

March 7, 1944.

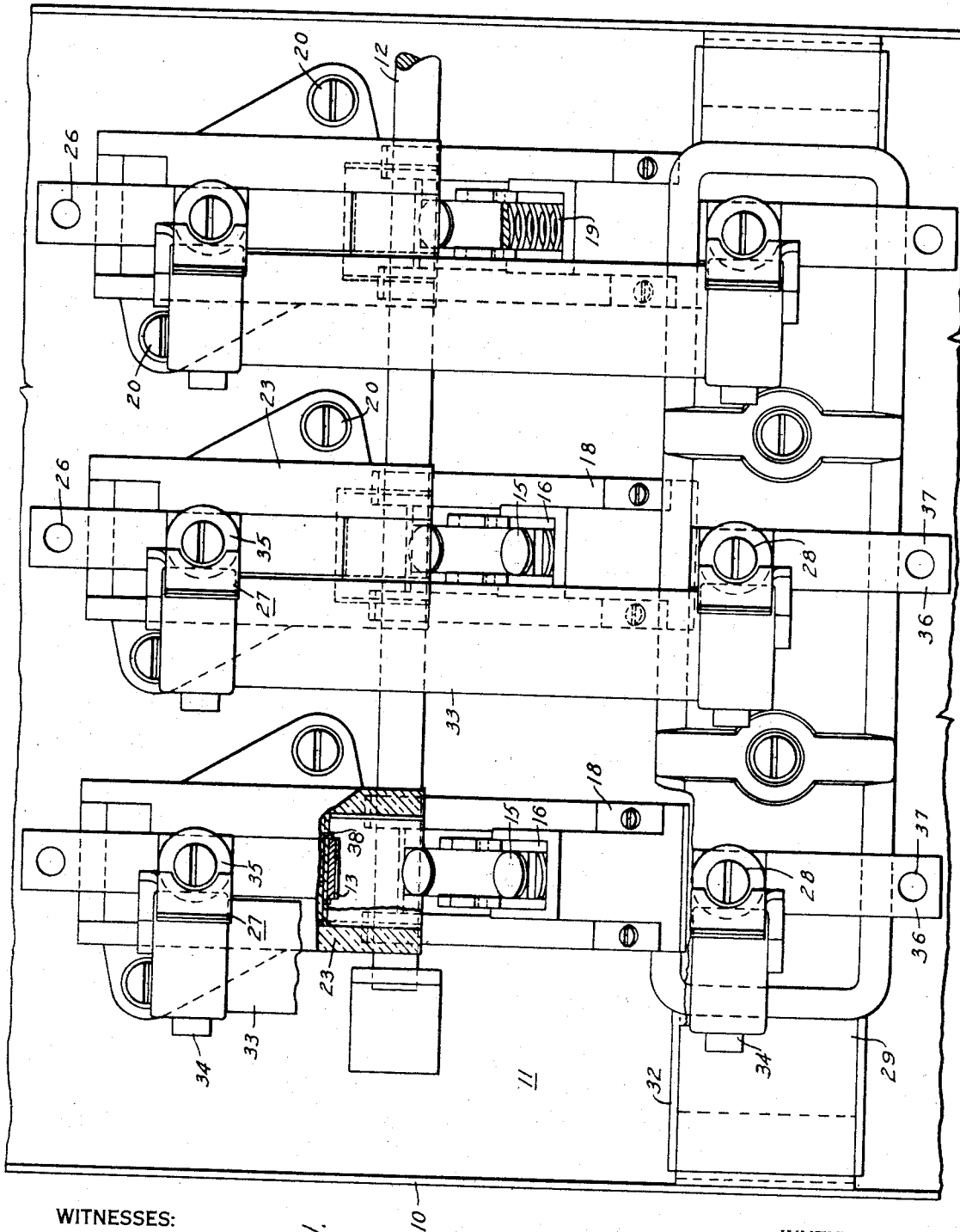
L. PIERCE

2,343,323

ELECTRIC SWITCH

Filed Aug. 11, 1942

2 Sheets-Sheet 1



WITNESSES:

N. F. Sisson
N. S. Chilcote

Fig. 1.

INVENTOR

Lawrence Pierce.

BY *W. D. Crawford*
ATTORNEY

March 7, 1944.

L. PIERCE

2,343,323

ELECTRIC SWITCH

Filed Aug. 11, 1942

2 Sheets-Sheet 2

Fig. 2.

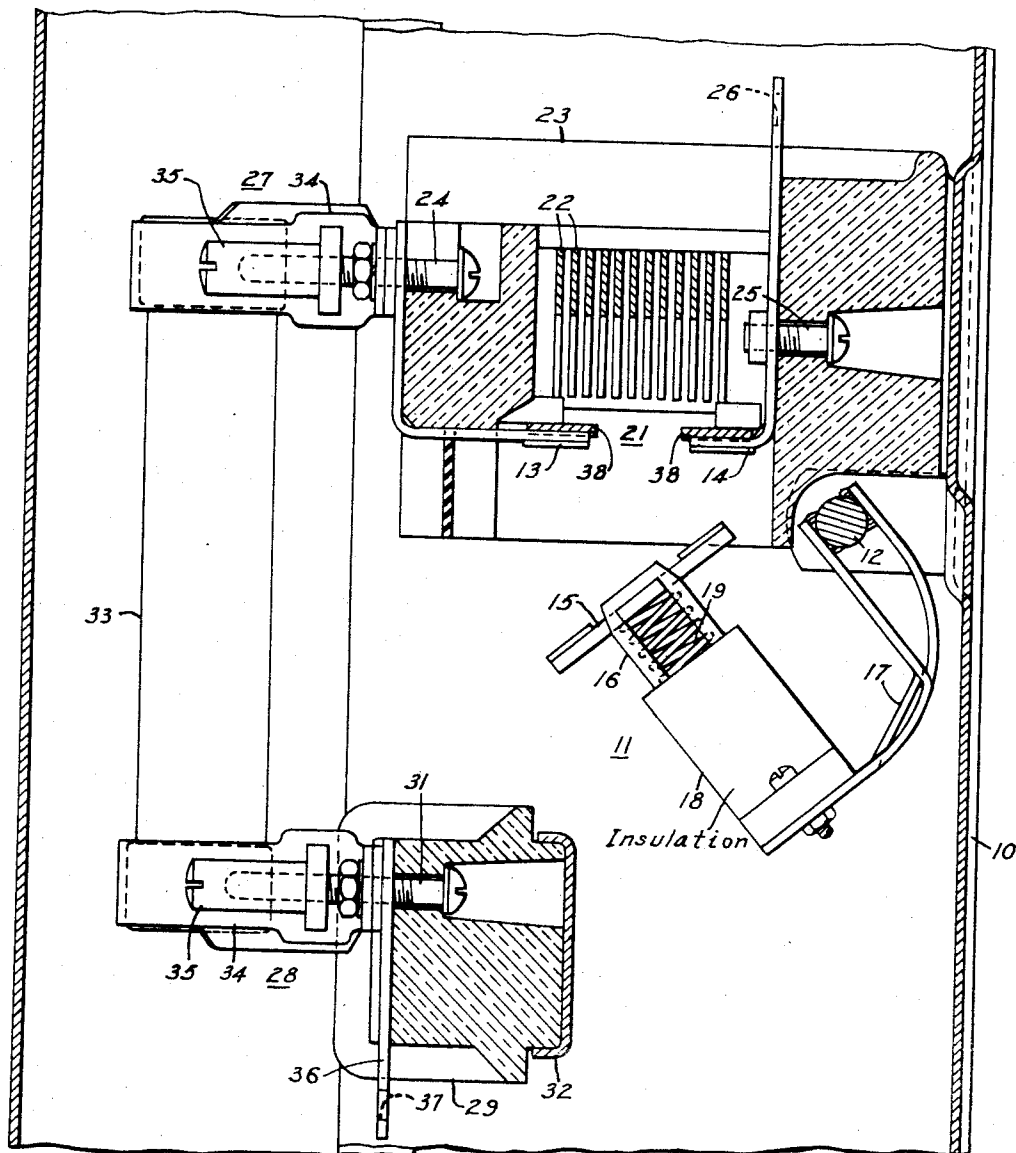
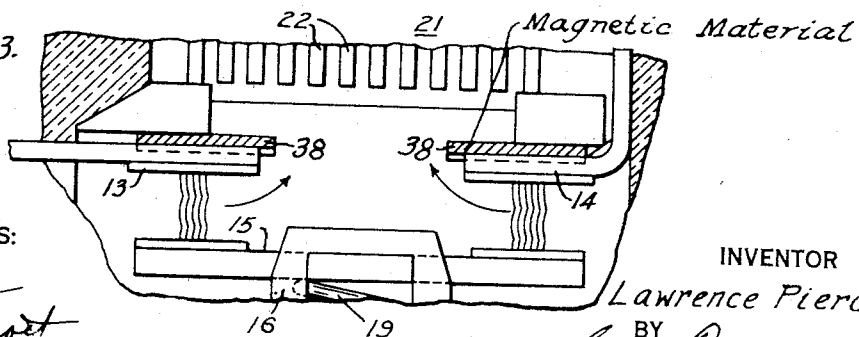


Fig. 3.



WITNESSES:

N. F. Lussan
H. Schilke

INVENTOR

Lawrence Pierce.

BY

M. Crawford
ATTORNEY

UNITED STATES PATENT OFFICE

2,343,323

ELECTRIC SWITCH

Lawrence Pierce, Edgewood, Pa., assignor to
Westinghouse Electric & Manufacturing Com-
pany, East Pittsburgh, Pa., a corporation of
Pennsylvania

Application August 11, 1942, Serial No. 454,357

5 Claims. (Cl. 200—147)

My invention relates, generally, to electric switches and, more particularly, to enclosed switches of the type known as safety switches.

An object of my invention, generally stated, is to provide a simplified and improved safety switch which shall be simple and efficient in operation and which may be economically manufactured and installed.

A more specific object of my invention is to reduce the overall dimensions of an enclosed safety switch of a predetermined rating.

Another object of my invention is to utilize bridging contact members of the double break type in an enclosed switch.

A further object of my invention is to control the movement of the arcs drawn between a movable bridging contact member and its cooperating stationary contact members.

Still another object of my invention is to prevent the separation of abutting contact members by a heavy overload current.

Other objects of my invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of my invention, bridging contact members of the double break type are so disposed between the fuses and the base or rear wall of the cabinet in which a switch is mounted that the overall length of the switch is materially shortened. Magnetic material is so disposed on the stationary contact members that the arcs formed upon opening the switch are moved into a grid structure. The magnetic material also functions to prevent the contact members from blowing open while carrying a heavy overload current.

For a fuller understanding of the nature and objects of my invention, reference may be had to the following detailed description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, in plan, of a switch structure embodying my invention, portions being cut away for clearness;

Fig. 2 is a view, partially in elevation and partially in section, of the switch structure shown in Fig. 1, and

Fig. 3 is an enlarged detailed view showing a bridging contact member in a partially open position.

Referring to the drawings, the structure shown therein comprises a cabinet 10, only a portion of which is shown, for enclosing a three-pole switch 11. In accordance with the usual practice, the cabinet 10 may be formed from sheet steel and a

rotatable shaft 12 is provided for opening and closing the switch members. One end of the shaft 12 may extend through a side wall of the cabinet 10 and an operating handle (not shown) may be provided for actuating the shaft.

As illustrated in Fig. 2, each pole unit of the switch 11 comprises a pair of spaced stationary contact members 13 and 14 which are bridged by a movable contact member 15. The movable contact member 15 is resiliently mounted in a stirrup 16 which is carried by a bracket 17 secured to the shaft 12. The stirrup 16 is insulated from the bracket 17 by an insulating and supporting member 18. A spring 19 is disposed inside the stirrup 16 for maintaining a predetermined contact pressure when the bridging member 15 is actuated into engagement with the stationary contact members 13 and 14 by rotative movement of the shaft 12.

In order to extinguish quickly the arcs drawn between the stationary contact members 13 and 14 and the bridging member 15 during the opening of the electrical circuit, an arc extinguishing device 21 is disposed adjacent the contact members 13 and 14 opposite the sides of the contact members engaged by the bridging member 15. The arc extinguishing device 21 may comprise a plurality of spaced plates 22 which are mounted in an insulating support 23 that may be secured to the bottom or rear wall of the cabinet 10 by screws 20, see Fig. 1.

The insulating member 23 also supports the contact members 13 and 14, the contact member 13 being secured to the insulating member 23 by a bolt 24 and the contact member 14 is secured by a bolt 25. An opening 26 is provided at the one end of the contact member 14 for making the necessary electrical connection when the switch is installed in service.

A fuse terminal 27 is also secured to the insulating member 23 by means of the bolt 24. A similar fuse terminal 28 is secured to an insulating support 29 by a bolt 31 which is similar to the bolt 24. The insulating support 29 may be mounted in a channel 32 which may be supported by the sides of the cabinet 10. The fuse terminals 27 and 28 may be of the type fully described in the copending application of Lawrence Pierce et al., Serial No. 332,046, filed April 27, 1940, now Patent No. 2,301,790 issued Nov. 10, 1942, and are designed to hold a fuse 33 securely in position when clamped in the terminals by means of pivoted arms 34 which are clamped against the fuse by cylindrical nuts 35 disposed on the ends of the bolts 24 and 31. A conductor 36 having an open-

ing 37 therein, is provided for making an electrical connection to the fuse terminal 28.

It will be seen that the overall length of the switch unit 11 is materially shortened by utilizing the bridging contact members and mounting the one fuse terminal directly on the arc extinguishing device 21 as illustrated. At the same time the necessary clearances between the switch parts are maintained for operating the switch at the usual voltages for which the switch is designed. In this manner the size of the cabinet and hence the space required for installing the switch are materially reduced.

In order to insure that the arcs drawn between the stationary contact members 13 and 14 and the bridging contact member 15 will be moved into the arc extinguishing device 21, separate pieces of magnetic material 38 are provided on the sides of the contact members 13 and 14 opposite the sides engaged by the bridging member 15. The pieces of magnetic material 38 are disposed between the contact members 13 and 14 and the plates 22 of the arc extinguishing device 21.

As illustrated in Fig. 3, an arc is drawn between the contact member 13 and the bridging contact member 15 and also between the contact member 14 and the bridging contact member 15 when the contact members are separated to interrupt a power circuit. As explained hereinbefore, the pieces of magnetic material 38 are so disposed on the back sides of the contact members 13 and 14 that strong fields are produced on the outside of the arc streams which move the arc streams in the direction indicated by the arrows. Thus, the two arcs are united into a single arc between the contact members 13 and 14 which is then moved into the plates 22 of the arc extinguishing device 21, thereby causing the arc to be extinguished in a manner well known in the art.

The principle involved in the moving of the arc stream in the desired direction is similar to that of an electrical conductor being drawn toward any magnetic material placed in the vicinity of the conductor while carrying an electric current. Thus, the magnetic members 38 are so disposed with respect to the arc streams between the contact members that the arcs are moved toward the magnetic members in the direction indicated by the arrows. This movement first causes the two streams to unite into a single stream flowing between the contact members 13 and 14 and then causes this stream to be drawn towards the arc extinguishing device 21.

Furthermore, the magnetic members 38 carry a flux which encircles the bridging contact member 15 while it is in engagement with the stationary members 13 and 14 and, consequently produces a strong pull on the bridging member 15 in a direction to hold the contacts closed while conducting heavy currents and oppose the normal tendency of the contact members to be blown open against the force of the spring 19 during short circuit conditions. In this manner injury to the contact members is prevented during the interval required for the fuse 33 to clear the circuit when a fault condition occurs. Otherwise, the arcs drawn between the separated contact members might be of such intensity as to burn badly or even melt the contact members.

It will be understood that the moving of the arc in the manner hereinbefore described during normal operation of the switch reduces contact burning. If the arc does not move toward the

center or should move outwardly instead of inwardly it will usually result in a short circuit between the poles of the arc boxes of a multipole switch, such as herein illustrated. The use of the magnetic material between the stationary contact members and the grid structure produces a magnetic field of sufficient strength to move the arc toward the center and into the de-ionizing grids.

From the foregoing description it is apparent that I have provided an enclosed switch structure which utilizes a bridging moving contact member of the double break type, thereby having the advantage of interrupting the power circuit at two points. Furthermore, the dimensions of the switch are materially reduced as compared with previous switches having the same rating as the present switch. In view of the simplicity of the parts and the smaller dimensions of the switch and cabinet the cost of manufacturing the switch may be materially reduced.

Since numerous changes may be made in the above described construction and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawings shall be interrupted as illustrative and not in a limiting sense.

I claim as my invention:

1. In an electric switch, in combination, a pair of spaced stationary contact members, a bridging contact member for engaging and disengaging said stationary contact members to establish and interrupt an electric circuit therethrough, an arc extinguishing device disposed adjacent the stationary contact members, and a piece of magnetic material mounted on the side of each stationary contact member opposite the side engaged by the bridging member and disposed between the stationary contact members and the arc extinguishing device for moving the arcs formed during the interruption of the circuit between said stationary contact members into said extinguishing device.

2. In an electric switch, in combination, a pair of spaced stationary contact members, a bridging contact member for engaging and disengaging said stationary contact members to establish and interrupt an electric circuit therethrough, an arc extinguishing device disposed adjacent the side of the stationary contact members opposite the side engaged by the bridging member, and magnetic means mounted on the stationary contact members opposite the side engaged by the bridging member and disposed between the stationary contact members and the arc extinguishing device for moving the arcs formed during the interruption of the circuit between said stationary contact members into said extinguishing device.

3. In an electric switch, in combination, a pair of spaced stationary contact members, a bridging contact member for engaging and disengaging said stationary contact members to establish and interrupt an electric circuit therethrough, an arc extinguishing device disposed adjacent the side of the stationary contact members opposite the side engaged by the bridging member, and a piece of magnetic material mounted on the side of each stationary contact member opposite the side engaged by the bridging member and disposed between each one of the stationary contact members and the arc extinguishing device for moving the arcs formed during the interruption of the circuit between said stationary

contact members into said extinguishing device.

4. In an electric switch, in combination, a pair of spaced stationary contact members, a spring-biased contact member for bridging said stationary contact members to establish an electric circuit therethrough, and magnetic means mounted on each one of the stationary contact members and overlapping portions of the bridging contact member thereby carrying a flux which encircles the bridging contact member to oppose movement of the bridging contact member away from the stationary contact members while carrying current.

5. In an electric switch, in combination, a pair

of spaced stationary contact members, a movable contact member for bridging said stationary contact members to establish an electric circuit therethrough, and a piece of magnetic material mounted on the side of each stationary contact member opposite the side engaged by the bridging member and overlapping a portion of the bridging member thereby carrying a flux which encircles the bridging member to oppose movement of the bridging member away from the stationary contact members while carrying current.

LAWRENCE PIERCE.