H. A. STEEN.

SWITCH.

APPLICATION FILED NOV. 2, 1910.

1,155,626.

Patented Oct. 5, 1915.

3 SHEETS—SHEET 1.

Fig. 1

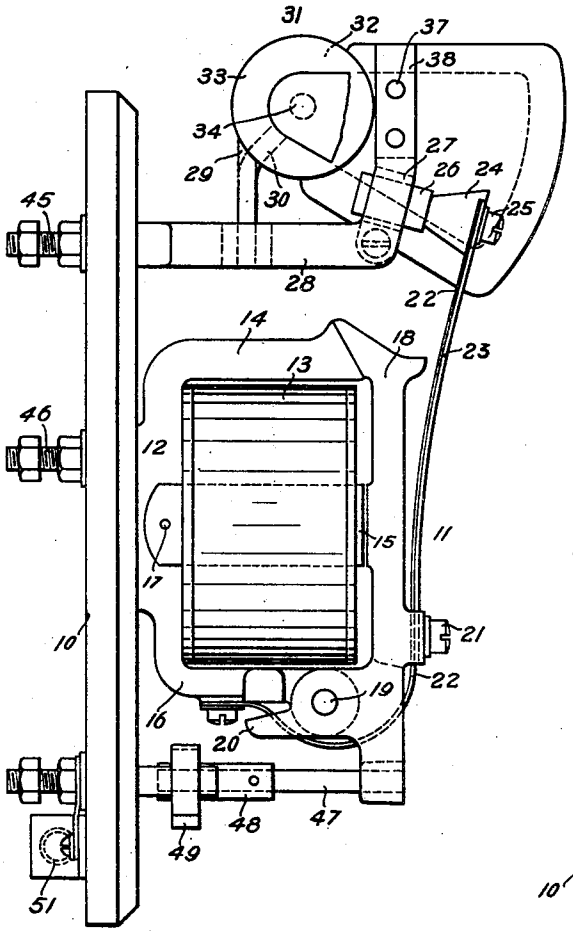
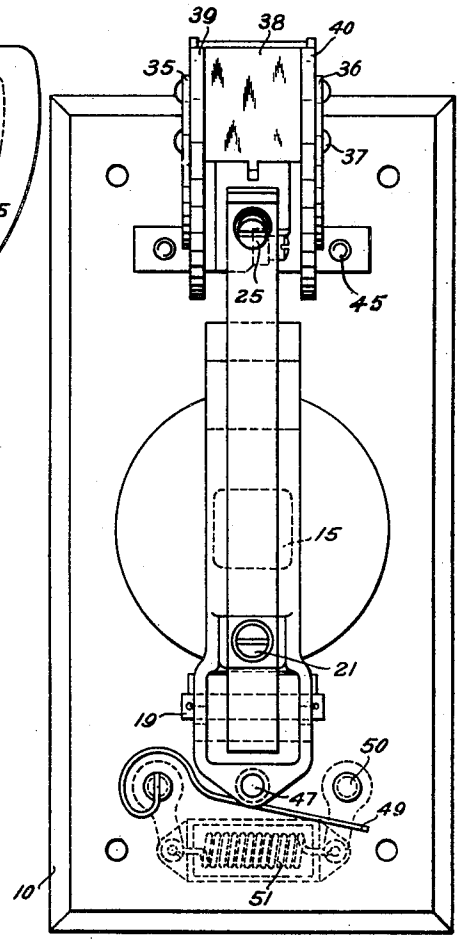


Fig. 2



Witnesses

Robt. E. Stolle.

Chas. L. Byron

Inventor

Haldan A. Steen

By Chas. E. Lord

Attorney

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3 SHEETS—SHEET 2.

Fig. 3

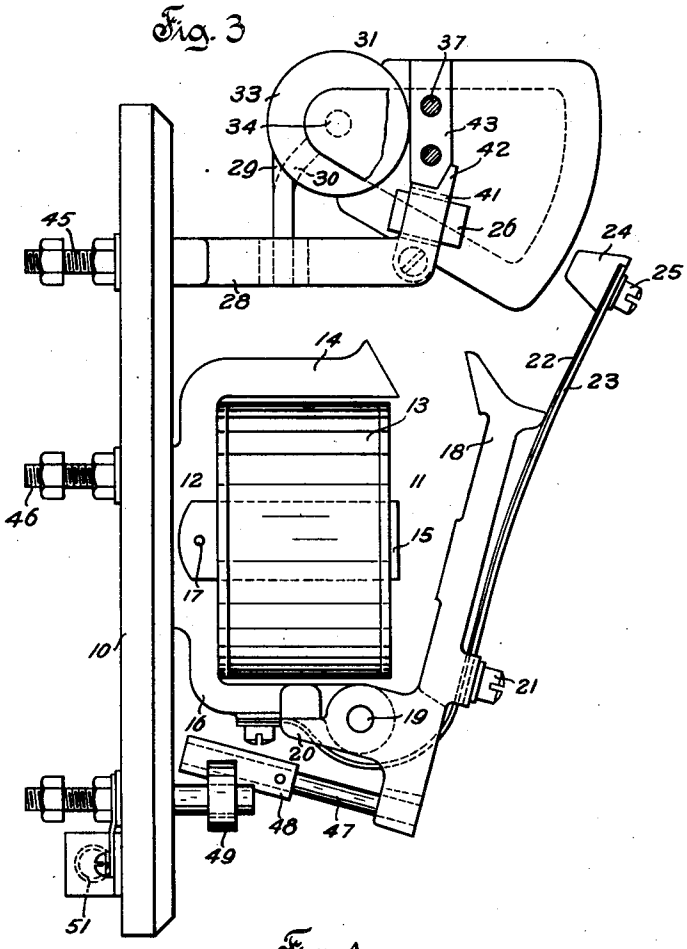
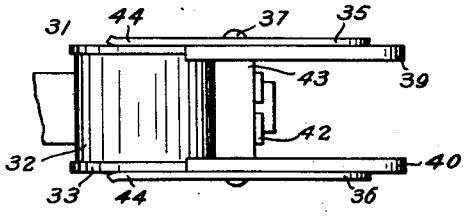


Fig. 4



Witnesses

Robt. E. Stoll.

Chas. L. Byron.

Inventor

Halfdan A. Steen

By Chas. E. Lord

Attorney

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3 SHEETS—SHEET 3.

Fig. 5

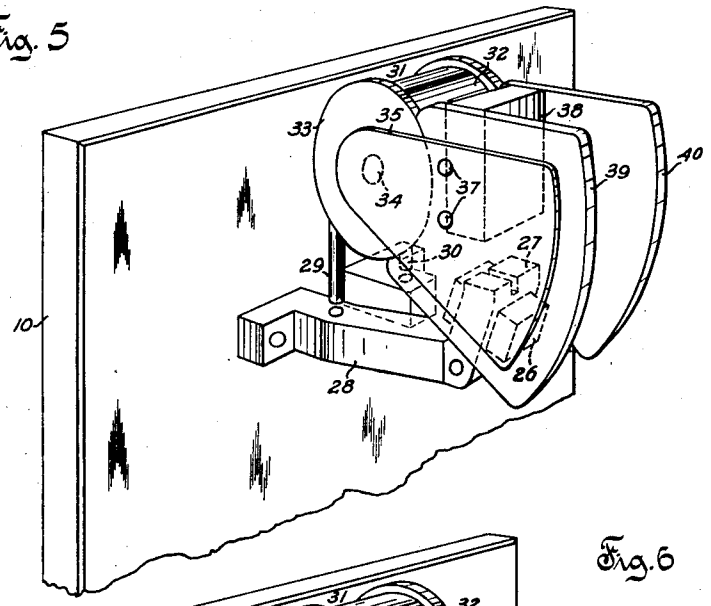
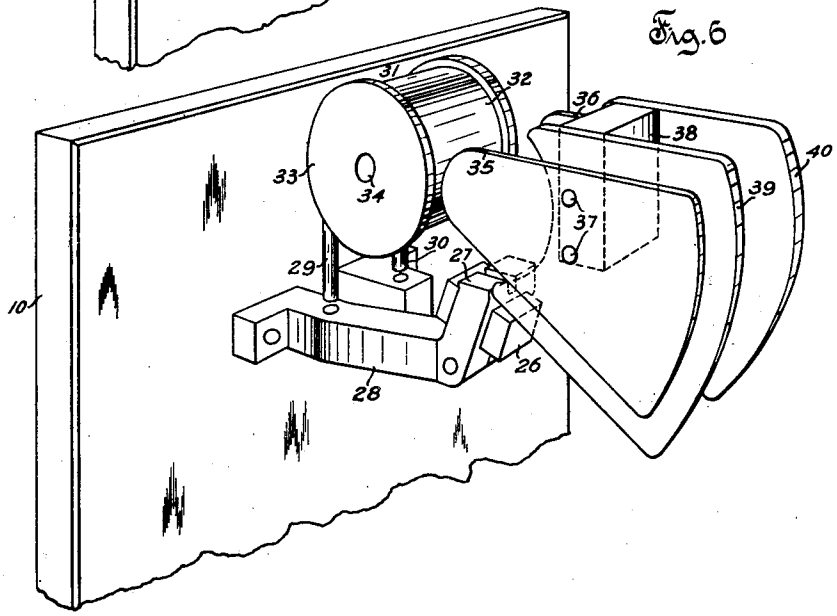


Fig. 6



Witnesses

Rob. E. Stoll.

Chas. L. Byron

Inventor

Halfdan A. Steen.

By Wm. E. Lord

Attorney

UNITED STATES PATENT OFFICE.

HALFDAN A. STEEN, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALLIS-CHALMERS MANUFACTURING COMPANY, A CORPORATION OF DELAWARE.

SWITCH.

1,155,626. Specification of Letters Patent. Patented Oct. 5, 1915.

Application filed November 2, 1910. Serial No. 590,295.

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 certain new and useful Improvements in Switches, of which the following is a full, clear, and exact specification.

This invention relates to magnet structures and more particularly to the construction of blow-out magnets on electric switches or circuit breakers.

Several arrangements have been devised whereby the poles and arc shields of blow-out magnets of switches or circuit breakers may be rotated about an axis to expose the contacts or circuit breaking points of the switch to permit inspection and repair. Other arrangements have been used where the whole blow-out magnet is removed when the contacts need attention.

The object of my present invention is to provide a simple, compact and inexpensive blow-out magnet possessing many commercial advantages over structures now in general use. This object is accomplished by constructing a blow-out magnet having the poles with their arc shield separably connected to the core of the magnet so that the core and poles are held together by their own friction. In this way the poles and arc shields can be removed or drawn away instantly from the core, making the contacts, which are normally in the magnetic path between the poles, easily accessible so that they may be inspected, repaired or replaced without delay.

The various novel features of my invention will be described in the specification and particularly set forth in the appended claims.

The invention is illustrated in the accompanying sheets of drawings wherein—

Figure 1 is a side elevation, partially in section of a magnetically actuated switch equipped with my invention, the switch being here shown in a closed position. Fig. 2 is a front elevation of the same; Fig. 3 is a side elevation of a switch equipped with a modification of my invention, the switch being shown in open position; Fig. 4 is a top elevation showing the general arrangement of the various parts of my improved blow-out magnet; Fig. 5 is a perspective view of my improved blowout magnet removed from its normal position; and, Fig. 6 is a perspective view of the same, showing the pole pieces removed from the core.

Mounted upon a suitable base 10 and supported thereby in any ordinary manner is a magnetically actuated switch which includes an actuating magnet 11 having a core 12 and winding 13. The magnet coil or actuating winding 13 is adapted to energize the magnet to attract an armature 18, which is pivotally secured at the point 19. In order to prevent the armature from flying back too far when the energizing circuit is broken, the armature is provided with a lug 20, which is adapted to engage a portion of the magnet core to limit the backward or opening movement of the armature. Secured to the back of the armature 18 by a screw 21 is a contact finger including metal strips 22 and 23 and a contact tip 24 to which the metal strips are secured by a screw 25. The metal strip 22 is copper and the strip 23 is a piece of resilient steel comparatively stiff in order to insure a firm contact between the movable contact tip 24 and a coöperating stationary contact member 26 which it is adapted to engage. The stationary contact member 26 is mounted on a stop 27 which forms one extremity of a support 28 which is supported in any usual manner by the base 10. The support 28 is formed in two portions which are adapted to receive the terminals 29 and 30 of the winding of the blow-out magnet 31. This blow-out magnet is designed to make it as simple and practical as possible. Its parts, especially the poles and core are capable of being shifted relatively to each other so that access may be had to the contacts 24 and 26, which are normally located in the magnetic path of the blow-out magnet. The instantaneous or ready adjustment of the parts, especially the connecting and disconnecting of the core and the pole structure of the magnet is accomplished by merely sliding one member relative to the other without the use of tools. It is to be noted that friction between the core and poles is depended upon to hold these parts together under normal operating conditions. As here shown the magnetic winding 32 is supported on a spool 33

through the middle of which passes the magnet core 34.

In the ordinary construction of blow-out magnets the poles 35 and 36 are bolted to the core so that when it is desired to inspect the contacts the poles are removed from their normal operating position by rotating the poles with the core about the axis of the core. But here I have shown the poles, which embrace the relatively movable contacts, secured together by bolts or rivets 37 and forced into contact with the core 34, and being held thereto by friction between the poles and the end portions of the core. The poles are held a predetermined distance apart by a supporting and spacing member 38 through which pass the rivets 37. With this construction, the end portions of the pole pieces which are adapted to engage the core of the blow-out magnet are capable of a slight movement toward and away from each other, due to the inherent resiliency of the plates forming such pole pieces. The normal distance between the core engaging ends of the pole pieces is slightly less than the length of the core of the blow-out magnet, so that when the pole pieces are forced over the core ends and into engagement therewith, they will be frictionally retained in such position by their inherent resiliency. The frictional grip of the poles on the core can be sufficient, of itself, to hold the poles and arc shields in any position in which they are set relatively to the core. The spacing member 38 engages the spool 33 and is adapted to engage and rest upon the stop 27 thus limiting the movement of the poles in certain directions and balancing or steadying the poles to prevent their shaking loose from the core. By means of this arrangement the poles 35 and 36 with their arc deflectors 39 and 40 respectively may be readily secured to and withdrawn from the core of the blow-out magnet so that access may be had to the contact members at any instant.

A slight modification of the device shown in Fig. 1 is illustrated in Fig. 3 wherein there is provided a stop 41 with a lock portion 42 which is adapted to receive the spacing member 43 to retain the unit including the poles, their arc deflectors and spacing member 43 in a fixed position. In this arrangement any tendency for the poles to pull out of engagement with the core by vibrations or any other incidental movements or jars which may be occasioned is overcome. If it is desired to remove the poles and arc shields as a unit from the core of the blow-out magnet it is merely necessary to take hold of the poles and draw them, preferably in a straight line, from the core. In placing the poles back in contact with the core ready for active service it is merely necessary to press the narrow ends 44 of the poles along the spools until the ends of said poles firmly engage the core where they are held by friction between the poles and core.

When the switch is in closed position, as indicated in Figs. 1 and 2, the current passes in through conductor 45 terminal 30, magnet winding 32, terminal 29, stationary contact 26, contact 24, metal strips 22 and 23, body portion 12 of the core 11, and out through conductor 46. When the switch is in this closed position a member 47, which is secured in the lower part of the actuating member 18 and provided with an insulating sleeve 48, engages a spring switch member 49 which in this position permits a resistance 51 to be inserted in series with the magnet winding 13 to reduce the current flow in it while the switch is being actively employed. When the switch is permitted to open the sleeved member 47 is swung about the pivotal point 19 permitting the switch member 49 to come in contact with its cooperating contact 50 to short-circuit the resistance 51 which is normally in the circuit of the actuating winding 13.

The blow-out magnet structure may be arranged in different positions with respect to the switch and may be used in connection with many other pieces of electrical apparatus; there may be many modifications of the precise form and arrangement herein shown and described, and I intend to cover all such modifications and arrangements which do not involve a departure from the spirit and scope of my invention as set forth in the appended claims.

What I claim as new is:

1. A blow-out magnet including a core and poles, said poles being removably held in engagement with said core by the frictional engagement of said parts.

2. In combination, a switch having relatively movable contact members, and a blow-out magnet including a core and poles, said poles embracing said contacts and being removably held in yielding engagement with said core.

3. In combination, a switch having relatively movable contact members, a blow-out magnet including a core and poles, said poles embracing said contacts and said core and removably held in position thereon by the frictional engagement of said parts, and means to limit the relative movement of said core and poles.

4. In combination, a switch having relatively movable contact members, and a blow-out magnet including a core and a pair of poles spaced apart and connected by non-magnetic material, said poles embracing said contacts and said poles and removably held in engagement with said core by the frictional engagement of the parts.

5. In a blow-out magnet, the combination of a winding, a metal member extending

through said winding, and poles having arcing shields, said poles embracing said metal member and removably held thereto solely by the frictional engagement of the parts.

6. In a magnet, the combination of a winding, a metal path in which flux is set up by said winding, said metal path comprising separable portions removably held together by the frictional engagement of the parts, and means for limiting relative movement between said portions.

7. In a magnet, the combination of a winding, and a metal path in which flux is set up by said winding, said metal path comprising separable portions removably held together by the frictional engagement between said portions.

8. In a magnet, the combination of a core, poles removably held in engagement with said core solely by the friction between said poles and core, and means to prevent relative movement between said core and poles when said poles are in operative position on said core.

9. In combination, a switch having relatively movable contacts, and a blow-out magnet including a winding, and a metal path for flux set up by said winding, said metal path comprising a part embraced by said winding and sections embracing said contacts and removably held in yielding engagement with the part embraced by said winding.

10. In a magnet, a core and a plurality of spaced and connected pole pieces, said pole pieces embracing and removably held in engagement with said core by the resiliency of the pole pieces.

11. In a blow-out magnet, a magnetic path comprising fixed and movable portions, the movable portion being resilient and removably held in operative engagement with the fixed portion solely by the frictional engagement of the parts.

12. In a blow-out magnet, a core and pole pieces, said pole pieces being secured together and removably held in yielding operative engagement with said core and being removable therefrom by forcible withdrawal.

13. In a magnet, a core, and a plurality of spaced pole pieces magnetically connected together and removably held in yielding engagement with said core.

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

HALFDAN A. STEEN.

Witnesses:
CHAS. L. BYRON,
LAURA HUENNEKENS.