H. A. STEEN.

SWITCH.

APPLICATION FILED JULY 25, 1914. RENEWED SEPT. 21, 1916.

1,220,569. Patented Mar. 27, 1917.

Fig. 1

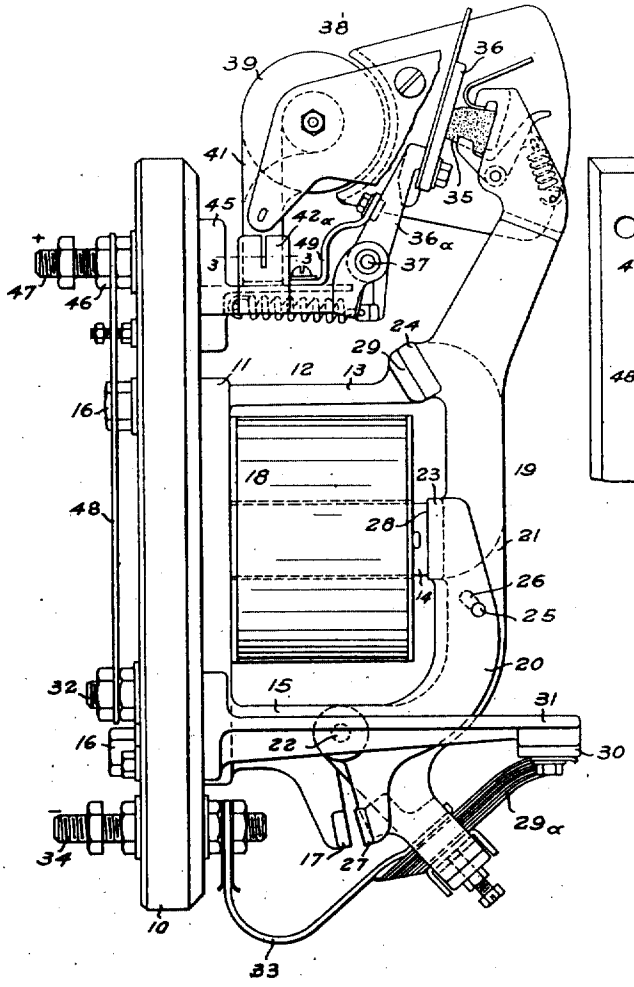


Fig. 2

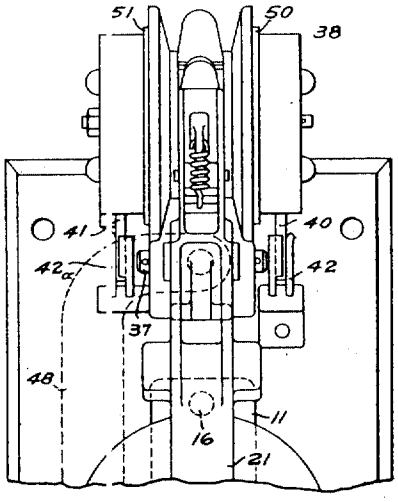


Fig. 3



Witnesses

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SWITCH.

1,220,569. Specification of Letters Patent. Patented Mar. 27, 1917.

Original application filed September 6, 1910, Serial No. 580,532. Divided and this application filed July 25, 1914, Serial No. 853,166. Renewed September 28, 1916. Serial No. 123,966.

To all whom it may concern:

Be it known that I, HALFDAN A. STEEN, a subject of the King of Norway, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Switches, of which the following is a specification.

This invention relates in general to apparatus for interrupting electrical circuits, and has particular relation to such apparatus of the type in which a magnetic field is utilized for extinguishing or suppressing the arc formed on the separation of the contacts.

It is an object of this invention to provide an improved circuit-breaking apparatus, which is simple in construction and efficient in operation.

It is a further object of this invention to provide an improved circuit-breaking apparatus embodying a blow-out magnet capable of being readily detached from operative position to permit inspection and repairs of the contacts or the parts of the magnet.

It is a further object of this invention to provide an improved circuit-breaking apparatus embodying a blow-out magnet removably held in position and connected to a source of current by a common means.

These and other objects are attained by this invention, the various novel features of which will appear from the description and drawings, disclosing one embodiment of such invention and will be particularly pointed out in the claims.

In the accompanying drawings:

Figure 1 is a side elevation of a switch embodying this invention, the switch as here shown being in closed position.

Fig. 2 is a front elevation of a portion of the switch shown in Fig. 1.

Fig. 3 is a sectional view of a detail of construction, in the plane of the line 3—3 of Fig. 1.

In the embodiment of the invention illustrated in the drawings, there is mounted upon a suitable base 10, a frame 11 of magnetic material of a magnet 12. This frame, which has three legs 13, 14, and 15, is secured to the base by bolts 16, and has a projection 17 which acts as a stop. The magnet 12 is provided with an actuating winding 18 which surrounds the middle leg or core 14 and is adapted to attract a switch actuating member 19. This switch actuating member comprises two members 20 and 21, each of which is pivotally connected to the frame 11 as indicated at 22, and provided with armatures 23 and 24 respectively. The part 20 of the switch actuating member is provided with a pin 25, which slides in a slot 26 of the other part 21 of the actuating member. The part 20 of the actuating member also has a projection 27, which is adapted to engage the projection 17 to limit the movement of said member. This switch actuating member is provided with these two relatively movable parts so that only a comparatively small or decreased amount of current will be required to draw the armatures 23 and 24 of said switch actuating member into contact with their corresponding engaging faces or surfaces 28 and 29, respectively, of the electromagnet. By means of this arrangement the air gap between the armature 23 and its corresponding attracting member is materially decreased from that of the ordinary arrangement and a steady and gradual pull of the switch actuating member is thus obtained. This is apparent from the drawings, where it is seen that, after the part 20 has been drawn toward the fixed part of the magnet a slight amount, the pin 25 of said part engages the part 21 giving this part an initial start, decreasing its air gap and making the pull of the magnet steady and gradual.

Mounted in the lower portion of the actuating member 19 is the main brush 29_a, preferably laminated, and adapted to engage a stationary contact 30, which is located at the end of a support 31, the latter being secured to the base 10 by bolts 32. Clamped into contact with the brush 29_a is a conductor 33, which is connected to a stud 34, the latter forming one of the terminals of the switch. Located at the other end of the switch actuating member 19 is an auxiliary contact 35, which is adapted to engage, with a wiping action, a relatively stationary contact member 36. This contact member is secured to a spring pressed member 36_a, which is pivotally mounted, as shown at 37. The main contacts are arranged horizontally, breaking vertically, and the auxiliary contacts are arranged vertically, breaking horizontally. These contacts are placed at opposite ends of the switch actuating member 19,

with the auxiliary contacts above the main contacts, in order to prevent any damage, which might occur to the main contacts due to arcs formed when the auxiliary contacts are separated.

In order to destroy arcs formed at the auxiliary contacts when the circuit is broken, a blow-out magnet 38 is employed. The coil of this magnet is wound on a spool 39 and its ends terminate in knife blade contacts 40 and 41, respectively, which are adapted to fit in contact sockets 42 and 42_a, as shown in cross section in Fig. 3. The contact sockets are suitably mounted, the socket 42_a being integral with or connected to a support 45, to which the contact carrying member 36_a is pivoted, and which is secured to the base 10 by a bolt 46, and the socket 42 being mounted separately or insulated from the support 45, and being suitably connected to the line terminal 47. By using a construction such as this, the blow-out magnet is efficiently supported in operative position, and can be removed rapidly at any time simply by drawing out the blow-out magnet with its knife blade contacts from the contact sockets 42, 42_a. It is thus seen that no screw connections are used and that the blow-out magnet can be removed rapidly without the use of any instruments. This blow-out magnet is provided as usual with poles 50 and 51, which are so located that the flux between them is directly in the path of arcs formed when the circuit through the auxiliary contacts is broken.

The securing bolt 32 is electrically connected to the bolt 46 through a conductor 48; and the spring-pressed member 36_a is preferably connected to, the support 45 through a flexible connection 49.

The switch circuits will now be traced. Current enters at the plus terminal 47, and passes through contact socket 42, knife blade 40, blow-out coil, knife blade 41, and contact socket 42_a. At this point, the circuit divides, one branch including bolt 46, conductor 48, bolt 32, support 31, contact 30, brush 29_a, conductor 33, and the minus terminal 34. The other branch includes conductor 49, contact-carrying member 36_a, auxiliary contact members 36 and 35, part 21 of the actuating member 19, conductor 33 and minus terminal 34.

It will be apparent that, in accordance with this invention, a circuit-breaking apparatus is provided in which a blow-out magnet is efficiently supported in operative position by means of contact portions that are effective to connect the magnet coil in circuit, and can be readily detached from such operative position to permit free inspection and repair of the switch contacts and the parts of the blow-out magnet.

While the ordinary and intended operation of the switch structure described does not include the removal of the blow-out magnet while the switch contacts are in engagement, nevertheless, it may be desirable to provide means for preventing removal of the blow-out magnet at such times. For this purpose, an armature may be provided on the blow-out magnet which, when the contacts come into engagement and the magnet is energized, will actuate a member which locks one or both of the parts 40, 41 in their sockets 42, 42_a, respectively.

The structural features which contribute to the improved electromagnetic operation of the switch disclosed, form no part of the present invention, such features being claimed in application, Serial No. 580,532, filed September 6, 1910, of which application the present one is a division.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In combination, a switch having fixed and movable parts, said movable part carrying main and auxiliary contacts at opposite ends thereof, a coöperating main contact, and a coöperating pivoted auxiliary contact.

2. In a switch, an actuating member, a contact carried by said actuating member, a relatively stationary contact adapted to be engaged by said movable contact, and a blow-out magnet for destroying arcs formed on the separation of said contacts and having a detachable switch connection with one of said contacts comprising conductive parts removably held together by the frictional engagement of the parts.

3. In a switch, an actuating member, a contact carried by said actuating member, a relatively stationary contact member engageable by said movable contact, a blow-out magnet for destroying arcs formed on the separation of said contacts, and contact sockets, said blow-out magnet having contact portions which are detachably held in said contact sockets through the frictional engagement between said contact portions and said sockets.

4. In a switch, fixed and movable contacts, a blow-out magnet adjacent said fixed contact for destroying arcs formed on the separation of said contacts, additional contacts, and a detachable connection between said latter contacts and the winding of said blow-out magnet, said connection consisting of parts held together by the frictional engagement thereof.

5. In a switch, an actuating member, a contact carried by said actuating member, a relatively stationary contact engageable by said movable contact, fixed contact portions disposed adjacent said relatively stationary

contacts, and a blow-out magnet for destroying arcs, said blow-out magnet having contacts detachably retained in yielding operative engagement with said fixed contact portions to maintain said blow-out magnet in operative position with its operating circuit established and to permit removal of said blow-out magnet from operative position by forcible withdrawal thereof.

6. In combination, a blow-out magnet comprising a core and a winding, and fixed contacts, the terminals of said winding being detachably held in engagement with said contacts through the frictional engagement of said parts, and said coöperative terminals and contacts forming means for detachably securing said magnet in position.

7. In combination with a circuit to be interrupted, a blow-out magnet comprising a core and a winding, the terminals of said winding being detachably held in engagement with portions of said circuit through the frictional engagement of said parts.

8. In combination, a switch comprising fixed and movable contacts, and a blow-out magnet comprising a winding, said magnet being detachably connected in the circuit controlled by said switch and supported in operative position through the terminals of said winding and being removable from operative position by forcible withdrawal.

9. In combination with a switch, a blow-out magnet comprising a core and a winding therefor, and means for removably retaining said magnet in operative position comprising a fixed contact portion and a contact portion in electrical engagement with said winding, said contact portions being yieldingly retained in engagement through the frictional engagement of the parts.

10. In combination with an electrical circuit, a switch comprising fixed and movable contacts, a blow-out magnet comprising a winding, a plurality of additional contacts held in position adjacent the fixed contact of said switch, one of said additional contacts being electrically connected to one of said switch contacts and the other of said additional contacts being connected to a terminal of said circuit, and contact portions in electrical engagement with said winding, said latter contact portions being removably held in engagement with said additional contacts, and said magnet being held in operative position through the resiliency of certain of said contacts.

11. A blow-out magnet including a winding, and fixed contacts, the terminals of said winding being adapted to frictionally engage and to be detachably held by said fixed contacts, and said magnet being removably supported in operative position by the frictional engagement between said terminals and said contacts.

12. In combination with a switch, a blow-out magnet having a winding with extending terminals, and a plurality of fixed contacts coöperative with said terminals, the frictional engagement between said terminals and said contacts being effective to support said magnet in operative position while permitting ready removal of said magnet by forcible withdrawal thereof.

13. In combination with a switch, a blow-out magnet having a winding, and a fixed contact, said fixed contact and a terminal of said winding being detachably held together solely by the frictional engagement between the parts, and said magnet being supported in operative position, at least in part, through said winding terminal and said fixed contact.

14. In combination with a switch, a blow-out magnet, and means for detachably supporting said magnet in operative position and connecting the winding of said magnet in circuit, said means comprising contact portions at the terminals of the winding, and fixed contact portions coöperative with the terminal contact portions, certain of said contact portions being adapted to detachably retain other of said contact portions through the frictional engagement of the coöperative parts and to maintain said magnet in operative position.

In testimony whereof, the signature of the inventor is affixed hereto in the presence of two witnesses.

HALFDAN A. STEEN.

Witnesses:
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