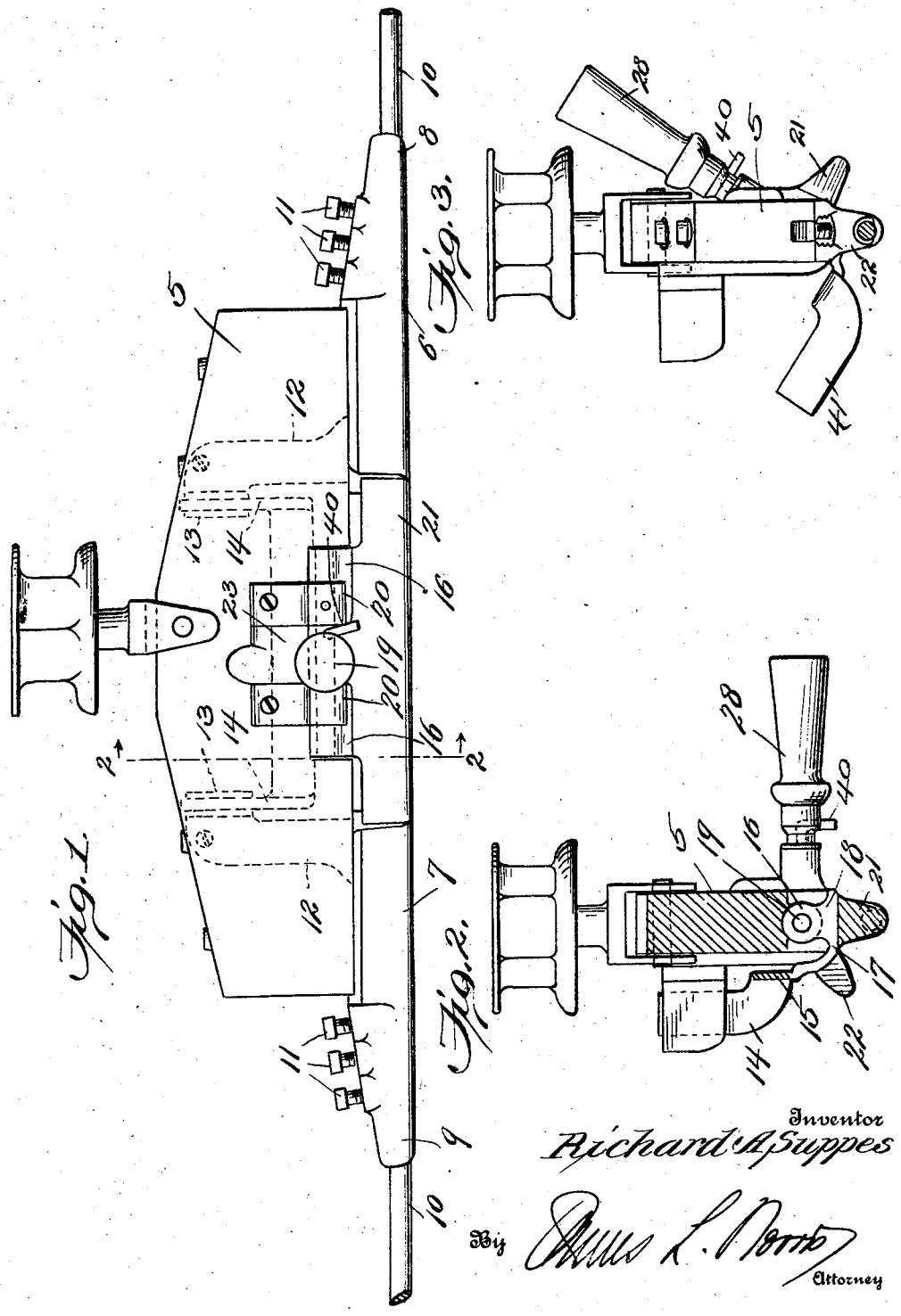
May 24, 1927. 1,629,893

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SECTIONAL INSULATOR OR CUT-OUT SWITCH

Original Filed Aug. 29. 1924 2 Sheets-Sheet 1



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Fig. 4.

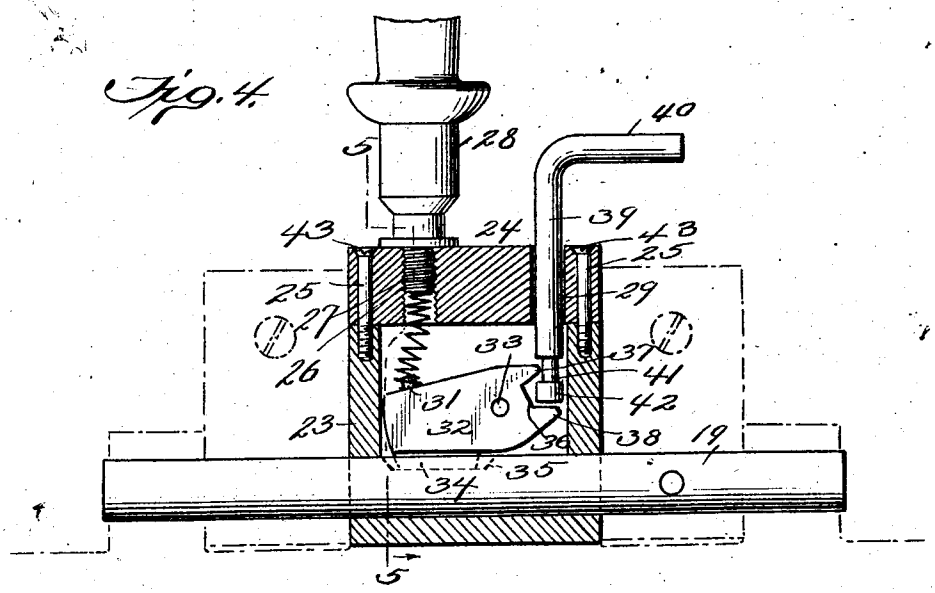


Fig. 5.

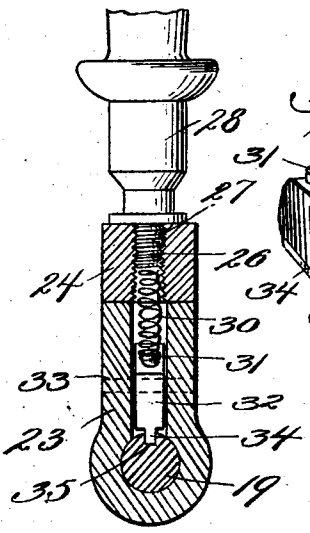


Fig. 7

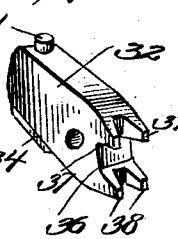
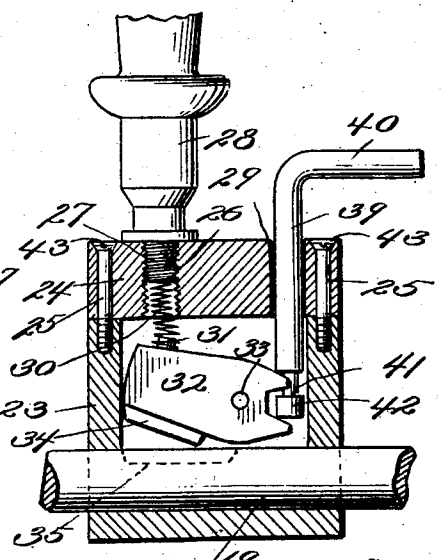


Fig. 6.



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UNITED STATES PATENT OFFICE.

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SECTIONAL INSULATOR OR CUT-OUT SWITCH.

Application filed August 29, 1924, Serial No. 735,030. Renewed June 24, 1926.

This invention relates to a sectional insulator or cut-out switch of the type used for dividing the conductor or trolley wire and is more particularly intended for general use in mines and similar places.

The primary object of the invention is to provide an improved device of this character of simple and durable construction and efficient in operation, and whereby the electrical circuit may be opened or closed by downwardly and upwardly oscillating a circuit-controlling element embodying a conducting and an insulating member for alternate disposition relatively to conducting means to which the terminals of trolley wires are connected.

A further object of the invention is to provide a sectional insulator or cut-out switch of the type specified which is arranged in such manner that the engaging knife switch blades, particularly when the device is installed in a mine, are between the trolley wire and the gob side of the entry or gangway and on the side opposite the location of the operating handle, thus eliminating all liability of contact with additional exposed electrically charged parts and also protecting the operator from the possibility of being burned on account of the arc frequently caused in making and breaking an electrical circuit.

The present improved sectional insulator or cut-out switch has the several components, and particularly the operating handle, so arranged that at no time can the handle extend out from the center line of the trolley wire a distance further than that represented by the measurement from the center line of the trolley wire to the end of the handle, and by this means a very objectionable condition present in prior devices of this type where head room is low is avoided and the possibility of motormen and others striking the protruding handle is lessened. Moreover, in view of the fact that the handle operates upwardly and downwardly in making or breaking the circuit, the making and breaking of the circuit is accomplished more quickly by the operator and with greater ease, and furthermore, such disposition and operation of the handle necessitates the use of only one style of insulator, whether the trolley wire is on the right or left side of a mine entry and whether the current is coming from a source to the right or left of the insulator. The handle will always be on the clearance side of the entry, and the said handle and its parts are never charged when open. When the improved sectional insulator or cut-out switch is closed a metallic conductor comes into place and provides perfect continuity for the trolley by means of a good close fit, thus further eliminating the formation of arcs due to gaps and destruction of the trolley wheel or dewiring of the same and cutting off the current to the locomotive or motor where it is necessary to cross a gap under power. On the other hand, when the improved sectional insulator is open, a non-conductor comes into place, thus allowing the locomotive or motor to run through or past the sectional insulator without dewiring or injurying the trolley or trolley wheel, the said non-conductor being sloped slightly from the right and left to the center to allow moisture to flow to the center and drop off, and thereby prevent parts from being charged by presence of moisture. The improved sectional insulator or cut-out switch further complies with the various State laws and especially the laws of the Department of Labor and Industry of Pennsylvania, by having means therein for automatically locking itself open, and by having in cooperative relation thereto a locking means which is released only by a particular form of key which cannot accidentally fall out or be removed until the insulator is opened. When the insulator is opened the key may be withdrawn by an authorized person until such time as he may wish to close the switch, when the key is again inserted and manipulated to release the switch members so that the handle may be operated to effect the introduction of the conductor in the conducting line or relatively to the conducting members to which the trolley wires are attached.

A preferred embodiment of the improved sectional insulator or cut-out switch is shown in the accompanying drawings, wherein:—

Fig. 1 is a side elevation showing the insulating member of the switch down between the inner opposing terminals of the conductor to which the trolley wires are attached.

Fig. 2 is a transverse vertical section on the line 2—2, Fig. 1.

Fig. 3 is an end elevation of the improved insulator or switch showing the handle in raised position and the insulating

member interposed between the inner terminals of the conductors or contact devices to which the trolley wires are attached.

Fig. 4 is a detail longitudinal vertical sectional view through the locking means and showing the latter holding the handle and cooperating parts in locked position.

Fig. 5 is a transverse vertical section of the locking means on the line 5—5, Fig. 4.

Fig. 6 is a longitudinal vertical section of parts of the locking means or mechanism showing the same released.

Fig. 7 is a detail perspective view of a portion of the locking means.

The numeral 5 designates an insulating member, beam or bar of insulating material such as wood and which serves as the insulating medium between the end members 6 and 7, which are in the form of metallic conducting terminals having tubular extremities or sockets 8 and 9 constructed to snugly receive trolley wires or conductors 10 fixedly held in the said tubular extremities or sockets 8 and 9 by a plurality of set screws 11, as in the usual form of sectional insulator or cut-out switch. The metallic conductors 6 and 7 are suitably secured to the insulating member, beam or bar 5 and extending upwardly therefrom are metallic arms 12, each of which carries an upper open socket or clip 13 to receive the switch blades 14 projecting upwardly from a metallic cross connector or yoke 15, which is attached to or forms a part of oscillating sleeves or hubs 16, the connecting bar or yoke 15 being held by projections 17 from the bottom enlargement 18 of the said sleeves. A fixed shaft 19 extends through the sleeves 16 and also through bearings 20 secured to the beam or bar 5 on opposite sides of the vertical center of the latter and to which the said shaft 19 is pinned or otherwise fastened to hold the same stationary. Between the bearings 20 the main switch elements are mounted and consist of a metallic conductor bar 21 and an insulating bar 22, the latter standing at an angle to the bar 21, or, in other words, the two bars 21 and 22 radiate relatively to the axis or shaft 19 at different angles and in such spaced relation that a comparatively short movement thereof will bring one or the other in alinement and close terminal engagement with the inner ends of the conductors 6 and 7. The conducting and insulating or non-conducting members 21 and 22 of the switch are connected to the collars or hubs 16 and also at the center to a box or enclosure 23, through the inner portion of which the shaft 19 also projects, the casing or box 23 being rotatable with the collars on the said fixed shaft 19 between the inner ends of the bearings 20. The box 23 has a top 24 fixedly secured thereto by fastening devices 25, and at one side of the center this top is formed with a screw-threaded opening 26, to receive the reduced screw-threaded stem 27 of a handle 28. In line with the screw-threaded opening or socket 26 the top 24 also has an opening or bore 29 formed therein for a purpose which will be presently explained. The top 24 is of greater thickness than the length of the stem 27, to provide a seat for a spring 30 engaged over a stud 31 of a locking tumbler or oscillating member 32 eccentrically pivoted as at 33 within the casing or box 23 and having an inner rib 34 extending partially along one edge to fit in a groove 35 formed in the portion of the shaft 19 located within the casing or box 23, as particularly shown by Figs. 4, 5 and 6. The spring 30 has a tendency to force the locking tumbler or member 32 towards the shaft 19 and effect an engagement of the rib 34 with the groove 35. The locking tumbler 32 is shown in detail by Fig. 7 and the end thereof adjacent to the eccentrically located pivot means therefor is vertically slotted as at 36 and transversely slotted as at 36^a, to thereby form projecting fingers 37 and 38, the slots 36 and 36^a being of such contour as to give the fingers 37 and 38 a tapered form towards the free ends thereof. The slots 36 and 36^a and fingers 37 and 38 are provided for engagement with a key having a straight shank 39, an outer angular head extremity 40 and a circumferential groove 41 at the opposite end, which provides a circular bit 42. The circumferential groove 41, as shown by Fig. 6, is adapted to be held between the fingers 37 and 38 with the bit 42 in the transverse slot 36^a, the groove or reduced portion of the key partially extending into the outer part of the groove 35 when the key is pressed inwardly through the top 24 and casing 23 to release the locking tumbler or member 32 or to disengage the rib 34 of the latter from the groove of the shaft 19. When the rib 34 of the locking tumbler or member is released from the groove 35 of the shaft 19, one end of the rib bears on and moves over the shaft and the bridging metallic conductor or member 21 or the insulating bridging member 22 may be moved in between the inner terminals of the metallic conductors 6 and 7 in alternation, and when the bridging conductor or member 21 is disposed between the conductors 6 and 7, the handle 28 stands outwardly at right-angles with relation to the insulator or cut-out switch body as shown by Figs. 1 and 2, the key including the shank 39 and outer angular head or extremity 40 being held intact or connected to the slotted and fingered end of the locking tumbler or member 32, which will then be in the position shown by Fig. 6, as hereinbefore specified, and when the locking tumbler or member is in the released position, the spring 30 will be compressed. The reason that the key is held

against removal within the casing 33 and in engagement with the slotted and fingered extremity of the locking tumbler or member 32 is that the distance between the adjacent wall of the casing and the maximum projecting portions or ends of the fingers 37 and 38 is less than the diameter of the bit 42 of the key. Conversely, when the handle is raised or thrown up obliquely against the adjacent side of the insulator or cut-out switch as shown by Fig. 3, the bridging insulating member 22 is thrown in between the inner terminals of the metallic conductors 6 and 7 and the rib 34 rides over in engaging relation to the groove 35 of the shaft 19, and immediately the spring 30 operates to press the rib extremity of the locking tumbler or member 32 inwardly to effect a locking engagement of the rib relatively to the groove and at the same time the distance between the opposite slotted and fingered end of the locking tumbler or member and the adjacent wall of the casing 23 is increased and particularly between the innermost fingers, which will be the fingers 37, and the said casing wall, and by this means the key will be released and may be removed by an authorized operator. The advantage of forming the one end of the locking tumbler or member 32 with the intersecting slots and fingers as hereinbefore explained is that the use of any other form of key to release the tumbler or locking member is rendered practically impossible. Moreover, as a further protection against unauthorized manipulation of the locking means the top 24 will be applied to the casing 23 in such manner as to render the fastening devices or screws 25 inaccessible, one means for accomplishing this result being by filling in the countersinks for the heads of the said screws or fastening devices 25 with solder or any other suitable substance as at 43.

A material advantage ensues by having the improved sectional insulator or cut-out switch automatically locked when open, by reason of the fact that the bridging insulating member 22 is then brought into alined engagement with or between the metallic conductors 6 and 7, and without knowledge of the operation of the improved locking means or the possession of a key similar to that which will alone release the locking means, it will be very difficult and in fact practically impossible for an unauthorized individual to open the lock and close the sectional insulator or switch, or bring the bridging conducting member 21 in operative relation between the inner ends of the conductors 6 and 7. It will therefore be understood that the improved insulator or cut-out switch embodies means for rendering it safe against irregular operation, and moreover, the position of the handle 28 will serve as an indicator or means to advise an authorized operator at a glance the relative positions of the bridging conductor and insulating members 21 and 22. It is proposed to have the abutting ends of the conductors 6 and 7 and the bridging conductor and insulating members 21 and 22 snugly join, so as to avoid jumps or wearing open joints and deterioration of trolley wheels. As hereinbefore indicated, the improved sectional insulator or cut-out switch may be disposed in either right or left position or may be conveniently installed in a mine to meet various contingencies without requiring modification or structural variation. When the bridging insulating member 22 is disposed between the conductors 6 and 7, the motor or locomotive will be permitted to run through the insulator or cut-out switch without dewiring or injuring the trolley, and it is proposed in practice to slope the edge of the bridging non-conductor in such manner as to render it effective in draining moisture therefrom and prevent the parts from becoming charged when the said bridging insulating member is in operative position between the metallic conductors 6 and 7. The construction of the locking tumbler or member 32 at one end as hereinbefore explained practically forks the said end, and by this simple construction an irregular unlocking operation is rendered extremely difficult by means of a foreign key or a key other than that provided for the locking means. Furthermore, the simple up and down operation of the handle 28 will effect an alternate disposition of the bridging insulating member 22 or the conducting member 21 between the metallic conductors 6 and 7 and thereby provide for certainty of operation as may be desired and found necessary.

What is claimed as new is:

1. In a sectional insulator or cut-out switch of the class specified, the combination with longitudinally alined spaced conductors adapted to have feed wires connected thereto, of oscillating means disposed between the said conductors and carrying a conducting member and an insulating member for alternate interposition between the said conductors, the said oscillating means being movable upwardly and downwardly in planes at right angles to the longitudinally alined conductors and provided with a handle that will serve as an indicator of the positions of the conducting and insulating members relatively to the spaced conductors.

2. In a sectional insulator or cut-out switch of the class specified, the combination with spaced conductors adapted to have feed wires connected thereto, of an oscillating conducting member adapted to be interposed between the said conductors, or

withdrawn, means connected to said oscillating member whereby it may be manipulated and locking means independent of said last mentioned means for automatically operating to positively lock said member against movement after said member is withdrawn from position between said conductors.

3. The combination set forth in claim 2 in which the locking means includes a locking element and a device for yieldingly urging said element toward locking position.

4. In a sectional insulator or cut-out switch of the class specified, the combination with a support, of spaced conductors mounted on the support and adapted to have feed wires connected thereto, an oscillating conducting member adapted to be interposed between the said conductors, or withdrawn, said member having locking means associated therewith which automatically operates to lock said member against movement after said member is withdrawn from position between said conductors, said locking means including a locking element, and means yieldingly urging said element toward locking position.

5. The combination set forth in claim 4 in which the locking means includes a key normally in engagement with and held against removal by, the locking element, the arrangement being such that the key is removable only when the said element is in locking position.

6. The combination set forth in claim 4 in which the locking element constitutes a lever pivoted intermediate its ends upon the oscillating conducting member and has a locking tongue on one side of its pivotal axis and a key engaging and retaining portion on the opposite side of said axis, the yielding means acting on the end of the lever remote from the key engaging portion and tending to expel the key as well as to propel the locking tongue toward locking position when it becomes active.

7. In a sectional insulator or cut-out switch of the class specified, the combination with longitudinally alined spaced conductors adapted to have trolley wires connected thereto, of an oscillating circuit making and breaking device pivotally shiftable in reverse directions between the inner ends of the said conductors and in planes at right angles to the latter and having conducting and insulating members for alternate interposition between the said conductors, the said oscillating device being provided with key operated locking means movable therewith and automatically operating to lock the device open or with the insulating member between the conductors to prevent shifting of the oscillating device to close the circuit by unauthorized persons.

8. In a sectional insulator or cut-out switch of the class specified, the combination with spaced conductors adapted to have trolley wires connected thereto, of an oscillating device interposed between said conductors and carrying a conducting member adapted to be inserted between the said conductors and withdrawn from such position, and locking means carried by and movable with the said device and having a key, the locking means automatically locking the said device in open position and permitting the key to be removed, the key being held inseparable with the locking means when the conducting member is interposed between the conductors.

9. In a switch of the class specified, the combination with alined conductors having a space between their inner ends and to the outer ends of which trolley wires are adapted to be connected, of an oscillating means disposed between the said conductors and carrying a conducting member and an insulating member at angles with relation to each other and shiftable as a unit in planes at right angles to the alined conductors for alternate movement between the inner spaced ends of the conductors, and means carried by the said oscillating means releasable only by a key for automatically holding the insulating member between the conductors until released by an authorized operator.

10. In a switch of the class specified, the combination with an insulating supporting means and metallic conductors secured thereto at opposite extremities and having their inner ends spaced apart and adapted also for attachment of trolley wires thereto, the conductors having switch blade receiving means on one side of the switch, and an oscillating circuit making and breaking device carried by the said insulating means between the conductors and having switch blades and a conducting member adapted to be inserted between the said conductors and withdrawn from such position, the oscillating device being mounted for pivotal movement in planes at right angles to the conductors and having a handle movable upwardly and downwardly in a vertical direction and serving as an indicating means relatively to the positions of the conductor and insulating members, the oscillating device also being provided with means for automatically locking the switch open.

11. In a switch of the class specified, the combination with insulating means having metallic conductors secured thereto in spaced relation and provided with means for receiving switch blades and for the attachment of trolley wires, of an oscillating

circuit making and breaking device carrying a conducting member movable into and out of position between the said conductors, a shaft mounted in the insulating means and on which the said device is oscillatable, said shaft having a groove therein, and automatically operating locking means carried by and movable with the device and including a member having a rib to automatically engage the groove of the said shaft and lock the switch open.

12. The combination with a support having a central recess, rail sections carried by the support and terminating at the opposite ends of the recess, a movable rail section pivotally supported within the recess for movement laterally into and out of alinement with the first rail sections and into and out of the vertical plane thereof, contact members carried by the ends of the first rail sections, and contact members carried by the ends of the movable rail section for engagement with the first contact members when said movable section is in alinement with the first sections and in the vertical plane thereof.

13. The combination with a support having a central recess, rail sections carried by the support and terminating in the opposite ends of the recess, a rail section pivotally connected to the support for swinging movement laterally into and out of alignment with the first rail section and into and out of the vertical plane thereof, contact members electrically connected to the ends of the first rail sections, and contact members associated with and operated by the movable rail section, for engagement with the first contact members when said movable section is moved into alignment with the first sections and in the vertical plane thereof.

14. The combination with a block and means for connecting the sections of a conductor therewith, in spaced relation, of a switch blade mounted in said block, contact members for connection with the sections of the conductor and cooperating with the blade, and a spring held and key operated latch for retaining the blade out of contact engaging position.

In testimony whereof I have hereunto set my hand.

RICHARD A. SUPPES.