Feb. 23, 1932. R. M. MARTENS 1,846,344

TRIPLE LOCK TRANSFER SWITCH

Filed Dec. 8, 1930 2 Sheets-Sheet 1

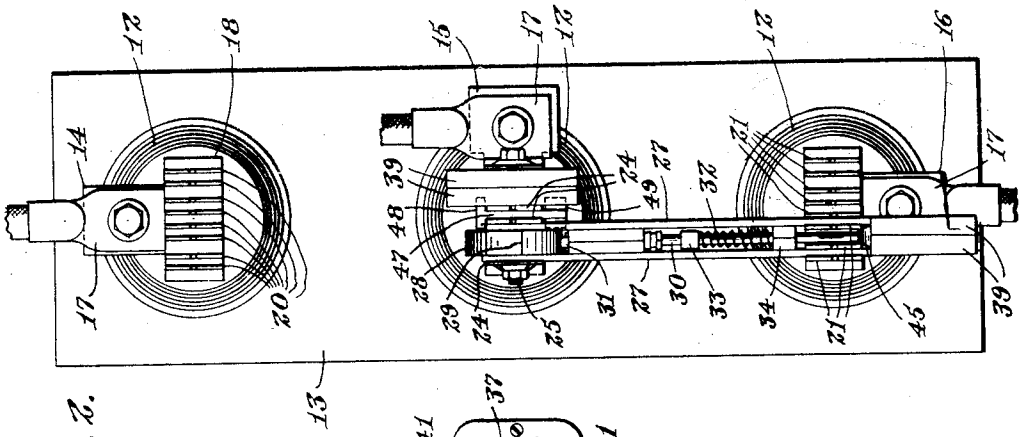


Fig. 2.

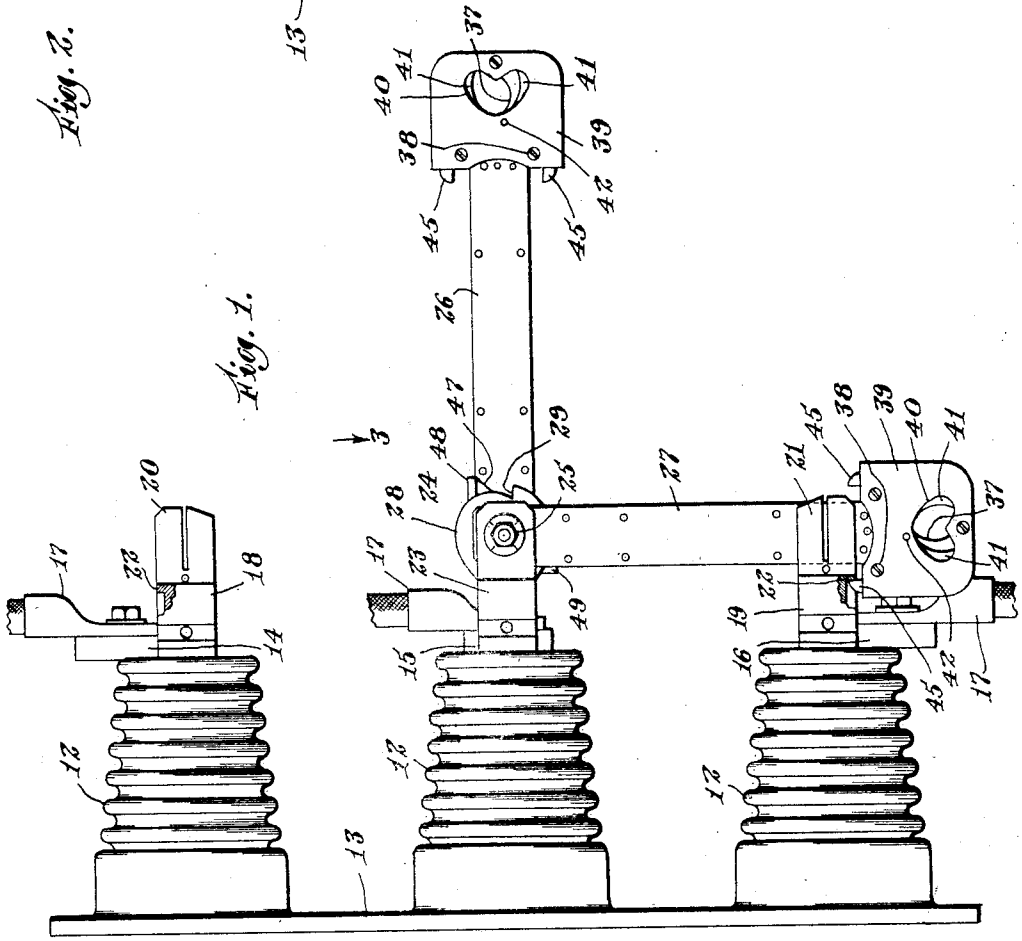


Fig. 1.

Inventor
Rudolph M. Martens
by A. M. Harrison
Attorney

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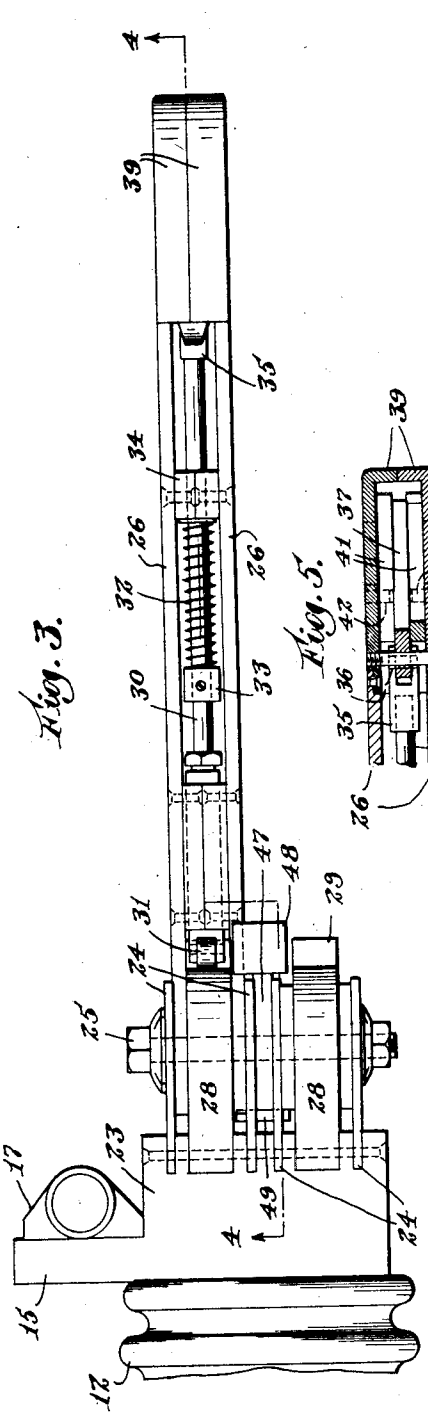


Fig. 3.

Fig. 5.

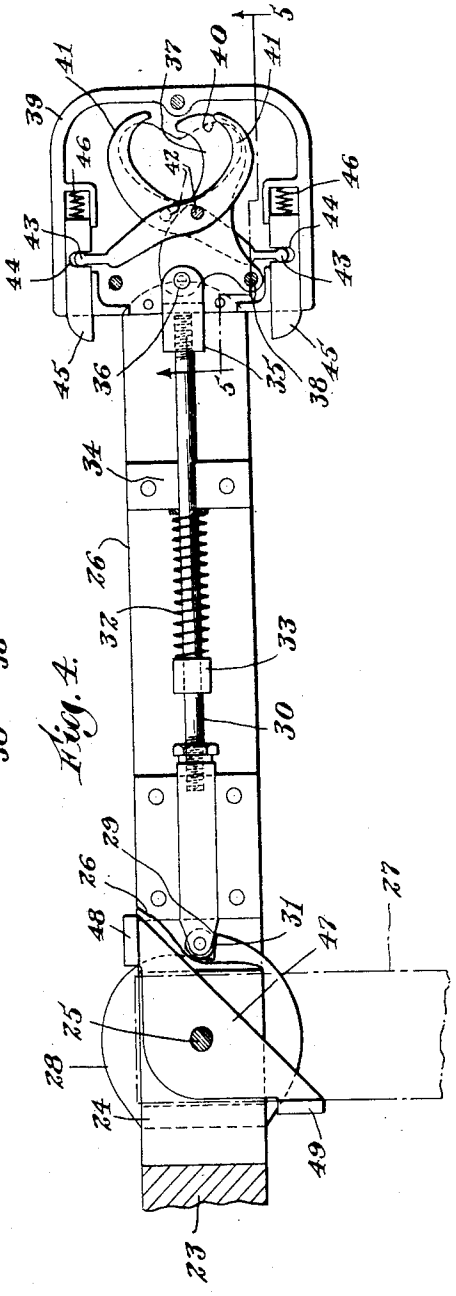


Fig. 4.

Inventor
Rudolph M. Martens
by A. M. Harrison
Attorney

Patented Feb. 23, 1932

1,846,344

UNITED STATES PATENT OFFICE

RUDOLPH M. MARTENS, WEST ROXBURY, MASSACHUSETTS

TRIPLE-LOCK TRANSFER SWITCH

Application filed December 8, 1930. Serial No. 500,728.

This invention relates to disconnecting switches for electric circuits, and has particular reference to switches of a type which may be referred to as a single-pull, double-blade, triple-lock, double-throw, transfer switch.

The object of my invention is to provide an improved switch structure which will meet the limited space conditions that are liable to exist in some stations where some approximate 13,800-volt construction is employed, and where the line disconnectors are conveniently mounted above the transfer bus connections, and where it is desirable to employ transfer bus conductors without increasing the spacings of the cell centers. To enable this to be done, and to permit a very economical cell wiring assembly, I have produced an improved switch structure including a positive lock for the closed position that requires a disengaging operation before the switch can be pulled through a downward operation, and also including an entirely independent lock for the 90° or clear position, which last-mentioned lock requires another disengaging operation before the blade can be swung to a new closed position at which position it becomes automatically locked. Incidentally it may be explained that the two operations just referered to may be effected without removing the usual switch stick or hook from the handle portion of the switch blade or blades. And one of the important features of my invention is that the structure provides a selector switch that is automatically locked in either one of oppositely swung positions of the blades.

With the above objects in view, and others hereinafter described, my invention consists in the construction and combinations of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:—

Figure 1 is a side elevation of my improved switch, partly broken out, showing the two blades in one of the relative positions which they may occupy.

Figure 2 is a view looking from the right of Figure 1.

Figure 3 is a view looking in the direction of the arrow 3 adjacent to Figure 1, and on a larger scale.

Figure 4 is a sectional elevation on the line 4—4 of Figure 3.

Figure 5 represents a section on the line 5—5 of Figure 4.

Similar reference characters designate similar parts or features in all of the views.

Three insulating posts 12 are mounted on a suitable base 13 adapted to be mounted on a wall member or panel board, said three posts having cap members 14, 15, 16, respectively, each of said cap members being provided with a clip 17, or other means, for the connection of circuit wiring.

The upper and lower cap members 14, 16, are formed or provided with block portions 18, 19, respectively, from which block portions the switch jaws 20, 21, project. As best illustrated by Figure 2, there are four pairs of switch jaws projecting from each of the upper and lower posts. As illustrated by Figure 1, each of the block portions 18, 19, is formed with a ledge 22 which constitutes part of the locking mechanism hereinafter described.

Supported by the central post is a block member 23 from which four plates 24 project in rigidly fixed positions, a pivot bolt 25 extending through said plates (Figs. 3 and 4).

Mounted on the pivot 25 are two switch blades 26, 27, which are practically duplicates of each other in construction. Each blade is duplex; that is, it consists of two strips spaced from each other and firmly connected, the space between the two strips being occupied by certain members presently described.

Located between the inner ends of the two strips of each switch blade is a rigidly mounted cam block 28 (Fig. 3) having a peripheral catch shoulder 29 (Fig. 4). The two cam blocks 28 might be integral with the block 23, but preferably, for convenience of construction, they consist of separate pieces having their inner edges, like the inner edges of the four plates 24, fitted in recesses in the block 23, with transverse holding pins extending through the block 23 and through the

plates 24 and cam blocks 28, as indicated by dotted lines in Figure 3.

Reciprocally mounted in suitable bearings in the space between the two strips of each switch blade, is a rod 30 having a roll 31 to ride along the cam-shaped surface of the block 28 and catch behind the shoulder 29 thereof as hereinafter described. Said rod and its roll is actuated toward the cam block by a spring 32 confined between a collar 33 secured to the rod and a fixed bearing 34 in which the rod slides. The outer end of each rod 30 is connected by a pin 36 to a finger lever 37 pivotally mounted at 38 in a housing 39 having an opening 40. The housing of each switch arm consists of two plate members held together by three screws one of which, 38, serves as the pivot for the lever 37. The portion of the lever 37 which is to be engaged by a finger or the hook of a switch stick traverses the opening 40, and preferably occupies about one-third of said opening as illustrated in Figure 4.

Each housing also contains two smaller finger levers 41 which cross each other (Fig. 4). Each lever 41 is pivotally mounted on a pin 42 (Figs. 4 and 5) projecting in from a wall of the housing, one end or tip of each lever 41, preferably rounded as at 43, entering a recess 44 in a sliding catch 45 normally held somewhat projecting from the housing by a spring 46. The portions of the levers 41 which are to be engaged by a finger or the hook of a switch stick traverse the opening 40 in the housing, but are so shaped as to normally occupy only the marginal portions of said opening. The ends of the sliding catches 45 are to coact alternately as hereinafter described with the locking ledges 22 hereinbefore referred to. One of them is illustrated in Figure 1 as interlocked with a ledge 22.

Mounted idly on the pivot bolt 25 is an angular detent 47 the shape of which is best illustrated in Figure 4. It will be referred to as the rocking detent. At one end it has opposite lips 48 and at the other end has opposite lips 49. As shown in Figures 2 and 3, said lips at one side project far enough to extend into the path of swing of the inner strip of the switch arm 26, and at the other side the lips project far enough to extend into the path of swing of the inner strip of the switch arm 27. Therefore, as illustrated by Figure 1, it would be impossible for the switch blades 26 to be thrown so as to close a circuit through it and the upper switch jaws 20 without first unlocking the switch blades 27 at 45, 22, and breaking the connection thereof with the lower switch jaws 21. And of course after any operation of the switch blades to close the circuit through the jaws 20 and open it at the jaws 21, it becomes impossible to again close the circuit at the jaws 21, without opening it at the jaws 20. The rocking detent alone serves to effect the control just described.

As will presently be explained, my improved structure is such that it is operable either as a transfer switch or a selector switch, the former because it is usable to transfer from one service bus to another of equal voltage without interrupting the load at the center post, and the latter because it is usable, when there are two service busses of unequal voltage, to select either the higher or lower as required for the load at the center post, the structure being such that the circuit of one of them must be broken before closing the circuit of the other.

The angular rocking detent 47 is removable, as by first removing the nut at one end of the bolt 25, and then sliding said bolt outwardly far enough to permit said detent to be lifted away, after which the bolt can be restored to its illustrated position to serve as a pivot for the parts mounted thereon. When said detent is removed, the structure is usable as a transfer switch, because both blades 26, 27, can then be swung in opposite directions to the jaws 20, 21. When said detent is in place as illustrated, the structure is usable as a selector switch because the end lips 48, 49, of said detent prevent any possibility of the blades closing a circuit at both of the jaws 20, 21. If one blade is in engagement with one set of jaws, the other blade is necessarily held away from the other set of jaws. But if the rod 30 of said other blade is actuated or permitted to release its roll 31 from the catch shoulder 29, it also may be lowered so that both blades may complete the circuit through the jaws 21. Therefore, and since each blade is duplex, the structure is usable as a heavy duty selector switch which usually requires two or more units of blades.

Either blade is retained in its 90° position by the roll 31 of its rod 30 engaging the fixed shoulder 29 so that it can not swing down by gravity or other accidental cause. It is important that the lock thus provided shall not be easily unlocked. This is preferably attained by employing a spring 32 of such strength as to render it necessary, in order to unlock it, to exert more force on the lever 37 than can be imparted thereto except by employing a hook or some equivalent thereof to engage said lever. This is because of danger due to the high-voltage current. The reference to the lever 37 as a finger lever is for convenience, and not as meaning that it would ordinarily be engaged by a finger of an operator's hand.

The surface of each block 28 just above its shoulder 29 is so shaped that when either switch arm or blade is swung up from a horizontal position, said surface acts as a cam on the roll 31, sliding the rod 30 outwardly and compressing the spring 32, so that when

said blade is engaged with the jaws 20 and locked there, said spring will not cause the lever 37 in the housing to oppose the operation of a hook used to actuate a lever 41 so as to unlock the blade from the upper ledge 22.

The lever 37 which crosses the opening in the handle or housing 39 is operated to release the lock at 29, 31, as referred to only when a circuit closure is to be effected at the lower jaws 21, and it is to be understood that by similarly releasing the locks of both switch arms or blades, both can be employed for a high-voltage circuit between the terminals at the lower post and the central post. But when the angular detent 47 is included in the structure as illustrated, neither blade can be swung to close a circuit at the upper jaws without first breaking the circuit at the lower jaws 21. To do this latter, the slidable catch 45 which is engaged with the ledge 22 of the lower post must first be drawn away from said ledge. Such disengagement is easily effected by actuation of the outermost of the two levers 41, the springs 46 of which are light, said levers crossing each other and the engageable portions of which are accessible at the opening in the handle or housing. The structure and mounting of each of the two sliding catches 45, and their actuating levers 41, is similar to that of the single lock illustrated and described in Letters Patent No. 1,465,451, issued to me August 21, 1923. In the present structure, however, there are two sliding catches 45 in opposite portions of the housing, and two levers 41 crossing each other (Fig. 4), the accessible portions of said levers being slightly within opposite margins of the opening 40 in said housing. Therefore both of the switch arms or blades can be locked side by side to connect the center post with the jaws of either the lower or the upper post. But, as hereinbefore explained, when the angular detent 47 is present as illustrated, one switch arm can not be connected with the jaws of the upper or lower post so long as the other switch arm remains connected with the jaws of the opposite post. The one that is locked to the upper or lower post must first be unlocked before the 90° one is swung to the opposite post. Hence, the two sliding catches 45 are important. By comparing Figures 1 and 4 it will be understood that the sliding catches 45 of both switch arms may be unlocked from the ledges 22, and when so unlocked, both switch arms can be swung to position to be locked side by side by the cooperation of their rods and rolls 30, 31, with the two fixed shoulders 29, the entire switch being entirely disconnected and locked against accidental closing at any point. And this same result is attainable if the angular detent 47 has been removed, as has been described, in order to permit the two switch arms to be connected to both the upper and lower jaws 20, 21.

Inasmuch as switches of the general type described are usually mounted in the upright position illustrated, it is for convenience of description that reference has been made to upper and lower posts and switch jaws. It is to be understood however, that the mounting may be in horizontal or other position if desired.

Having now described my invention, I claim:—

1. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position.

2. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, said interconnections including a fixed shoulder adjacent to the pivot of each blade and a manually shiftable locking member carried by each blade and movable toward and from position to engage a shoulder.

3. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, each of the blades carrying means for freeing it from locked position.

4. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, said interconnections including fixed shoulders adjacent to the pivot of the blades, and a manually shiftable locking member carried by each blade and movable toward and from one of said fixed shoulders.

5. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, said switch having two contacts in different locations and each blade having two manually shiftable catch members, means being provided adjacent to each of said contacts to coact with the catch members of the blades to hold said blades in circuit-closing positions.

6. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, said in-

terconnections including an angular detent mounted to rock on the pivot of the blades and having portions traversing the path of movement of the blades.

7. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, each of said blades having a housing at its outer end, said housing having an opening, a lever in said housing and having a portion traversing said opening, a rod connected at one end to said lever and mounted to move longitudinally of said blade and having a roll at its inner end, and a fixed catch in position to coact with said roll in maintaining the blade in circuit-breaking position.

8. An electric switch comprising a pair of independently pivoted blades mounted on a common axis and provided with interconnections to prevent one blade from being swung to close a circuit while the other blade remains in circuit-closing position, each of said blades having a housing at its outer end, said housing having an opening, a pair of levers in said housing and crossing each other and having portions traversing said opening, a pair of slidable catches mounted in said housing and engaged with said levers, and ledges adjacent to the contacts to coact with said catches in locking the blade to complete a circuit at the upper or lower contact.

9. An electric switch having upper and lower contacts, a pivoted conducting blade between said contacts and having a housing at its outer end, said housing having an opening, pair of levers in said housing and crossing each other and having portions traversing said opening, a pair of slidable catches mounted in said housing and engaged with said levers, ledges adjacent to the contacts to coact with said catches in locking the blade to complete a circuit at the upper or lower contact, a third lever in said housing and also having a portion traversing said opening, a rod connected at one end to said third lever and mounted to move longitudinally of said blade and having a roll at its inner end, and a fixed catch in position to coact with said roll in maintaining the blade in circuit-breaking position.

In testimony whereof I have affixed my signature.

RUDOLPH M. MARTENS.