

1,047,772.

C. J. EMBREE.
SELF LOCKING KNIFE SWITCH.
APPLICATION FILED DEC. 15, 1908.

Patented Dec. 17, 1912.

2 SHEETS-SHEET 1.

Fig. 2.

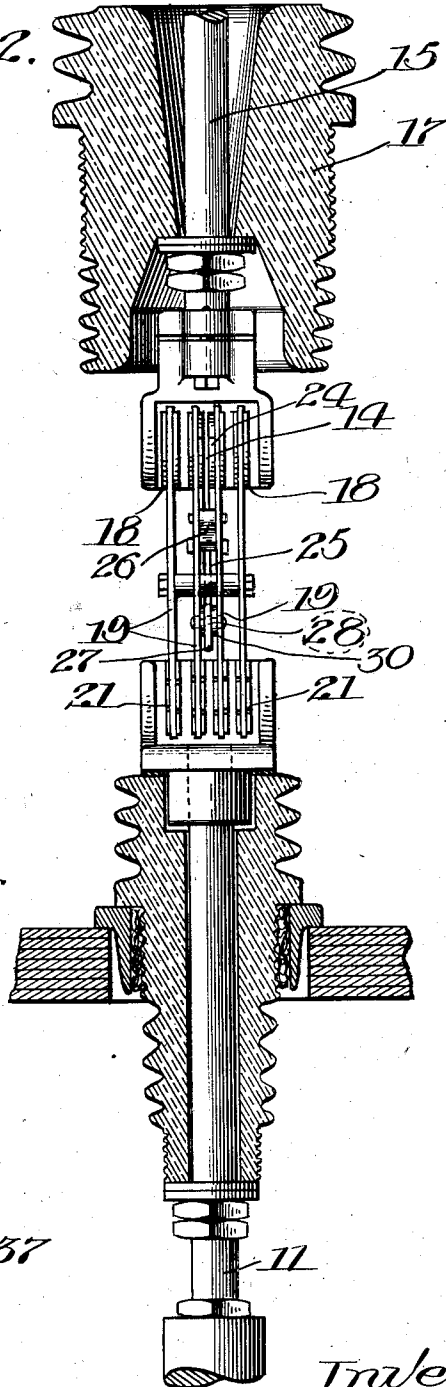


Fig. 1.

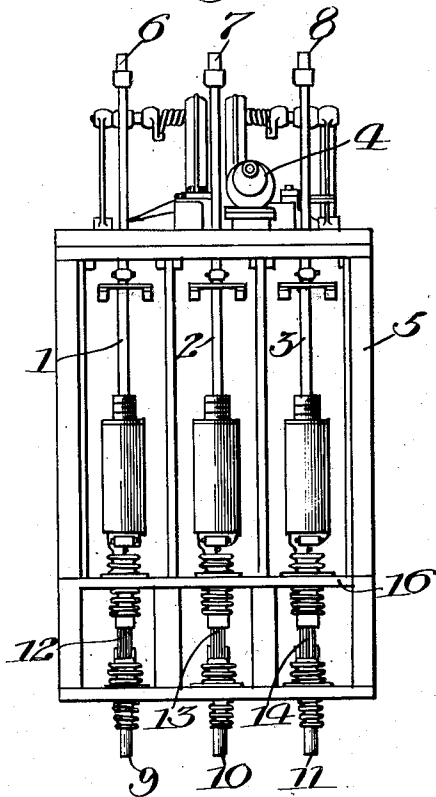
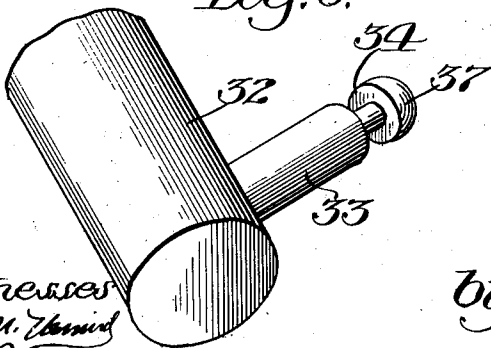


Fig. 6.



Witnesses
O. M. Darnold
E. B. Campbell

by

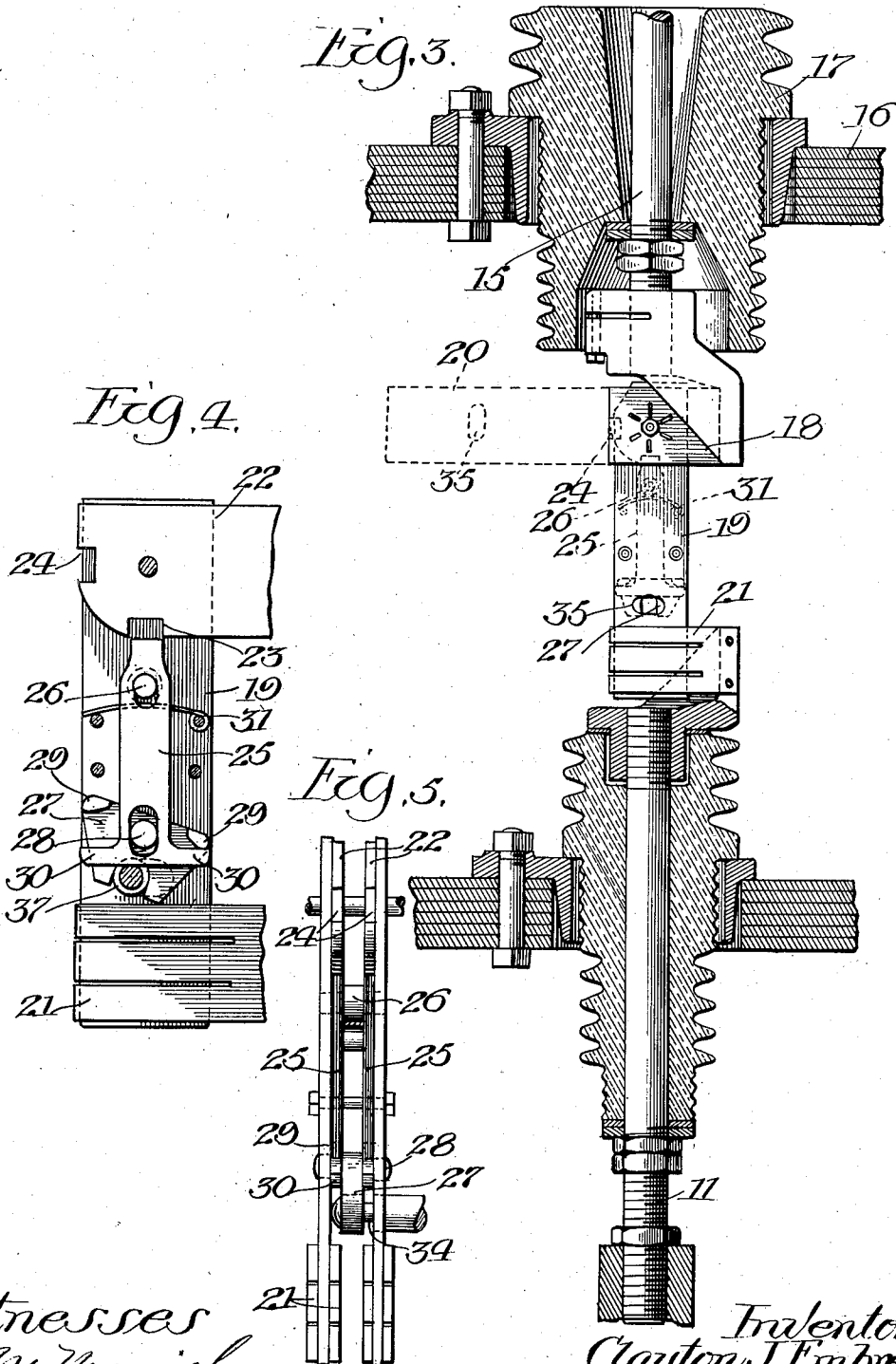
Inventor
Clayton J. Embree.
Max W. Label
Att'y

C. J. EMBREE.
SELF LOCKING KNIFE SWITCH.
APPLICATION FILED DEC. 15, 1908.

1,047,772.

Patented Dec. 17, 1912.

2 SHEETS-SHEET 2.



Witnesses
Chas. Vermier
L. B. Campbell

Inventor
Clayton J. Embree
by Max W. Label
Atty

UNITED STATES PATENT OFFICE.

CLAYTON J. EMBREE, OF CHICAGO, ILLINOIS, ASSIGNOR TO INVENTORS DEVELOPMENT COMPANY, OF CHICAGO, ILLINOIS.

SELF-LOCKING KNIFE-SWITCH.

1,047,772.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed December 15, 1908. Serial No. 467,632.

To all whom it may concern:

Be it known that I, CLAYTON J. EMBREE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Self-Locking Knife-Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to self locking switches, and has for its object the provision of a practical switch of this nature which is automatically positively locked, both in its closed and open position.

It is of great importance in the operation of high tension switches that a switch-blade when opened be free from a high potential, by reason of the fact that the switch-blade when moved to its open position usually approaches closer to the outer boxlike structure of the switch or support than is allowed by the ordinary rules applicable in such cases. For this reason it is desired that a switch when opened be swung around its upper extremity, and to this end positive locking features must be applied, so that the switch cannot through a fault become closed and cause serious trouble.

I have shown my switch in this application as applied to a motor-controlled oil-break switch, my improved switching device serving to properly control the operations of the auxiliary switching device usually mounted below the main switch-blade.

My invention, however, is not limited to such application, as will be readily apparent from the construction which I will now describe in connection with the accompanying drawings, in which—

Figure 1 is a general view of an oil-break switch illustrating one of the forms of my invention; Fig. 2 is an enlarged view showing my improved switching device; Fig. 3 is a side view thereof; Fig. 4 is a view more in detail, showing the locking features; Fig. 5 is an end view of the construction of Fig. 4; and Fig. 6 is a detailed view of a handle used in the construction shown.

Referring more particularly to Fig. 1, I have shown a three phase standard type of oil-break switch, having three switch plungers 1, 2 and 3, suitably operated by

means of the motor 4 from the main switch-board. An insulating casing 5 surrounds the switching members. The leads 6, 7 and 8 supply current to the consumption circuit, and leads 9, 10 and 11 come from the generating circuit, which leads 9, 10 and 11 are therefore usually alive. There are auxiliary switch members 12, 13 and 14 mounted in separate compartments, having an inclosing insulating wall, which switch members are used as a precautionary measure to insure safety in the operation of the oil-break switches. The auxiliary switches 13, 14 and 12 are of my improved construction, as will be described hereinafter, and are especially applicable for use in this connection, although, as before stated, equally capable of other and independent application.

In general, when the switch members 1, 2 and 3 are opened, and it is desired to have repairs made to said switches, switch-blades or switch-members, it is necessary to see that said oil-break switch parts are entirely free from a high potential charge. To this end the auxiliary switches 12, 13 and 14 are employed, for it has been found in practice that the upper switch-blades mounted upon the plungers 1, 2 and 3 are alive and receive a charge through the oil, even though the switches are opened. Thus, when it is necessary to make repairs on the said oil-break switch, switches 12, 13 and 14 must be opened by the attendant before such repairs can be made. The operation of these auxiliary switches 12, 13 and 14 presents various difficulties. For instance, if the switch members 12, 13 and 14, which are connected to the live leads 9, 10 and 11 when closed, are swung around their lower extremities, the upper extremities of said switches approach too closely to the front wall of the compartment in which they are mounted, and therefore provide an undue hazard. By my invention I am enabled to swing these switch blades around their upper extremities, in which event it will be observed that the lower extremities thereof may be swung closely to the compartment walls, as said switch members are no longer alive, having been released from the lower contact leads 9, 10 and 11. It is by virtue of my improvement that I am enabled to operate these switches in this way, because it will be ap-

parent that merely to swing them around their upper extremities will not sufficiently guard against danger, as said switch members must be securely locked in their upper position, and must likewise be incapable of remaining in any intermediate position between the closed and open position. These various features I accomplish by means of the construction which will now be set forth more in detail.

Referring particularly to Figs. 2 and 3, the upper lead 15 passes through the compartment wall 16, through the interposition of the insulating member 17. The conductor 15 then ends in knife switch contacts 18—18, which are in association in this instance with four knife blades 19—19. The knife blades 19 are hinged to the knife contacts 18, so that the switch blades 19 may be swung around their upper support into the dotted position 20, shown in Fig. 3. The lower extremities of the knife-blade members 19 when closed make contact with the knife-contact members 21, thus connecting the lower lead 11, for instance, to the conductor 15, which leads to one of the terminals of the oil-break switch.

By virtue of my improved construction the switch blades 19 are locked in position automatically when the switch blades are in association with the contact elements 21, and the switch blades 19 are likewise locked automatically in their open position when in the position shown in dotted lines at 20 in Fig. 3. To accomplish this desirable object, I provide notched washers 22 of Fig. 4, which notched washers each have two notches 23 and 24, into which bolts 25, mounted between two of the blades 19, project when the switch is in either its open or closed position. A spring 31 holds these bolts firmly pressed against the notched washers 22. The bolts 25 are held in place by means of the pins 26 and 28, which permit said bolts to have a motion longitudinally of the switch blades 19.

For the purpose of releasing the bolts from the notches 23 and 24, I provide a rocking link 27, pivoted about the pin 28, which is likewise securely mounted between two of the members 19. This rocking link 27 has ears 29—29, which rest against the flaring arms 30 of the bolts 25, when the bolts or plungers are in the position to lock the switch in place. Should the rocking bar 27 be tilted, for instance as shown in Fig. 4, either to the right or to the left, lugs 29 will press against the arms 30, and release the bolts from engagement with the notch 23.

It will be apparent that the switch can then be opened, and when the switch is opened a sufficient distance, so that the plunger 25 registers with the notch 24, the parts 25 and 27 will again regain their normal position, due to the spring 31. The switch

blades 19 having been swung about their upper extremities, are away from the live knife contacts 21, and it is therefore immaterial how closely they approach the compartment walls. The switch being open the oil switch members can be worked upon with entire safety, and when said work is completed, the knife blades 19 are again closed, and the oil switch is ready for another operation. It is therefore necessary to so arrange the opening and closing of the switch 14, which comprises the knife blades 19, that said knife blades 19 cannot be left in any but an open and closed position. This I accomplish by means of a handle 32, having a finger 33, in which finger is cut an annular recess 34. The insertion of the finger 33 is shown more in detail in Fig. 4, and the manner in which it accomplishes the desired result is as follows: The rocking member 27 acts upon the opposite sides of the lower portion of the member 25. A slot 35 is provided in the blades 19, just large enough to accommodate the finger 33. The finger 33 of the handle 32 can then be inserted into position through the slot 35, and between the bifurcated end of the member 27. In this position, as is evident from Fig. 4, the said finger and its head 37 just clear the bolt 25. On account of the size of the slot 35, the finger 33 is incapable of a movement longitudinally of said knife blades, but is capable of a transverse motion. Now drawing the handle, after insertion, toward the operator, tilts the lever 27, thereby releasing the bolts from the notch 23, and at the same time causing the said bolts to enter the annular groove 34 to hold the handle in the switch blades, until a sufficient movement has been had to bring the plungers into the notches 24, when the handle is releasable.

Thus to open the switch, the attendant inserts the finger 33 through the openings 35 in the switch blades, draws the handle toward him, which tilts the rocker 27, continues pulling the handle 32 toward him, which thereby releases the knife blade 19 from the blades 21, and continues this operation until he is enabled to release the handle, which is only possible when the plunger 25 enters the recess 24. The handle being then releasable, it is removed by the attendant, and he knows that the conductor of the oil switch, and its parts, are free from possible charges of high potential current.

To close the switch, the attendant re-inserts the finger 33, and by pushing it in opposite direction, tilts the rocker 27 in an opposite direction to that when opening, which again releases the plungers 25, and by continuing this pressure after release of the plunger, the switch blades 19 are pushed into engagement with the members 21, and when finally in their closed position the plunger 25 again enters recess 23, and the

handle 32 with its finger 33 is removable, thus showing that the switch is again in an operative position.

It will be observed that the handle by virtue of the elements 33, 34 and 37 forms an interlocking member which interlocks with the interlocking portion of the element 27 in combination with the lower portion of the plunger 25 which prevents withdrawal of the handle. These members thus interlock together in such a way as to permit removal under some conditions and prevent removal under other conditions.

While I have herein shown and particularly described the preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent is:

1. An electric switch having jaws and switch blades, instrumentalities having an interlocking member for locking said blades when in a full open position, and a removable interlocking handle for moving said blades and unlocking said instrumentalities upon its initial blade moving actuation.

2. An electric switch having jaws and switch blades, mounting means for pivotally holding said blades, instrumentalities co-acting between said blades and said mounting means for locking said blades when in a full-open position, and a handle for unlocking said instrumentalities by its initial

blade-actuating movement, removable from said switch only when said instrumentalities have locked said switch blades in position.

3. An electric switch having jaws and switch blades, a plunger for locking said blades when in a closed or a full-open position, a removable handle for opening and closing said blades, said handle when inserted in position to operate said blades, releasing said plunger from its locking position upon initial actuation of said handle, and means whereby the disconnection of said handle from said blades is prevented when said blades are in an intermediate position.

4. An electric switch having jaws and switch blades, means for locking said blades when in a closed or a full-open position, a removable handle for opening and closing said blades, said handle when inserted in position to operate said blades, releasing said means from its locking position upon initial actuation of said handle, and means whereby the disconnection of said handle from said blades is prevented when said blades are in an intermediate position.

In witness whereof, I hereunto subscribe my name this 24th day of November A. D., 1908.

CLAYTON J. EMBREE.

Witnesses:

MAX W. ZABEL,
O. M. NENNID.