker arm 41 are in their closed position the rotary latch member is held against the tension of the spring 51 by the latch arm 67, the spring 65 holding the armature of the electro-magnet 54 away from said magnet. The terminal 23 is connected to the electric circuit through the winding of the electro-magnet 54 and the armature 59 adjusted so that if an excess of current flows through the said magnet the armature will be attracted and operate the latch arm 67 to release the rotary latch member. On the release of the rotary latch member, the spring 51 causes the spindle 27 to rotate breaking connection between the terminals 17 and 23 and simultaneously breaking the connection between the terminals 40 and 36 as described. Both sets of contacts are arranged to break at the same instant, therefore it will be readily seen that the total air gap of the break in the circuit is increased very rapidly and consequently the tendency to arc between the contacts is very much lessened. The arcing tendency is also lessened by the magnetism of the plates 1 and 2.

69 is a wire leading from the electric current supply to the electro-magnet 54. The current flows through the magnet 54, contacts and rotary switch to the terminal 17 and from said terminal flows through the wire 70 to the armature of the motor. The return wire 71 from the fields of the motor is connected to the bolt 40 and the current flows through the contacts 42 and 39 to the terminal 36 and from said terminal 36 is carried through the wire 72 to the source of supply. It will be seen that the electrical connection to the motor will be broken at two separate points and neither of the connections leading from the source of supply to the motor will be in contact when the circuit breaker is operated.

What I claim as my invention is:—

1. In an electric circuit breaker, an electric switch closing an electric circuit and spring actuated to break said circuit, a spring held latch mechanism holding said switch in its closed position, an electro-magnet included in said electric circuit and having a hollow core and an armature spindle extending through said core and an armature adjustably secured to said spindle, said armature spindle being operatively connected to said latch mechanism.

2. In an electric circuit breaker, an electric switch, spring oscillated to break an electric circuit, a catch forming part of a latch mechanism and oscillating in a parallel plane to said switch and operating coincidently, an electro-magnet, a spindle extending through said magnet and parallel to said switch axis, an armature mounted toward one end of said spindle, an arm forming part of said latch mechanism extending across said latch and pivotally secured at both ends, one end to said spindle, and an adjustable spring connected to said spindle.

3. In an electric circuit breaker, the combination with a suitable casing, of an oscillatory electric switch supported in said casing and closing an electric circuit and spring actuated to break said circuit, a latch member oscillating with said switch, a pivotal latch arm having a projecting lip adapted to engage said latch member and hold said oscillatory switch to its closed position, a spindle supported in suitable lugs extending from said casing, a ratchet disk fixedly secured to said spindle, a dog engaging said ratchet disk, a coiled spring fixedly secured to said spindle and extending outwardly therefrom and holding said latch arm in engagement with said latch member, and an electro-magnet having an armature operatively connected to said latch arm.

4. In an electric circuit breaker, a pair of electrical contacts suitably supported, an oscillatory switch formed of a piece of insulating material of substantially sector shape having a notch formed therein and an electric contact piece secured to its outer periphery adapted to engage said electrical contacts, spring means for operating said oscillatory switch to break the electrical connection between said contacts, a spring held latch mechanism holding said oscillatory switch against spring tension and in contact with said contacts, means for releasing said latch mechanism, a rocker arm pivotally supported and electrically connected to a wire leading to the circuit breaker and having an electric contact piece on one end

thereof and the other end extending into the notch formed in said oscillatory switch, an electric contact adapted to engage the contact piece on said rocker arm suitably supported and electrically connected to a suitable terminal, and spring means for holding the contact piece of said rocker arm in engagement with its coacting contact piece.

5. In an electric circuit breaker, a pair of electrical contacts, a rotatable spindle suitably journaled, an oscillating switch spring operated from its closed position and mounted intermediately on said spindle, a catch forming part of a latch mechanism mounted at one end of said spindle, a pair of electrical contacts independent of the aforesaid contacts and spring-held to engagement, a latch member coacting with said catch, an electro-magnet having its core parallelly arranged with said switch spindle and operatively connected to the latter latch member and means extending from one of the latter pair of contacts for engaging the body of said switch member for parting said contacts coincidently with the opening operation of said switch.

6. In an electric circuit breaker, a pair of spring supported electrical contacts arranged in an arc-shaped path, a cam-shaped switch member suitably journaled and making wiping contact with said contacts, a pair of electrical contacts independent of the aforesaid contacts and spring-held to engagement, a spring rotating said switch member and breaking the electrical connection, a latch mechanism holding said switch member against said spring operating means, electric means for releasing said latch mechanism and means engaged by the body of said switch member for parting the latter pair of spring-held contacts.

Signed at the city of Toronto, county of York, Province of Ontario, Canada, this 19th day of February, 1909.

WILLIAM WALZ.

Witnesses:
H. DENNISON,
WM. C. MUIR.