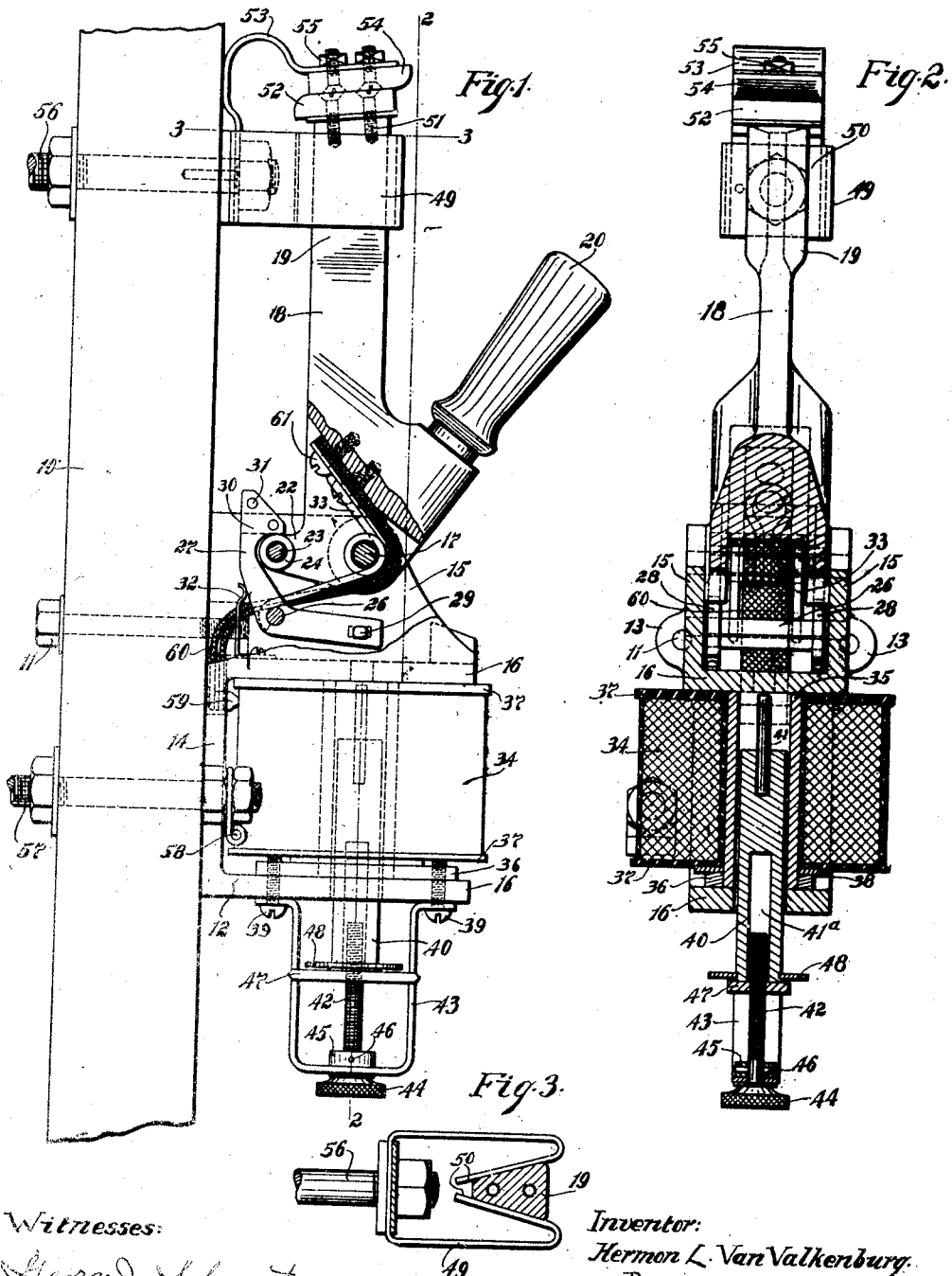


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CIRCUIT BREAKER.
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1,011,097.

Patented Dec. 5, 1911.



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CIRCUIT-BREAKER.

1,011,097.

Specification of Letters Patent.

Patented Dec. 5, 1911.

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To all whom it may concern:

Be it known that I, HERMON L. VAN VALKENBURG, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a full, clear, and exact specification.

My invention relates to circuit breakers.

10 The object of my invention is to provide a circuit breaker of few parts, simple in construction and operation, and which will still be durable and effective.

My invention consists of the details of 15 construction and combinations of elements described in the specification and set forth in the appended claim.

For a more complete understanding of my invention reference is had to the accompanying 20 drawings in which—

Figure 1 is an elevation of my circuit breaker with parts broken away for the sake of clearness, the circuit breaker being in this instance shown attached to a portion of a 25 switch-board panel. Fig. 2 is a section of my circuit breaker along the line 2—2 of Fig. 1; and Fig. 3 is a section along the line 3—3 of Fig. 1, showing in detail the contact members.

30 Referring to the figures of the drawings I have shown at 10 a portion of a switch-board panel to the front of which is attached, by bolts 11, a supporting bracket 12. The bolts 11 engage ears 13 on each side of 35 the supporting bracket. The bracket is made of cast metal and has a rear wall 14 adapted to bear against the switch-board, two upper vertical arms or ears 15 and two lower horizontal arms or ears 16.

40 Mounted on a horizontal pin 17 between the arms 15 is a pivoted blade 18, made of good conducting material, and having an upper wedge-shaped contact portion 19. The blade has an upwardly and forwardly 45 extending handle 20, by means of which it may be opened or closed at will. At the lower part of the blade there are two rearwardly extending fingers or lugs 22 between which is mounted a pin 23 carrying a roller 50 or sleeve 24.

Mounted on a pin 26 between the vertical arms 15 and at the rear of pin 17 is the tripping latch or trigger 27. This latch consists preferably of two bellcrank shaped 55 arms 28, made from sheet metal punchings.

The lower ends of the punchings are spaced apart, in this case, by a steel pin or rod 29 having expanded or riveted ends. The upper ends of the two side members 28 are each preferably provided with a nose or 60 hook and are spaced apart by a bar of steel 30 held to the side members by pins 31. As is shown by the drawing, the upper end of the latch is adapted to engage the roller 24 at the lower rear end of the blade 18 to hold 65 the latter in closed position. A small spring 32, mounted on the bracket 12, bears against the upper end of the latch to normally hold the latch and roller 24 in engagement. Mounted on the pins 17 is a coil-spring 33, 70 one end of which engages the switch-blade and the other end of which engages the stationary pin 26. This spring is put under strain when the blade is closed and is adapted to throw the blade into the open position, 75 or to open the circuit, when the latch is moved out of engagement with the roller.

Mounted between the horizontal arms 16 of the supporting bracket on a tube 35 of any suitable material is the tripping solenoid coil 34. A metal plate 36 is preferably 80 screwed to the lower end of the tube 35, while insulation 37 in the shape of a spool supports the coil and separates it from the tube, the upper arm 16 and the plate 36. 85 The end disks of the insulation 37 are preferably screwed to the ends of the tube 35. A washer 38 in this case separates the metal plate 36 from the insulation 37. Screws 39 hold the plate 36 to the lower arm 16 as 90 shown in Fig. 1, thus holding the coil 34 and its associated parts in place.

The solenoid core is shown at 40 and carries at its upper end a pin 41, preferably of non-magnetic material, adapted to engage 95 the tripping latch, and is hollowed out at its lower end, as at 41^a, to receive the adjusting screw 42. The core of the solenoid is made of any suitable magnetic material. The core-adjusting device is supported in this 100 case by a U-shaped strap or stirrup fastened to the under side of the lower arm or extension 16 by the screws 39. The adjusting screw 42 is provided with a knurled head 44 and a collar 45, the latter being secured to the screw by a pin 46. By means of the head 44 and collar 45, the screw is held in position against longitudinal movement, but can be 105 turned in the strap at will. Mounted on the screw 42 and engaging the sides of the U- 110

shaped member 43 is a vertically movable supporting member 47 on which the core normally rests as is shown in the drawing. As will be seen from Figs. 1 and 2, by turning the screw 42 the position of the supporting member 47 and hence of the core can be vertically adjusted at will, so that the circuit breaker can be thrown or opened at any desired load.

10 An important feature of my invention is the magnetic plate 48 at the lower end of the solenoid core. The purpose of this plate is to accentuate the latter part of the stroke of the core or to give the core a quick positive movement at the instant the pin 41 strikes the latch to release the blade. This plate accomplishes the desired result in the following manner: Normally and while the plate and core are in the lower position the lines of force pass across the air-gap separating the core from the plate 36 and the lower extension 16. As the current passing through the coil is increased above a predetermined amount, the core will be drawn up into the coil in the usual manner. The metal plate 25 48 is so arranged on the core that just before the core reaches its uppermost position the plate 48 approaches so near to the lower extension 16 that the magnetic reluctance between the plate 48 and extension 16 is very low, and if desired the air-gap can be made so small that the reluctance will be less than the reluctance of the air-gap separating the core and the plate 16. It will thus be seen that just before the pin at the top of the core strikes the holding latch the plate 48 enters the magnetic field and causes the core to be moved quickly and positively upward, whereby the latch will be struck with sufficient force to release the blade.

Another important feature of my invention is the arrangement and shape of the contact faces. As was stated above the contact blade is provided with a wedge-shaped contact portion 19. The stationary contact or jaw consists of a piece of flexible, good conducting material 49 having inclined faces 50, which are adapted to be engaged by the inclined faces of the contact portion 19 of the blade. Secured to the upper end of the blade by means of screws 51 is the arcing tip 52. Extending upward from the stationary contact is the spring member 53 having an arcing tip 54 secured thereto by screws 55. The faces of the main contacts and arcing tips are so inclined, or the angle of contact is such that the force tending to separate the contact members is almost balanced by the

force of friction tending to hold the members in engagement. The result of this arrangement of contact faces is, that the members will be held in firm engagement when the switch blade is closed, while but little force will be required to open or close the blade. The angle of contact is preferably so chosen that the force tending to separate the contacts is always slightly greater than the force of friction tending to hold the contacts together. Allowance must be made for the increased coefficient of friction due to pitting or roughening from use.

The stationary contact member 49 is held to the switch-board panel by the bolt 56 which forms one terminal of the circuit breaker. The other terminal of the circuit breaker is the bolt or rod 57, which extends through the switch-board panel and is connected at 58 to one terminal of the solenoid coil. The other terminal of the solenoid coil is connected as at 59 to the flexible shunt 60, which shunt is attached to the switch blade by screws 61.

Thus it is seen that my circuit breaker is simple in construction and can be easily and cheaply made but is sufficiently durable for all purposes. The circuit breaker herein shown and described may be modified so far as its construction and arrangement are concerned without departing from the spirit of my invention and I aim in the appended claim to cover all such modifications.

What I claim as new and desire to secure by Letters Patent is:—

In a circuit breaker, an insulating support, a stationary contact jaw mounted on the insulating support, a contact blade pivoted at its lower end below the stationary contact jaw and having a rearwardly extending nose or projection adjacent the pivotal center of the blade, a bellcrank holding latch pivoted below the contact blade and having an upwardly extending member adapted to engage the nose or projection and also having a forwardly extending portion the end of which is approximately vertically below the pivotal center of the blade, and a tripping magnet supported below the holding latch and having a vertically movable core the upper end of which is adapted to engage the end of the holding latch.

In testimony whereof I affix my signature, in the presence of two witnesses.

HERMON L. VAN VALKENBURG.

Witnesses:

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