

June 28, 1927.

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1,634,121

INTERLOCKING SWITCH MECHANISM

Filed Aug. 2, 1924

2 Sheets-Sheet 1

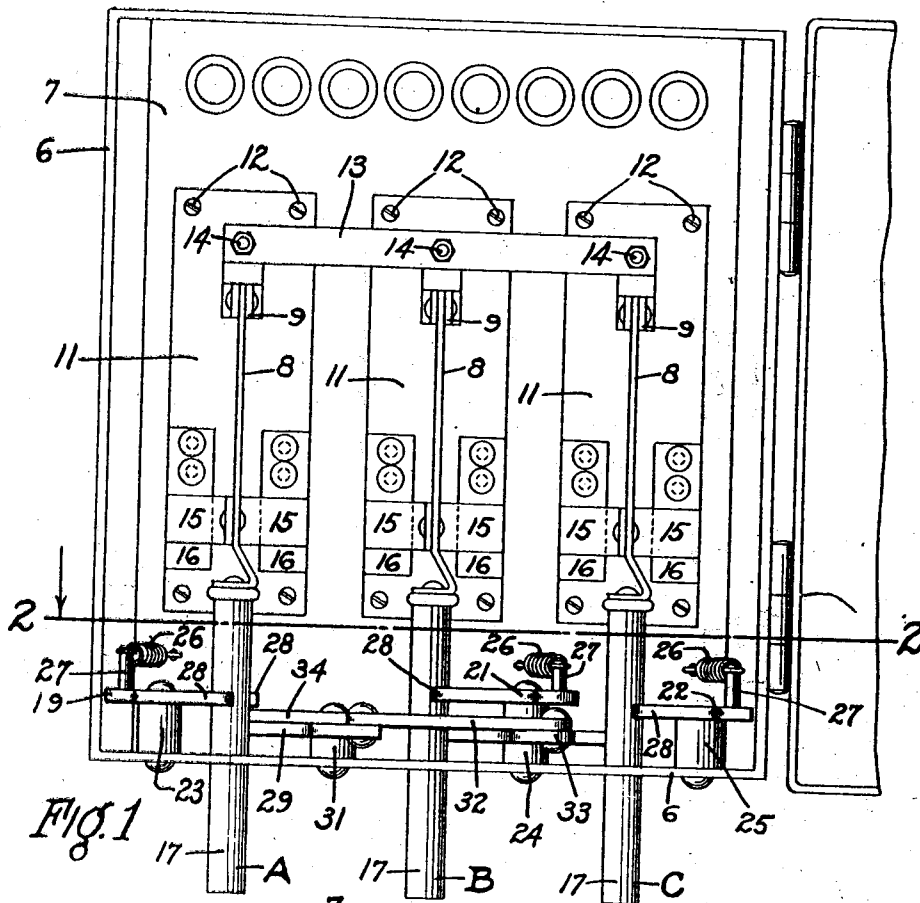


FIG. 1

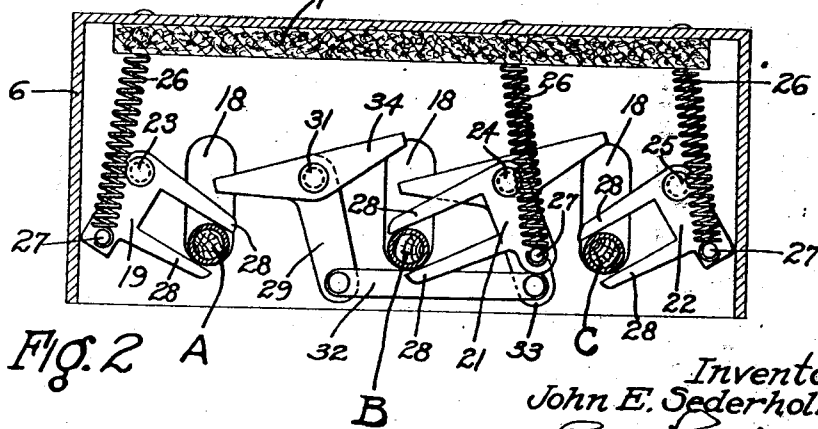


FIG. 2

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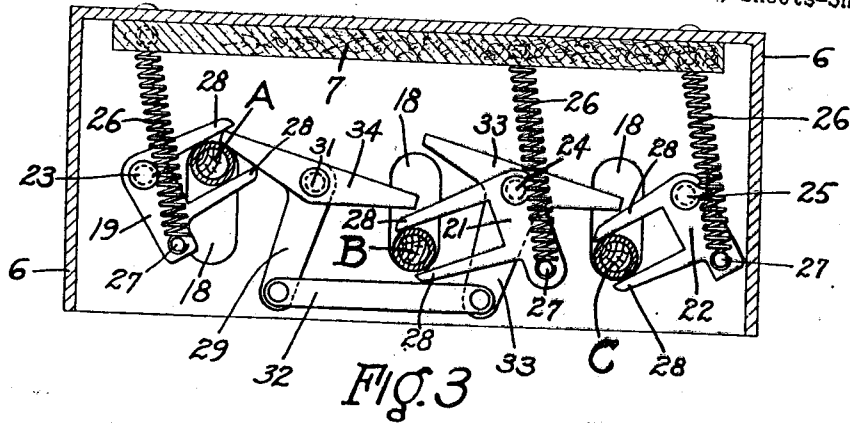
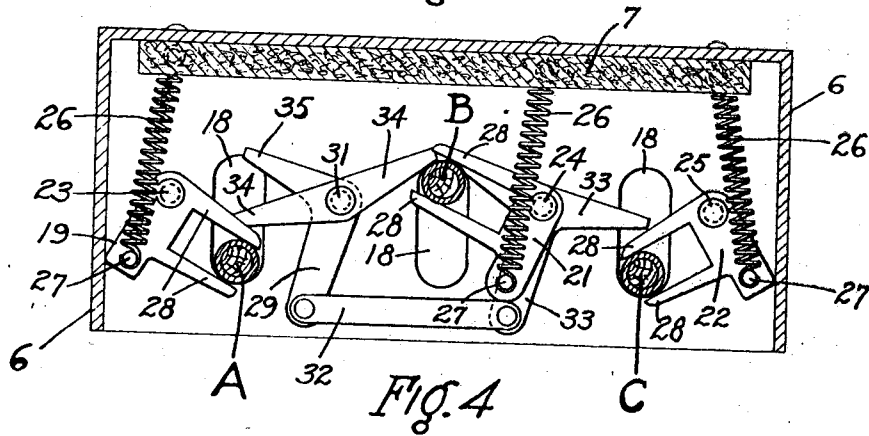
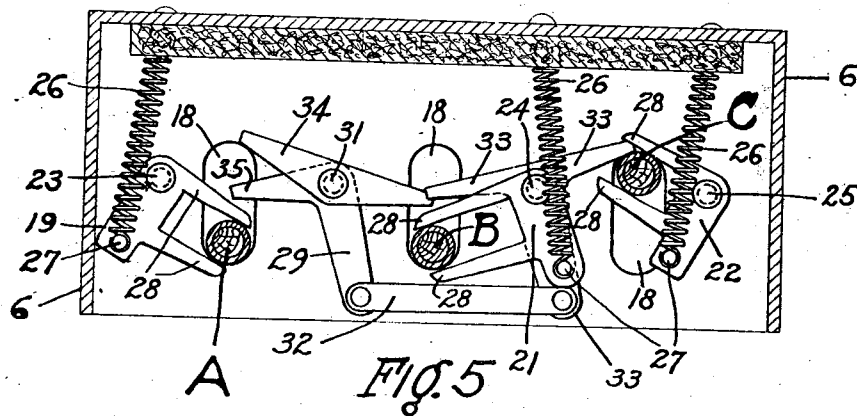
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2 Sheets-Sheet 2



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Patented June 28, 1927.

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UNITED STATES PATENT OFFICE.

JOHN E. SEDERHOLM, OF ST. PAUL, MINNESOTA, ASSIGNOR TO AMERICAN HOIST & DERRICK CO., A PARTNERSHIP COMPOSED OF F. J. JOHNSON AND W. O. WASHBURN, OF RAMSEY COUNTY, MINNESOTA.

INTERLOCKING SWITCH MECHANISM.

Application filed August 2, 1924. Serial No. 729,807.

This invention relates to new and useful improvements in interlocking switch mechanisms particularly adapted for use in connection with ordinary knife switches such as are commonly used to control electric circuits, and more particularly relates to such a device which is operable in conjunction with a plurality of switches such as are commonly employed in conjunction with electric rivet heaters or other electric heaters, which usually have a plurality of different heats and therefore a like number of control switches in order that any one of the different heats may be used independently of the others.

In the operation of multiple switch mechanisms such as are commonly employed at present to control a plurality of circuits, extreme care must be exercised in the manipulation of the switch levers to prevent more than one switch or circuit being closed at a time. Should two or more circuits be closed at one time serious damage may be caused as a result of short-circuiting and burning out some of the coils or windings which would render the apparatus inoperative. It is therefore desirable that means be provided whereby it will be impossible to effect the closing of more than one such switch, and therefore circuit at a time.

The primary object of this invention, therefore, is to provide an improved interlocking switch mechanism which may readily be applied to an ordinary multiple knife switch having a plurality of manually operable switch control levers for the purpose of positively preventing more than one of the control levers thereof from being moved into switch closed position at the same time. A further and more specific object of the invention is to provide such a device of simple and inexpensive construction having means operable in conjunction therewith to yieldably retain the switch levers in either open or closed position.

Other objects of the invention will more fully appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the drawings there has been disclosed a structure designed to carry out the objects of the invention, but it is to be understood that the invention is not confined to the exact structure shown, as various changes

may be made in the scope of the claims which follow.

In the accompanying drawings forming a part of this specification,

Figure 1 is a plan view of a multiple switch showing my invention applied thereto;

Figure 2 is a cross-sectional view on the line 2-2 of Figure 1 showing all of the switches in open position;

Figures 3, 4 and 5 are similar views to show the different positions assumed by the parts when the various switches are actuated.

In the selected embodiment of the invention here shown, for purposes of disclosure, there is illustrated a multiple switch of ordinary construction comprising a case or cabinet 6 having an insulated panel 7 mounted therein upon which the switches are mounted. The switches here shown are similar in construction and it will therefore be necessary to describe but one, like parts being indicated by like numerals. Each switch preferably consists of a lever 8 pivotally mounted between lugs 9 upon a subpanel 11 which is secured to the panel 7 by means of screws 12. The lugs 9 of the series of switches are electrically connected together by means of a bar 13 secured thereto by screws 14 as shown in Figure 1. The usual contact fingers 15 are secured to the lever 8 and are adapted to be moved into and out of contact with the stationary contacts 16 secured to the subpanel 11. One side of the power line is connected to the bar 13 and the other side to the stationary contacts 16 so that when the switch lever 8 is in closed position as shown in Figure 1, the current will flow from the bar 13 through the lever 8 to the stationary contact 16 and therefore the other side of the line. An insulated hand grip or handle 17 is secured to each switch lever 8 by means of which they may be manually operated. These handles preferably outwardly project through elongated apertures 18 provided in the wall of the cabinet as shown in Figures 2, 3, 4, and 5.

An important feature of this invention resides in the novel means provided for positively preventing more than one switch from being moved into closing position at one time, and also for yieldably retaining the switch levers in either open or closed position. Such means preferably consists in the

provision of a series of yokes, or spring controlled latch members 19, 21, and 22 which are pivotally mounted upon studs 23, 24 and 25, respectively, as shown in the various 5 figures. For convenience in describing this mechanism and its operation the switch handles 17 will be hereinafter referred to by the letters A, B, and C. Each yoke is yieldably held in switch-opening or closing position by means of a spring 26 having one end 10 pivotally connected thereto by means of a pin 27 and its other end secured to the wall of the casing. The fingers 28 of each yoke are adapted to straddle its complementary switch handle so that movement of the 15 switch handle will cause its respective yoke to oscillate upon its pivot. Thus each lever has connected therewith a pivoted spring controlled latch member adapted to positively yieldably maintain the lever at opposite switch control limits after manual starting. An L-shaped arm, or bell crank lever as a rock member or pivoted arm, 29 is 20 pivotally mounted upon a stud 31 secured to the casing wall and this arm is connected, by means of a link 32, to a T-shaped rock member or pivoted arm 33 which is pivotally mounted upon the stud 24 upon which the yoke 21 is mounted. A rock arm or element 25 34 is similarly mounted upon the stud 31, the opposed ends of which are adapted to engage the switch handles A and B.

In Figure 2, the parts are shown in inoperative position, in a row at a position herein 30 designated "normal" or "switch open" position, with the movable contacts 15 out of engagement with the stationary contacts 16. When thus positioned, the switch handles A, B, and C first, second and third will be 40 moved to the outer or lower end of the elongated openings 18 and will be yieldably held in such position by means of the springs 26, as a result of the pins 27 oscillating about the axes of the pivots 23, 24 and 25 of the yokes 19, 21 and 22, respectively, thereby 45 tending to elongate the springs 26 as they pass over the pivots 23. As soon as the springs pass over the pivots 23 the fingers 28 of the yokes 19, 21 and 22 will be downwardly moved to the position here shown, 50 caused by the action of the springs 26 as they contract.

In Figure 3, the switch handle A is shown in switch-closing position wherein the fingers 55 28 of the yoke 19 have been upwardly moved and in which position the handle A will be yieldably held against the end of the elongated opening 18. As the switch handle A is moved from the position shown in Figure 60 2 to that shown in Figure 3, it will engage the reduced end portion 35 (see Fig. 4), of the L-shaped arm 29 and move it to the position here shown. When thus actuated, the lever 34 and the T-shaped arm 33 will 65 also be actuated by means of the line 32.

In Figure 4, the switch handle B is shown as having been moved to switch-closing position in which position it also is yieldably held against the end of the elongated opening 18 by the action of the spring 26. When 70 the switch handle B is moved from the position shown in Figures 2 and 3 to that shown in Figure 4, it will engage one end of the rocker-arm 34 and upwardly move it as here shown, while the other end of the 75 rocker-arm 34 will engage the switch handle A and downwardly move it to switch-opening position as shown in this figure. When thus positioned, the switch handles A and B will be yieldably held in their respective 80 switch-opening and switch-closing positions by means of the springs 26.

In Figure 5, the switch handle C is shown in switch closing position and the switch 85 handles A and B in inoperative or switch-opening position. When the switch handle C is moved to the position here shown from that shown in Figures 2, 3 and 4, it will engage one side of the T-shaped head of the arm 33 while the other side of the T-shaped 90 head will engage the switch handle B and downwardly move it to the position here shown in which position the two switch handles B and C will in like manner be 95 yieldably held in their respective positions.

Thus it will readily be seen that by the employment of this novel interlocking mechanism any one of the series of switches may be selectively moved into closing position and also that it will be impossible for more than 100 one switch to be moved into such position at one time. Referring to Figure 5, it will be seen that should the switch handle A be moved into switch-closing position as shown in Figure 3, it will engage the reduced end 105 portion 35 of the L-shaped arm 29 which will cause said arm to oscillate upon the pivot pin 31. Such oscillation of the arm 29 will effect a similar operation of the T-shaped arm 33 as a result of the link connection therebetween. Such oscillation of 110 the T-shaped arm 33 will therefore cause the one side of the T-shaped head to engage the switch handle C and downwardly move it to switch-opening position as shown in 115 Figures 2, 3 and 4.

In the drawings, I have shown this novel switch mechanism as applied to a multiple switch comprising three switch levers. It is 120 to be understood, however, that it may be used in conjunction with any number of switch levers by simply increasing or decreasing the number of parts, depending, of course, upon the number of switch levers 125 with which it is to be used.

I claim as my invention:

1. A device of the class described comprising three pivoted knife-edge switch levers first, second and third, said levers normally 130 alined at one throw limit, the levers being

swingable to an opposite throw limit in planes parallel to one another through small arcs of substantially equal length and in the same direction, a first rockable element having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and second switch levers, said rockable elements having a common pivot, a third rockable element having extensions across the paths of the second and third switch levers, said first and third rockable elements being connected for movement in unison, and spring controlled pivoted elements engaging the switch levers to hold the same at either throw limit and to snap the levers to those limits after movement has been manually initiated.

2. A device of the class described comprising three pivoted knife-edge switch levers first, second and third levers normally alined at one throw limit, the levers being swingable to an opposite throw limit in planes parallel to one another through small arcs of substantially equal length and in the same direction, a first rockable element between the first and second switch levers having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and second switch levers, said elements having a common pivot, a third rockable element between the second and third switch levers having extensions across the paths of said second and third levers, said first and third rockable elements being connected for movement in unison, and having extensions respectively normally lying near the first and second levers, and said second and third levers having extensions respectively normally lying at greater distance from second and third levers.

3. A device of the class described comprising three pivoted knife-edge switch levers first, second and third, said levers normally alined at one throw limit, and being swingable to an opposite throw limit in planes parallel to one another and in the same direction, a first rockable element having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and second switch levers, said elements having a common pivot, a third rockable element having extensions across the paths of the second and third switch levers, said first and third rockable elements being connected for movement in unison, the connection being made on that side of the levers adjacent the normal throw limit.

4. A device of the class described comprising three pivoted knife-edge switch levers first, second and third, said levers normally

alined at one throw limit, and being swingable to an opposite throw limit in planes parallel to one another and in the same direction, a first rockable element having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and second switch levers, a third rockable element having extensions across the paths of the second and third switch levers, said first and third rockable elements being connected for movement in unison, all extensions lying the same side of the levers.

5. A device of the class described comprising three pivoted knife-edge switch levers first, second and third, said levers normally alined at one throw limit, and being swingable to an opposite throw limit in planes parallel to one another and in the same direction, a first rockable element having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and second switch levers, said elements having a common pivot, a third rockable element having extensions across the paths of the second and third switch levers, said first and third rockable elements being connected for movement in unison, said rockable elements being normally slanted in a direction generally toward the first switch lever.

6. A device of the class described comprising three pivoted knife-edge switch levers first, second and third, said levers normally alined at one throw limit, and being swingable through small arcs of substantially equal length, and in the same direction, to an opposite throw limit, a first rockable element having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and second switch levers, said elements having a common pivot, a third rockable element having extensions across the paths of the second and third switch levers, said first and third elements being connected for movement in unison through substantially equal arcs, and spring controlled pivoted elements engaging the switch levers to hold the same at either throw limit and to snap the levers to those limits after movement has been manually initiated.

7. A device of the class described comprising three pivoted knife-edge switch levers first, second and third, normally alined at one throw limit, the levers being swingable through small arcs in the same direction, to an opposite throw limit, a first rockable element having an extension arranged across the path of the first lever, a second rockable element having extensions arranged respectively across the paths of the first and sec-

ond switch levers, a third rockable element and second levers and being initially nearer
between the second and third switch levers those levers, and the other extensions being 10
having extensions across the paths of the farther respectively from the second and
second and third switch levers, said first and third levers.
5 third elements being connected for move- In witness whereof, I have hereunto set
ment in unison, the extension of the first, my hand this 30th day of July 1924.
and one extension of each of the second and
third rockable elements overlying the first

JOHN E. SEDERHOLM.