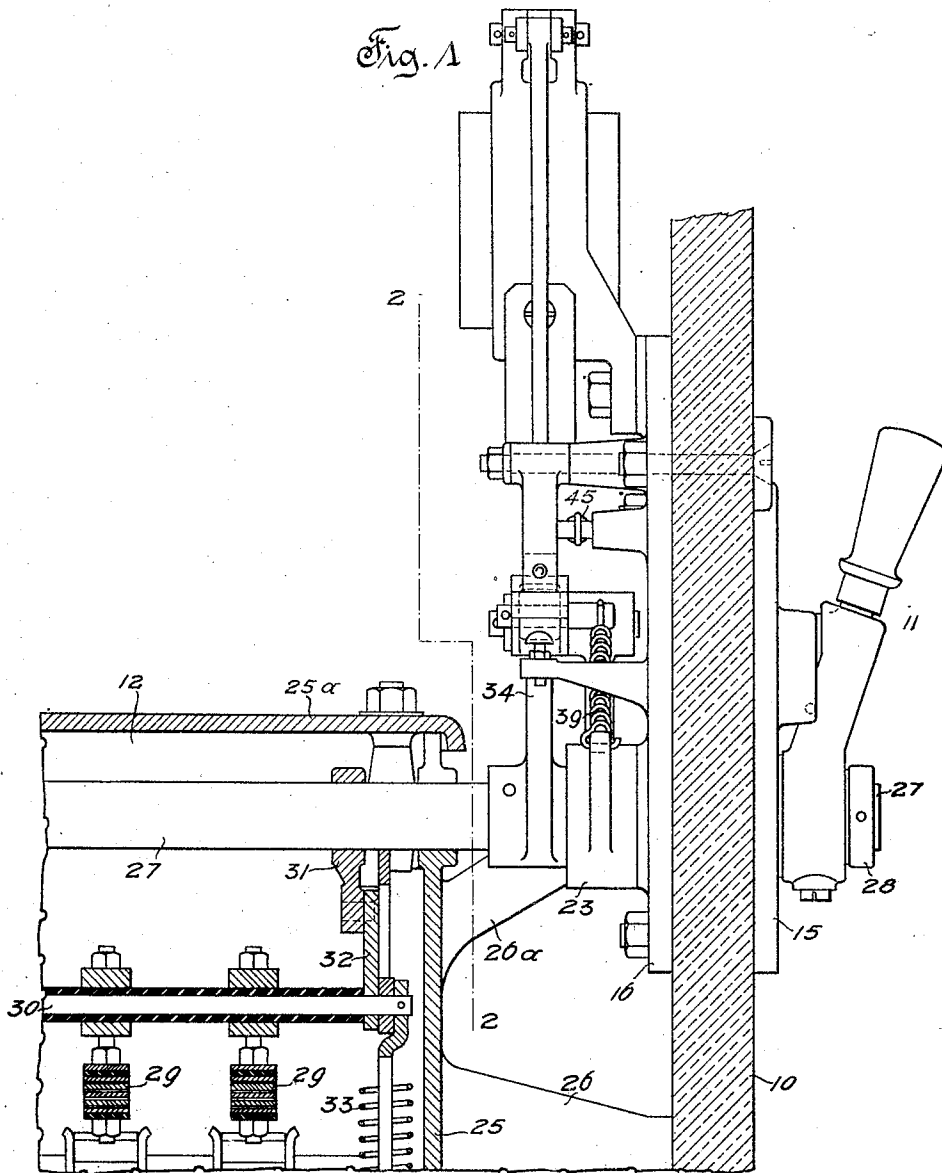


H. W. CHENEY.
 SWITCH OPERATING MECHANISM.
 APPLICATION FILED APR. 3, 1909.

1,052,409.

Patented Feb. 4, 1913.

3 SHEETS—SHEET 1.



Witnesses

Rob. E. Hall.

Chas. L. Byron

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Herbert W. Cheney

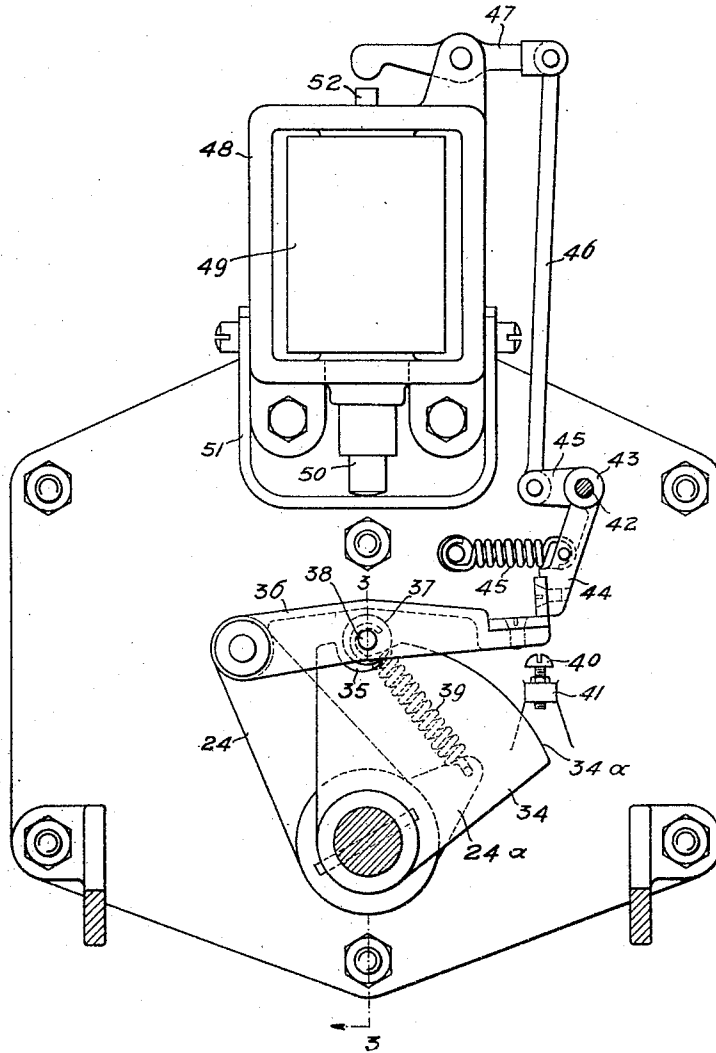
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 3 SHEETS-SHEET 2.

Fig. 2



Witnesses
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3 SHEETS-SHEET 3.

Fig. 4

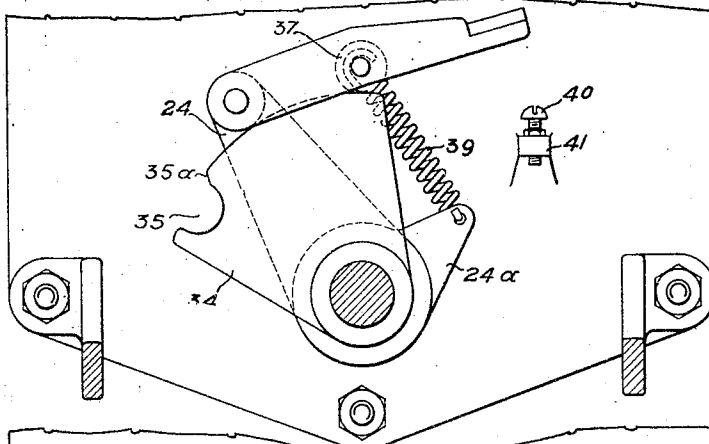


Fig. 5

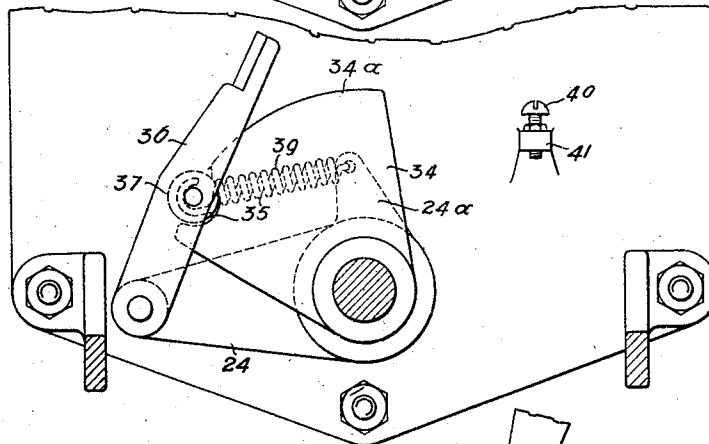
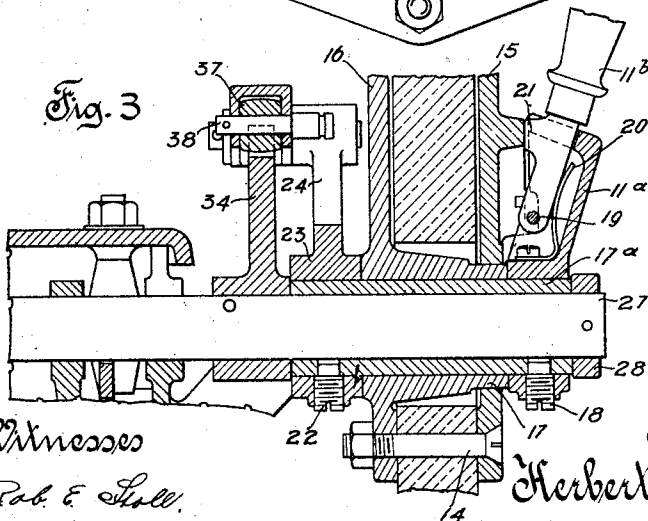


Fig. 3



Witnesses

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UNITED STATES PATENT OFFICE.

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SWITCH-OPERATING MECHANISM.

1,052,409.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed April 3, 1909. Serial No. 487,731.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Switch-Operating Mechanisms, of which the following is a full, clear, and exact specification.

10. This invention relates to switches, and particularly to that type wherein there is provided at some point between the handle and the switch a separable connection or coupler which permits the switch to be opened independently of the handle.

More particularly the present invention relates to an improved switch operating mechanism and especially to certain features in connection with the separable connection between the handle and the switch.

20. The object of the invention is the provision of an effective and reliable switch operating mechanism which is compact and simple in construction, which will permit the switch to be closed or opened manually, or to be opened automatically independently of any movement of the switch handle so that it will be impossible for the operator to hold the switch closed by retaining the handle in its "on" or closed position during the continuance of an abnormal line condition, such as an overload.

30. The particular operating mechanism which I have shown in the accompanying drawings and which will be described presently, includes two rotary shafts, one of which is connected to the operating handle and the other of which extends to and operates the movable contact member or members of the switch, the two shafts being adapted to be moved in unison or independently, depending upon whether or not the parts of the coupling means are in driving engagement. Some of the features of my present invention, however, are not limited to an operating mechanism of this particular type, and may, with slight modifications which I consider within the scope of my invention, be adapted to switches and operating mechanisms quite different in form and principle from those here shown.

50. My invention may be briefly summarized as consisting in certain novel details of construction and combinations and arrangements of parts which will be described in

the specification and set forth in the appended claims.

Reference is had to the accompanying sheets of drawings, in which—

Figure 1 is a side elevation of a switch 60 having an operating mechanism constructed in accordance with my invention; Fig. 2 is a sectional view substantially along the line 2—2 of Fig. 1, looking toward the switch board; Fig. 3 is a vertical sectional view substantially along the line 3—3 of Fig. 2, looking in the direction indicated by the arrow; Fig. 4 is a view of a portion of the operating mechanism viewed as in Fig. 2, and showing the relative positions 65 of certain parts particularly of the separable driving connection, when the switch has been opened automatically; and Fig. 5 is a similar view showing the parts of the connection reengaged or the driving connection restored so that the switch can be closed by a movement of the operating handle.

Referring now to the figures of the drawing, 10 represents the switch-board panel 80 on the front of which is the operating handle 11, and on the rear of which is secured a switch 12 and certain parts of the operating mechanism to be described.

Secured to the front and rear of the panel 85 respectively by means of screws or bolts 14 are two cast metal plates 15 and 16, the former of which is preferably notched and coöperates with the handle to hold the latter in its "on" or "off" positions, and the latter of which holds and supports part of the operating mechanism. The plate 16 has a tubular flange 17 which projects forwardly through the panel and through the plate 15 as shown in Fig. 3, 95 and forms a bearing for a hollow shaft 17^a which projects forwardly beyond the plate 15 and rearwardly beyond the plate 16. To the forward end of the hollow shaft 17^a is secured the handle 11 which consists of two main parts 11^a and 11^b, the former surrounding and being secured to the end of the shaft 17^a by means of a screw 18, and the latter being pivoted to the portion 11^a by means of a transverse pin 19. The portion 11^b of the handle is pressed yieldingly forward toward the plate 15 by means of a leaf spring 20 and provided with a tongue or projection 21 which is adapted to co-operate with certain notches on the plate 110

15. To the rear end of the hollow shaft 17^a is secured by means of a screw or pin 22, a hub 23, having an integral crank arm 24 and a shorter arm 24^a at substantially right angles to the arm 24. This arm 24 forms
5 part of the separable connection or coupler to be explained more fully presently.

The switch 12, a portion of which is shown in Fig. 1, includes a cast metal frame 25 which is secured to the plate 16 and to the panel by arms 26 and 26^a, said frame forming an oil receptacle and being provided with a removable cover 25^a. Mounted in the upper portion of this frame or inclosure 25 is a horizontal rotary shaft 27, the axis of which coincides with the axis of the hollow shaft 17^a, and which, in this case extends through and is journaled in the hollow shaft 17^a, the forward end of the shaft 27 in this case extending beyond the end of the shaft 17^a and having secured thereto a retaining collar 28. The shaft 27 may be employed for operating any suitable switch and may convey any desired movement to the movable contacts of the switch, but in this case it is designed to shift a plurality of movable contact members 29 in a vertical direction. These contact members 29 are carried by a horizontal shaft 30 which is below the shaft 27 and receives vertical movement from the latter by means of cranks 31 and links 32 the latter being connected to the ends of the cranks 31 and to the shaft 30, one of the cranks 31 and one of the links 32 being shown in Fig. 1. The shaft 30 is guided for movement by any suitable guiding means and is designed to be shifted upwardly so as to open the switch with a quick movement by means of springs 33, one of which is shown in Fig. 1.

Secured to the shaft 27 adjacent to the crank arm 24 is a crank arm 34 in the form of the segment of a circle and having at its outer arc shaped end 34^a and near one corner thereof a rounded notch 35 which is preferably slightly larger than a half circle and has an inclined portion 35^a. Pivotal-ly connected to the outer end of the crank arm 24 and extending in the plane of and
45 over the segment 34 is an arm 36 which is hollowed out or recessed on its under side and is provided between the downwardly projecting sides formed by the recess, with a roller 37 which is mounted upon a pin 38 projecting transversely through the sides of the arm 36 and extending a suitable distance beyond the latter toward the switch-board. This roller is of a size such that it will readily engage the notch 35. The arm 36 is
50 pressed toward the segment 35 so as to hold the roller either in the notch 35 or upon the arc shaped portion of the segment 34 by means of a coil spring 39 which is connected to the end of pin 38 and to the free end of
65 the arm 24^a, which, as stated before, extends

from the hub with which the crank arm 24 is integral.

When the roller is the full distance in the notch 35, a driving connection is formed between the hollow shaft 17^a and the shaft 27 no matter in what direction the switch handle is moved. When the switch is opened automatically in a manner to be explained presently, the parts of the coupler or connecting means occupy substantially the positions shown in Fig. 4, that is, the segment is turned relative to the roller 37 through a suitable arc, the turning of the segment being due to the rotation of the shaft 27 incident to the opening of the switch. The roller now bears against the arc shaped portion of the segment. To close the switch the handle is thrown from one extreme position to the other so as to cause the arms 24 and 36 to be turned in a proper direction until the roller 37 again drops into the notch 35, parts being then in the position shown in Fig. 5. When the switch handle is thrown in the opposite direction, the arms 24 and 36 and the segment 34 will be turned simultaneously, the driving connection now being formed, and the switch can be closed. In order that the segment 34 may be readily released or separated from the arm 36 to effect the opening of the switch, I provide in the path of the arm 36 a projection which, at the final closing movement of the handle, or just as the switch is being closed, is engaged by the end of the arm 36 and causes a slight relative movement between the latter and the segment 34, the movement of the arm 36 being sufficient to lift the roller partially from the notch 35 or until it rests upon or engages the inclined portion 35^a of the notch. When the parts are in this position, the engaging parts of the coupler are biased toward entire disengagement but are normally prevented from relative separation by means to be described. The projection referred to consists in this case of an adjustable screw 40 mounted in a lug 41 projecting rearwardly from the plate 16.

To hold the parts in the position just described, and in order that the switch may be opened manually or automatically, I provide the following mechanism: Pivoted upon a pin 42 extending laterally from the plate 16 is a bell crank latch or trigger 43, having an arm 44, the lower end of which is held by a coiled spring 45 a short distance above the head of the screw 40 in position such that it will be engaged by the end of the arm 36 as the latter is moved upwardly after engagement with the head of the screw 40 and as the roller 37 engages the inclined portion 35^a of the notch. It will be seen that the switch cannot now be opened until either the arm 44 has been rocked out of engagement with the arm 36, or until the latter has been moved by a manual operation

of the switch handle out of engagement with the arm 44. The bell crank lever 43 also includes an arm 45 which is connected by a link 46 to one end of a small lever 47 pivotally mounted upon the frame 48 of a tripping magnet 49. The magnet is provided with an armature 50 which is normally held in the lowermost position by a support 51, and which, when an overload occurs in the main circuit, will be drawn upwardly so as to strike a hammer 52 which is directly below one end of the lever 47 and will rock said lever 47 so as to cause the link 46 to move the arm 44 of the bell crank 43 out of engagement with the end of arm 36. As soon as these parts are disengaged, the members which tend to open the switch, in this case the springs 33, cause the segment to force the roller upwardly entirely out of the notch or off of the inclined portion thereof. The segment is then quickly turned to the position shown in Fig. 4 by the opening movement of the switch. The opening of the switch may be effected manually, or rather the arm 36 may be manually disengaged from the arm 44 of the bell crank latch by shifting the switch handle and after this takes place the segment and the roller 37 are disengaged and the switch is opened with a quick movement, by the springs as just described.

What I claim as new and desire to secure by Letters Patent is:—

1. In combination with a switch, an operating mechanism comprising a handle and a coupler through which said handle may operate the switch, said coupler comprising two concentrically arranged parts which are connected together in driving engagement until the switch is tripped, and means for causing a slight relative movement between said parts of the coupler during the movement of the handle, so that after the switch is closed said parts are biased toward separation.

2. In combination with a switch, an operating mechanism comprising a handle and a coupler through which said handle may operate the switch, said coupler comprising two concentrically arranged parts which are connected together in driving engagement until the switch is tripped, means for causing a slight relative movement between said parts of the coupler during the final closing movement of the handle so that said parts are biased toward separation after the switch is closed, and means for normally preventing the separation of said parts.

3. In combination with a switch, an operating mechanism comprising a handle and a connection through which said handle may operate the switch, said connection comprising two rotatably mounted parts which are in driving engagement until the switch is tripped, means for causing a slight relative

movement between said parts of the coupler during the final closing movement of the handle so that said parts are biased toward separation after the switch is closed, and a latch for normally preventing the separation of said parts.

4. In combination with a switch, an operating mechanism comprising two members, one connected to the handle, and the other to the switch, and a coupler between said members, said coupler comprising two rotatably mounted parts which are connected together when the switch is closed by a movement of the handle, means for causing one of the parts of the coupler to be moved to a position such that it tends to move out of engagement with the other part of the coupler, and means for normally preventing disengagement between said parts.

5. In combination with a switch, an operating mechanism comprising a handle and a separable coupler through which said handle may operate the switch, said coupler comprising two rotatably mounted parts, one having an open notch and the other a projection which engages said notch while the switch is being closed, and means for causing a slight relative movement between said projection and the part having a notch so that said parts tend to separate, said relative movement taking place during the final movement of the switch handle.

6. In combination in a switch operating mechanism, an operating handle, two concentrically arranged members, one connected to the handle and adapted to shift the other, a separable connection between said members, said connection comprising two parts, one having a notch and the other a projection, which, when in full engagement with said notch, permits one of said members to be shifted by the other, means for causing a slight relative movement between said parts of said members during a final movement of the handle in one direction, and means for stopping said relative movement and for holding the parts of the coupler in positions such that they are biased to separation.

7. In combination with a switch, a switch operating mechanism comprising two members, one connected to the handle and the other to the switch, a separable connection between said members comprising two adjacent rotatably mounted arms connected to the two members respectively, one of said arms having an open notch and the other a device which is adapted to engage said notch when the handle is moved to one position and to remain in engagement therewith while the switch is being closed by a further movement of the handle, and a member for causing said device to be moved partially out of said slot during the final closing movement of the handle, to a position such that said device tends to emerge from said

slot and permit the parts of the coupler to move relative to each other.

8. In combination with a switch, a switch operating mechanism comprising two members, one connected to the handle and the other to the switch, a separable connection between said members comprising two adjacent rotatably mounted arms connected to said members respectively, one arm having an open notch and the other a device which is adapted to engage said notch when the handle is moved to one position and to remain in engagement therewith while the switch is being closed by a further movement of the handle, a member for causing said device to be moved partially out of said slot during the final closing movement of the handle, to a position such that said device tends to emerge from said slot and permit the arms to move relative to each other, and a movable device for preventing movement of said device from the notch until after the occurrence of a predetermined abnormal line condition.

9. In combination with a switch, a switch operating mechanism comprising a rotary handle, a shaft connected to the handle, a second shaft connected to the switch, a separable connection between said shafts comprising two adjacent members connected to said shafts respectively, said members being in driving engagement until the switch is tripped, and means for causing a slight relative movement between the parts of said connection during the final closing movement of the handle so that said parts are biased toward separation.

10. In combination with a switch, a switch operating mechanism comprising a rotary handle, a shaft connected to the handle, a second shaft connected to the switch, a separable connection between said shafts comprising two adjacent members connected to said shafts respectively, said members being in driving engagement when the switch is being closed by a movement of the handle, means for causing a slight relative movement between the parts of said connection during the final closing movement of the handle so that said parts of the connection are biased toward separation, and means for normally preventing disengagement between said parts.

11. In combination with a switch, a switch operating mechanism comprising a handle, two shafts, one connected to the handle and the other to the switch, a separable connection between said shafts, said connection comprising two members, one having an open slot and the other a device which is adapted to extend into said slot and thereby form the driving connection between said shafts when the switch is being closed by a movement of the switch in one direction, means for causing a partial movement of

said device in the slot during the final closing movement of the handle to a position such that it is biased toward movement out of the slot, and means for normally preventing disengagement between said parts.

12. In combination with a switch, a switch operating mechanism comprising a handle, two shafts, one connected to the handle and the other to the switch, a separable connection between said shafts, said connection comprising two members one having an open slot and the other a device which is adapted to extend into said slot and thereby form the driving connection between said shafts when the switch is being closed by a movement of the switch in one direction, means for causing a partial movement of said member to a position such that it is biased toward movement out of the slot, and means for holding said parts together and for automatically releasing the same upon the occurrence of a predetermined line condition.

13. In combination with a switch, an operating mechanism therefor comprising an operating handle, a shaft connected to said handle, a second shaft connected to the switch, a separable connection between said shafts comprising two members connected to the shafts respectively, one having a notch and the other an arm pivoted thereto and provided with a device which is adapted to engage said notch so as to form the driving connection between the shafts, means for causing said device to engage the notch when the handle is moved to one extreme position, and to be held yieldingly therein when it is moved to the other extreme position in closing the switch, means for causing said device carried by the arm to be moved partially from said slot during the final closing movement of the handle to a position such that the parts of the coupler are biased toward separation, means for holding the parts against such separation, and means for shifting said holding means so as to permit the switch to be opened.

14. In combination, a switch, an operating mechanism comprising an operating handle, two shafts, one connected to the handle, the other to the switch, a separable coupler between said shafts, said coupler comprising two members mounted on said two shafts respectively, one of said members having an open notch and the other having pivoted thereto, a spring pressed arm provided with a roller adapted to engage said notch and to remain in engagement therewith during the closing of the switch by a movement of the switch handle in one direction, means for causing said roller to move partially from said notch during the final closing movement of the handle to a position such that it is biased to emerge entirely from the slot, and a member which

is engaged by said arm and normally prevents the roller from emerging from the slot.

15. In combination, a switch, an operating mechanism comprising an operating handle, two shafts, one connected to the handle and the other to the switch, a separable coupler between said shafts, said coupler comprising two members mounted on said two shafts respectively, one of said members having an open notch, and the other having pivoted thereto, a spring pressed arm provided with a roller adapted to engage said notch, and to remain in engagement therewith during the closing of the switch by a movement of the switch handle in one

direction, means for causing said roller to move partially from said notch during the final closing movement of the handle to a position such that it is biased to emerge from the slot, a pivoted latch which is engaged by said arm and normally prevents said roller from emerging from the slot, and means for automatically tripping said latch so as to permit the parts of the coupler to separate and the switch to open.

In testimony whereof I affix my signature, in the presence of two witnesses.

HERBERT W. CHENEY.

Witnesses:

H. C. CASE,
CHAS. L. BYRON.