June 23, 1931. W. M. GRAY 1,811,830

SWITCH STAND

Filed Feb. 20, 1930 3 Sheets-Sheet 1

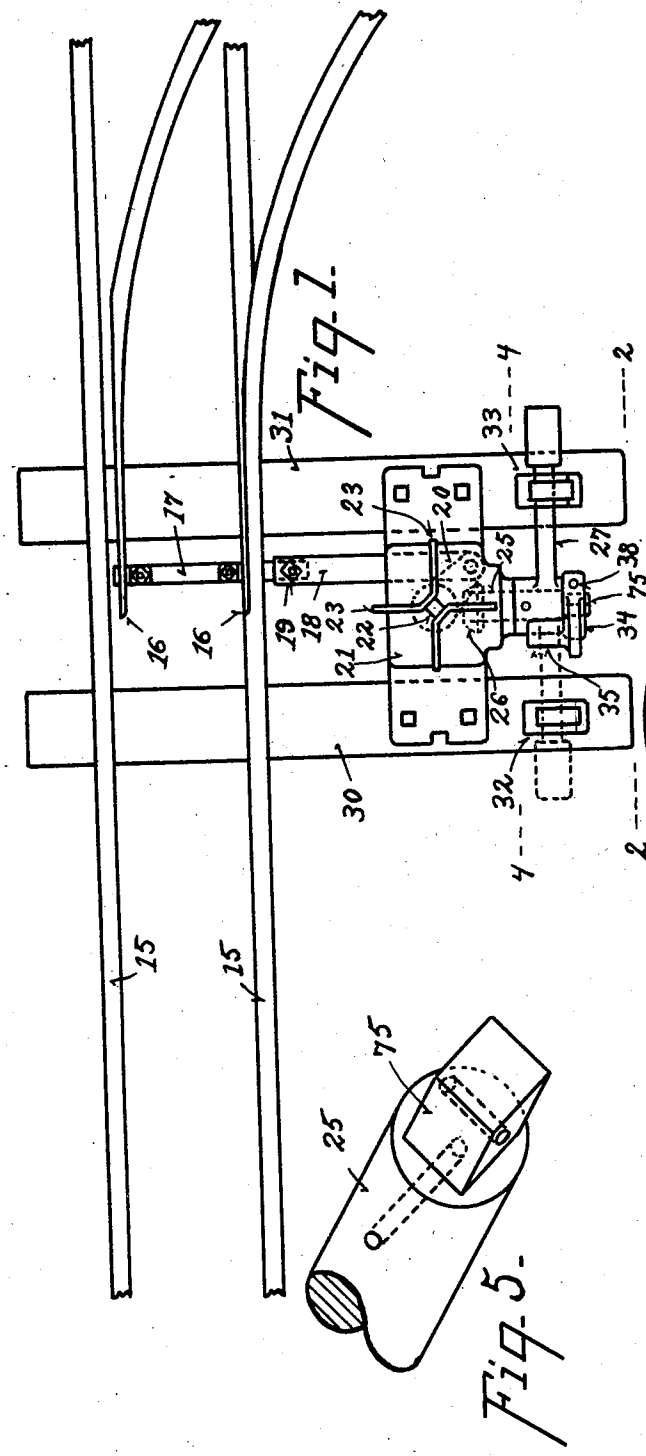


Fig. 1.

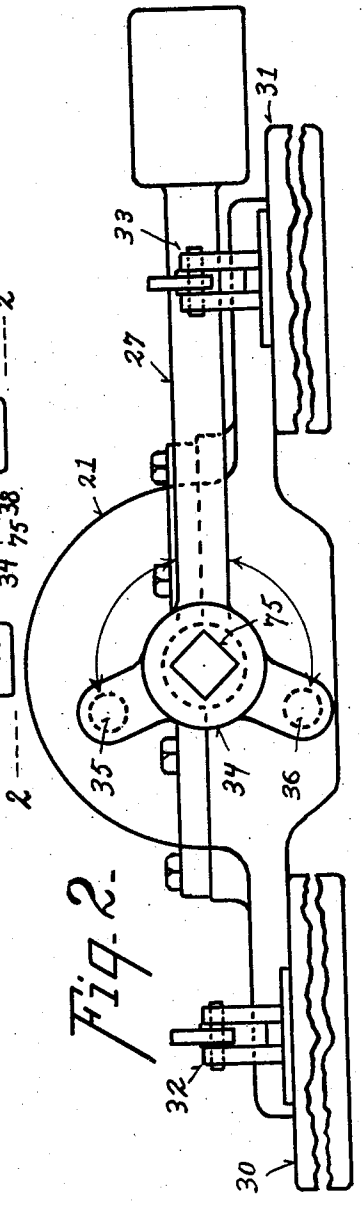


Fig. 2.

Fig. 5.

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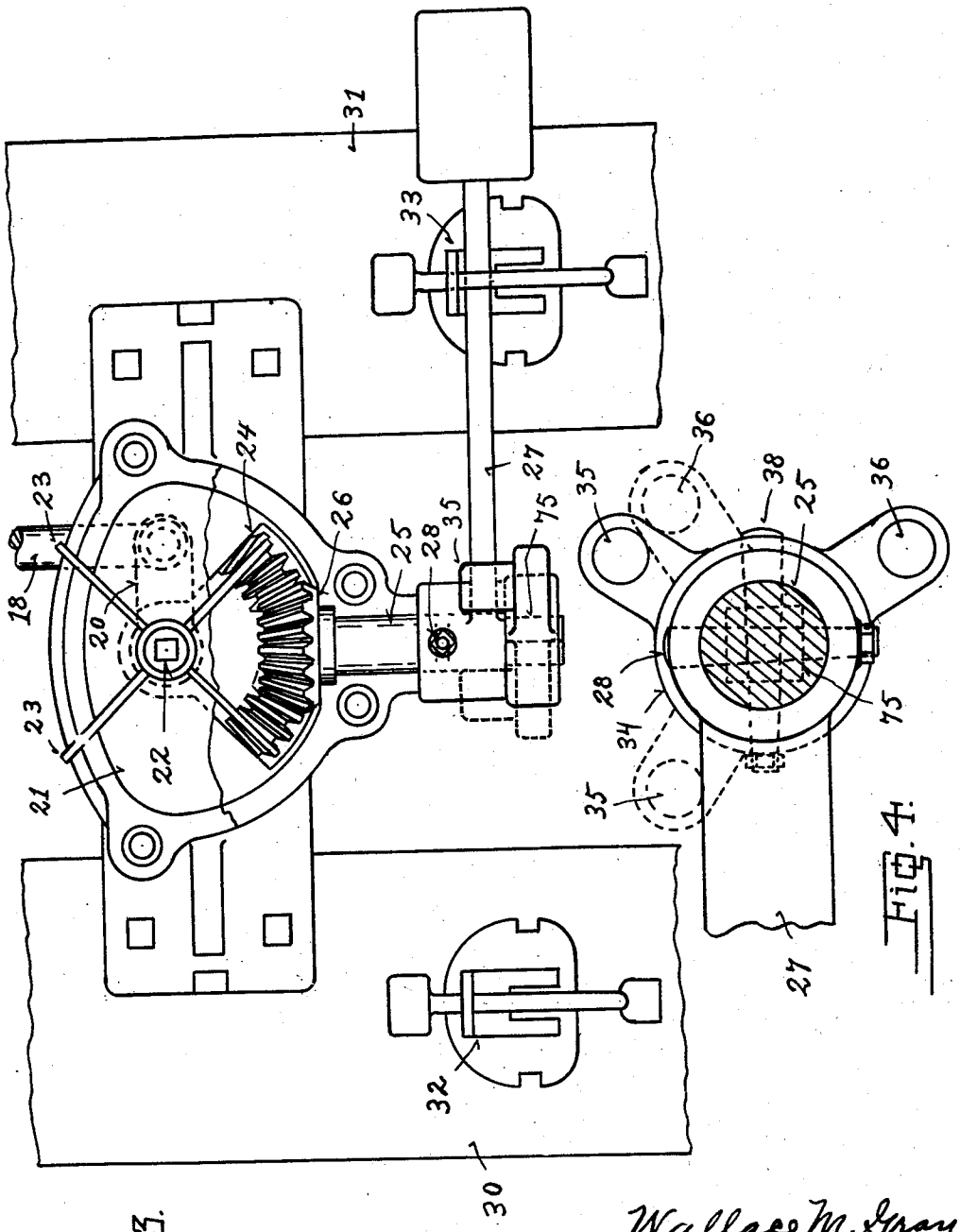


Fig. 4.

Fig. 3.

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Fig. 6.

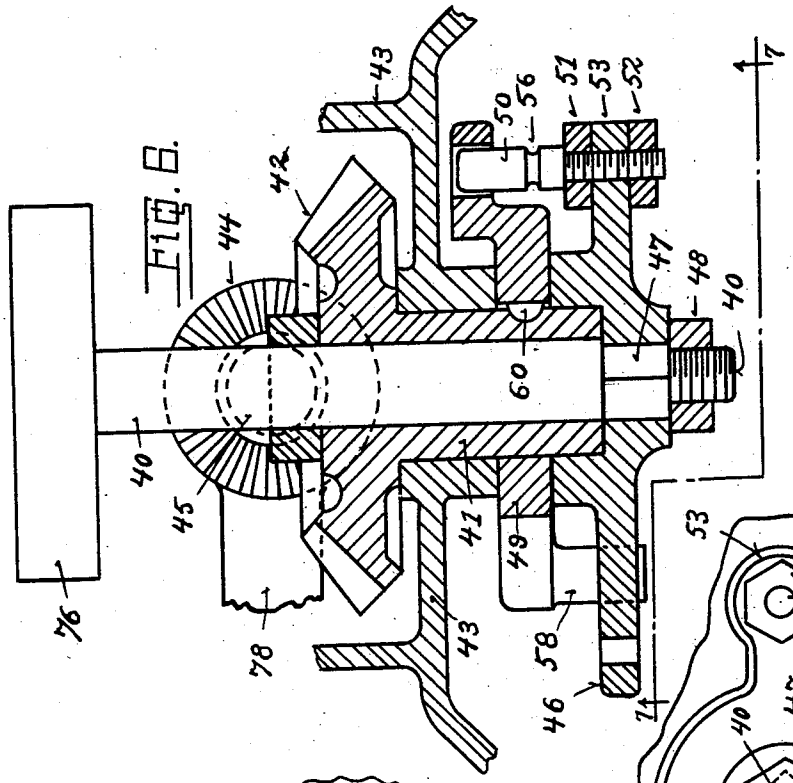


Fig. 7.

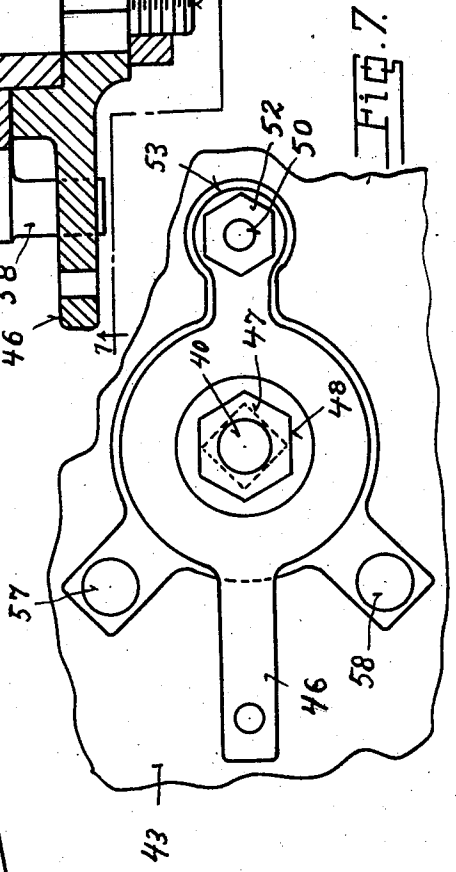
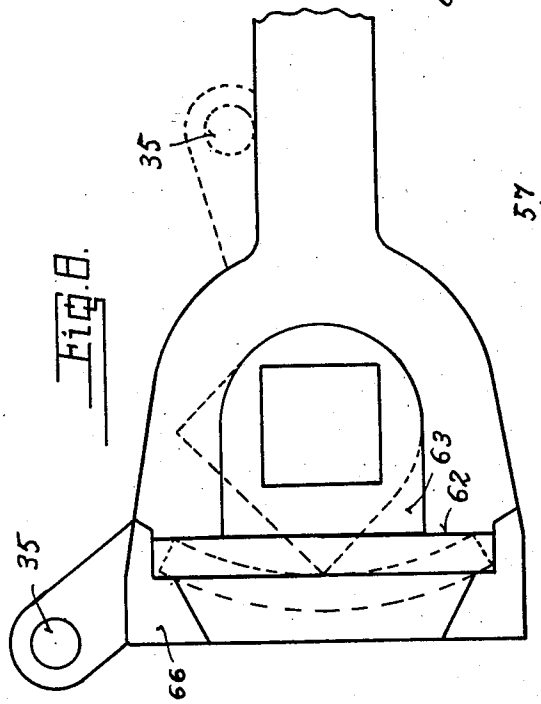


Fig. 8.



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UNITED STATES PATENT OFFICE

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SWITCH STAND

Application filed February 20, 1930. Serial No. 429,951.

My invention relates to improvements in railway switch apparatus. One of its objects is to provide an improved switch apparatus provided with a breakable or bendable and replaceable member adapted when the switch is forced to yield and thereby permit the switch points to move a portion of a normal throw, but not a full normal throw, said movement of the switch being sufficient to permit the rolling stock to pass without breaking or injuring the more expensive and important switch members. Another object is to provide means brought into operation when the yieldable member has been forced and has yielded to prevent the switch points being forced entirely over to the opposite extremity of their throw, either by the action of the rolling stock or by a trainman, thereby preventing the switch points taking a position tending to deceive or mislead the trainmen into believing that the switch is still in operative condition when in fact it has been forced and is not in operative condition. Another object is to provide yieldable means adapted to yield when the switch is forced and means brought into action when the switch has been forced and said yieldable member has yielded tending to leave the switch points in a position intermediate of the extremities of the throw of the switch to thereby indicate by the position of the switch points and warn the trainmen that the switch has been forced and rendered inoperative even in the absence of a switch stand signal or target, and notifying the trainmen to restore the switch to operative condition by replacing the yieldable member before further use is made of the switch. My invention also comprises certain details of form and arrangement and combination of components, all of which will be fully set forth in the description of the accompanying drawings, in which:

Fig. 1 is a plan of a railway switch and switch stand embodying my invention.

Fig. 2 is an end view of the switch stand in its normal or operative condition, taken on line 2—2 of Fig. 1.

Fig 3 is a view similar to Fig. 1, illustrating the position of the parts after the switch has been forced.

Fig. 4 is an enlarged sectional detail taken on line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the outer end of the switch actuating shaft detached.

Fig. 6 is a central vertical section through a switch stand illustrating a modification.

Fig. 7 is a bottom plan of the same taken on line 7—7 of Fig. 6.

Fig. 8 is a sectional detail showing the use of a bendable in place of a breakable yieldable member.

Switch stands in general when forced or trailed, that is, run through by a locomotive or other rolling stock from the wrong direction, are seriously injured due to the excessive strain to which the switch and switch stand are subjected, and to the ultimate bending or fracture of some member thereby permitting the switch points to be forced away from the rails by the wheel flanges. As a partial remedy, some switch stands heretofore have been provided with a breakable crank or other member, more readily replaceable than the gears, and more expensive switch members. Under the above circumstances the switch points being rendered independent of the rigidly latched actuating lever, are free and able to take a position with reference to the main rails calculated to mislead the approaching trainmen into believing the switch is in operative condition when it is not. My improved switch apparatus is adapted to limit the movement of the switch points in the event that the switch is forced, to substantially one-half of a normal throw of the switch, leaving the points midway between and spaced away from both main rails, so as to render it apparent to approaching trainmen, whether a switch stand signal or target is employed or not, by this intermediate position of the switch points, that the switch has been forced. It frequently happens that trainmen when they notice that they are responsible for having forced and injured a switch are liable to try to manually readjust the switch points when such is possible and leave the switch in condition to cause an accident rather than to report and

restore the switch to operative condition, their line of reasoning being that in the event of an accident, it can be charged to accidental fracture in use, or to the acts of others besides themselves. Hence it is important to provide a switch apparatus, which when forced tends to indicate by the position of its switch points that it has been forced, and gives warning that it requires to be restored to operative condition before further use, and also one which is incapable of being tampered with to mislead others to believe it is in operative condition when it is not.

The accompanying drawings illustrate modifications of my improved switch apparatus in Figs. 1 to 5 of which 15 represents the main rails, 16 the switch points held together by a cross bar 17, and operable from one position to another by means of a connecting bar 18 pivotally attached at 19 to one end to the cross bar 17 and switch points 16, and at its opposite end pivotally attached to the free end of a crank arm 20 located beneath the switch housing 21 and attached to the lower end of the vertical crank shaft 22, which is journaled in bearings in the housing 21. A signal target 23 is preferably attached to the upper end of the shaft 22. A gear segment 24 is attached to the shaft 22 and located within the switch housing. A switch actuating shaft 25 is journaled in a substantially horizontal position in bearings carried by the housing 21. A pinion 26 is attached to the inner end of the actuating shaft and said pinion meshes with the gear segment on the crank shaft. The gear ratio of the pinion and gear segment is two to one, and the normal crank throw is ninety degrees, while the throw of the actuating lever is one hundred and eighty degrees.

The end of the actuating shaft which projects outside of the switch housing has a cylindrical section upon which the hub of a switch actuating lever 27 is mounted and normally locked against rotation by means of a breakable or bendable pin 28. The switch housing is mounted rigidly upon two timbers or railway ties 30 and 31. Also mounted upon the ties 30 and 31 are two latch members 32 and 33 which serve to latch the free and weighted end of the actuating lever 27 at opposite extremities of its movement. The projecting end of the actuating shaft outside of the hub of the actuating lever has a squared or polygonal exterior 75 to which is non-rotatably secured a hub or sleeve 34 which is provided with two rugged or non-breakable projections 35 and 36 which project one above and the other below and into the plane of movement of the actuating lever, so as to limit the rotative movement of the actuating shaft 25 to approximately that of ninety degrees with reference to the latched actuating lever, assuming that the breakable or bendable pin or member 28 is either removed or sheared off. The collar or sleeve 34 is held detachably in place upon the polygonal section of the actuating shaft by means of a pin or bolt 38, which is subjected to but little strain or tendency to fracture.

In practice when a switch is forced the wheel flanges of the rolling stock will subject the switch points to a heavy lateral strain, sufficient to fracture or bend some member of the switch and force the points over about fifty percent of their normal throw, where the lateral action of the wheel flanges upon the switch points ceases, and where, unless manually tampered with, the switch points would remain except for the vibratory action set up by the passing rolling stock which might cause the now freed switch points to creep or work to a position equal to more than fifty percent of a normal switch throw away from the position of the switch points prior to being forced. With my improved switch stand, when forced, lateral strain is put upon the switch points, tending to throw the switch to its opposite position, except for the restraining action of the actuating lever latched to one of the latch members 32 or 33. The pin 28 holding the actuating lever to the actuating shaft being designedly the weakest point on the apparatus, is sheared off or caused to yield permitting the actuating shaft to rotate within the hub of the stationary actuating lever and within limits prescribed by the stop members 35 and 36, and causing the switch points to move and the signal target where a signal target is employed to move with the switch points. One of the projections 35 or 36 by engaging with the edge of the actuating lever will serve to positively limit the movement of the switch points when forced to fifty percent of the normal switch throw and thereby prevent tampering from causing a movement of the forced switch points from vibration or other cause greater than fifty percent of the normal switch throw away from the position they occupied prior to being forced. Therefore, the switch points show by their position that the switch has been forced and the signal target which remains in operative relation to the switch points can only make a fifty percent normal movement, or a rotatory movement of forty-five degrees, thereby showing both colors or signals, and also when used indicating to the trainmen that the switch has been forced. Also when the switch has been forced, a trainman due to the limiting action of the stop members 35 and 36 will not be able to manually tamper with the switch and falsify the signal by throwing the target to indicate a safe position of the switch points, except by actually restoring the switch to operative condition.

The breakable member and the non-breakable stop members are preferably applied to the connection of the actuating lever with

the actuating shaft, as this leaves the signal target connected to the switch points after the switch has been forced, and is also a conveniently accessible location to restore the switch to operative condition. If desired, however, my improvements may be applied with less perfect operative results and convenience to the point where the crank shaft and gear segment are mounted upon the vertical shaft or crank shaft as illustrated in Figs. 6 and 7.

In the modification Figs. 6 and 7, a vertical shaft 40 corresponding to the crank shaft of Figs. 1 and 2 is journaled in the hub 41 of a gear segment 42 corresponding to the gear segment 24 of Fig. 1. The hub 41 is in turn journaled in the switch housing 43. A signal target 76 may be mounted upon the upper end of shaft 40. A pinion 44 is mounted upon an actuating shaft 45 and meshes with the gear segment 42. An actuating lever 78 is attached rigidly to the outer end of the actuating shaft, and is adapted to be latched by latch members 35 and 36 as shown in Fig. 1, at opposite extremities of its throw.

A crank arm 46 is seated upon a polygonal faced section 47 of the lower end of the shaft 40 and held in place by means of a nut 48. A collar or sleeve 49 corresponding to the collar 32 of Fig. 1 is keyed by a key 60 or otherwise attached to the hub 41 of the gear segment 42 to rotate therewith, and a replaceable breakable or bendable member 50 corresponding to the breakable or bendable member 28 of Figs. 1 and 2 is detachably attached by nuts 51 and 52 to an ear 53 on the crank arm, and projects into a perforation or recess 54 in an extension 55 of the collar 49. The breakable member 50 has a neck of reduced cross section 56 to control the point of fracture. The collar 49 is also provided with two non-breakable projections or stop members 57 and 58, corresponding to the stop members 35 and 36 of Figs. 1 and 2, located upon opposite sides of the crank arm and in the plane of movement of the crank arm to limit the movement of the crank arm and also the switch points, after the switch has been forced, to not over fifty percent of the normal throw of the crank and switch points. It will be noted that the signal target 76 if employed remains connected to and movable with the switch points.

In the modification Fig. 8 I have illustrated a bendable member 62 shown interposed between the hub 63 of an actuating member 27 and a collar 66 on the end of the actuating shaft 25 provided with a stop 35. The bendable member 62 is composed of iron or low carbon steel adapted to bend under strain rather than to break, and having portions of said bendable member of sufficient length between their points of engagement with the actuating lever and actuating shaft to permit a fifty percent normal rotation of the actuating shaft relative to the actuating lever by bending without fracturing member 62. A bendable member in place of a breakable member is adapted to be employed substantially as shown in the modification Figs. 6 and 7, if desired.

The apparatus herein shown and described is capable of considerable modification within the scope of the claims without departing from the spirit of my invention.

What I claim is:

1. In combination with a switch, a crank shaft provided with a crank operatively connected to the switch, a switch actuating lever adapted to actuate said crank shaft and to be latched to normally hold the switch in place at either extremity of the switch movement, a stop member normally movable with said crank shaft and actuating lever to permit a full throw of said actuating lever and crank shaft, and yieldable means adapted to normally hold said actuating lever in predetermined operative relation to said crank shaft and switch, said yieldable means being adapted to yield when said actuating lever is latched and said switch is forced to change the relation of said stop member to said actuating lever and thereby permit said switch to be forced a fraction of its normal throw and prevented by said stop member from being forced a complete normal throw, and thereby indicating by the position of the switch that the switch has been forced.

2. In combination with a switch, a switch actuating lever operatively connected with said switch to throw said switch from one extremity of the switch movement to the opposite extremity of the switch movement, said actuating lever being latched at opposite extremities of its movement to thereby hold the switch in a desired position at one extremity of the switch throw, a yieldable member interposed between said actuating lever and the switch and adapted to yield when the switch is forced and the actuating lever is latched to thereby permit relative movement between said switch and actuating lever, and a stop member normally movable with said switch and actuating lever and serving to limit the relative movement between said switch and actuating lever to a fraction of a complete throw of the switch, thereby indicating by the position of the switch that the switch has been forced.

3. In combination with a switch, a crank shaft provided with a crank operatively connected to the switch, a switch actuating lever operatively connected with said crank shaft to throw said switch from one extremity of the switch movement to the opposite extremity of the switch movement, means to latch said actuating lever at opposite extremities of its movement to thereby normally hold the switch in a desired position at one extremity of the switch throw, a yieldable member in-

terposed between said actuating lever and said crank shaft and adapted to yield when the switch is forced and the actuating lever is latched to thereby permit relative movement between said crank shaft and actuating lever, and a stop member normally movable with said crank shaft and actuating lever and serving to limit the relative movement between said crank shaft and actuating lever to a friction of the complete throw of the crank shaft, thereby indicating by the position of the switch that the switch has been forced.

4. In combination with a switch, a crank shaft provided with a crank operatively connected to the switch and with a signal target, a switch actuating lever operatively connected with said crank shaft to throw said switch from one extremity of the switch movement to the opposite extremity of the switch movement, means to latch said actuating lever at opposite extremities of its movement to thereby normally hold the switch in a desired position at one extremity of the switch throw, a yieldable member interposed between said actuating lever and said crank shaft and adapted to yield when the switch is forced and the actuating lever is latched to thereby permit relative movement between said crank shaft and actuating lever, and a stop member normally movable with said crank shaft and actuating lever and serving to limit the relative movement between said crank shaft and actuating lever to a fraction of the complete throw of the switch, thereby indicating by the position of the switch and also by the position of the signal target that the switch has been forced.

5. In combination with a switch, a crank shaft provided with a crank operatively connected to the switch and a signal target to indicate the position of the switch, a switch actuating lever adapted to actuate said crank shaft and to be latched at opposite extremities of its movement, stop means interposed between said crank shaft and said actuating lever and normally movable in unison with the movements of said actuating lever to permit a full throw of the actuating lever crank and switch, yieldable means adapted to normally hold said stop members out of engagement with the switch actuating mechanism, said yieldable member being adapted to yield under strain when the actuating lever is latched and the switch is forced, and said stop members serving to limit the movement of the switch and signal target when forced, to a fraction of their normal throw.

6. In combination with a switch, a crank shaft provided with a crank operatively connected to the switch and a signal target to indicate the position of the switch, a switch actuating shaft adapted to actuate said crank shaft, signal target and switch, a switch actuating lever connected to said actuating shaft by means of a yieldable member and adapted to be latched at opposite extremities of its throw, stop means carried by and movable with said actuating shaft and operable when said switch has been forced and said yieldable member has yielded, to limit the movement of said crank shaft, signal target and switch to a fraction of their normal throw.

7. A switch stand having a vertical crank shaft operatively connected to said switch and provided with a signal target, an actuating shaft operatively connected to said crank shaft, an actuating lever operatively connected to said actuating shaft by means of a yieldable member and adapted to be latched at opposite extremities of its throw, stop members carried by said actuating shaft and located upon opposite sides of and in the path of travel of said actuating lever, and normally movable with said actuating lever and actuating shaft from one to the other extremity of its throw to permit a full throw of the crank shaft, signal target and switch, said stop members serving when the switch has been forced and said yieldable member has yielded to limit the movement of said crank shaft, signal target and switch to a fraction of their normal throw.

8. A switch stand having a vertical crank shaft adapted to be operatively connected to a switch, an actuating shaft operatively connected to said crank shaft, an actuating lever adapted to be latched at opposite extremities of its throw and operatively connected to said actuating shaft by means of a member which is adapted to yield under the abnormal strain of the switch being forced to permit a limited rotative movement of the actuating shaft while the actuating lever remains stationarily in its latched position, and a stop member carried by and movable with said actuating shaft and in position to engage said actuating lever to thereby, when the switch has been forced and said yieldable member has yielded, engage said actuating lever and limit the movement of the crank shaft, signal target and switch to a fraction of their normal throw.

9. A switch stand having a vertical crank shaft adapted to be operatively connected to a switch, an actuating shaft operatively connected to said crank shaft, an actuating lever adapted to be latched at opposite extremities of its throw and operatively connected to said actuating shaft by means of a breakable member adapted to yield under the abnormal strain of the switch being forced to permit a limited rotative movement of the actuating shaft while the actuating lever remains stationarily in its latched position, and a stop means carried by and movable with said actuating shaft and adapted to engage said actuating lever to thereby when the switch has been forced and said breakable

member has been broken, engage said actuating lever and limit the movement of the crank shaft, signal target and switch to a fraction of their normal throw.

10. A switch stand having a vertical crank shaft adapted to be operatively connected to a switch, an actuating shaft operatively connected to said crank shaft, an actuating lever loosely journaled upon said actuating shaft outside of the switch stand casing and adapted to be latched in position at opposite extremities of its movement, a yieldable member serving to normally connect said actuating lever to said actuating shaft, and adapted to yield under abnormal strain and release said actuating lever from said actuating shaft, and a stop member attached rigidly to said actuating shaft outside of said actuating lever, said stop member moving normally with said actuating lever and said actuating shaft, and serving when said actuating shaft is released from said actuating lever to engage said actuating lever and limit the movement of said actuating lever and crank shaft to less than a full throw thereof.

11. A switch stand having a vertical crank shaft adapted to be operatively connected to a switch, an actuating shaft operatively connected to said crank shaft outside of the switch stand casing and adapted to be latched in position at opposite extremities of its throw, a yieldable member serving to normally connect said actuating lever to said actuating shaft and adapted to yield under abnormal strain and release said actuating lever from said actuating shaft, and a stop member keyed rigidily and detachably to said actuating shaft outside of said actuating lever, said stop member moving normally with said actuating lever and said actuating shaft and serving when said actuating shaft is released from said actuating lever to engage said actuating lever and limit the movement of said released actuating lever and crank shaft to less than a full throw thereof.

In testimony whereof I have affixed my signature.

WALLACE M. GRAY.