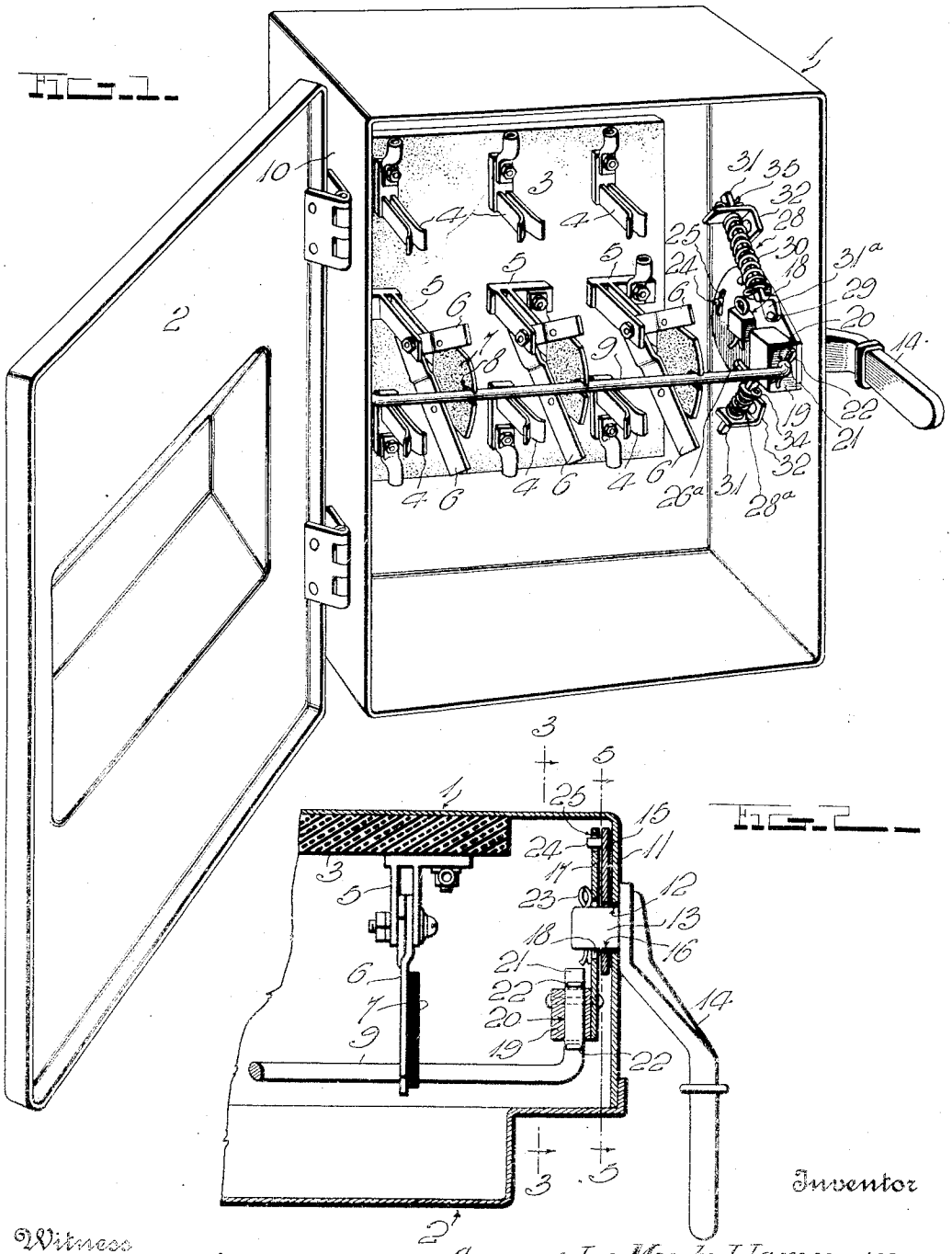
June 8, 1926. 1,588,359

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DOUBLE THROW SWITCH

Filed July 18, 1925 2 Sheets-Sheet 1




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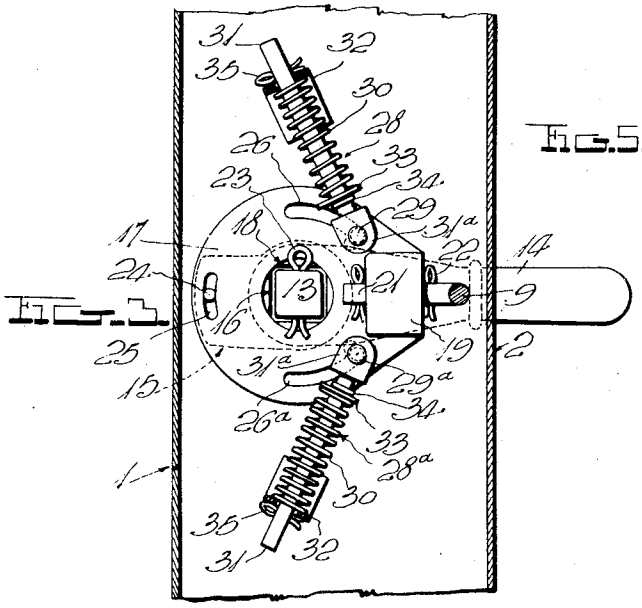


Fig. 3.

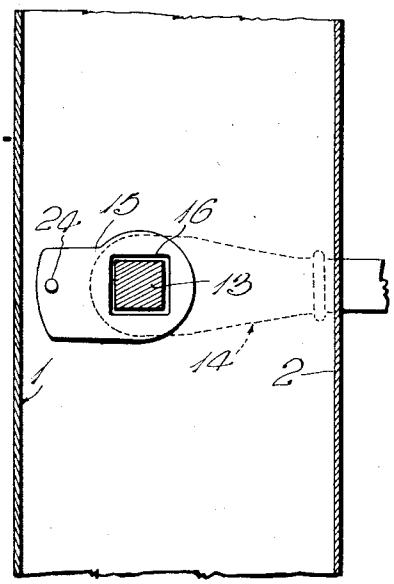


Fig. 5.

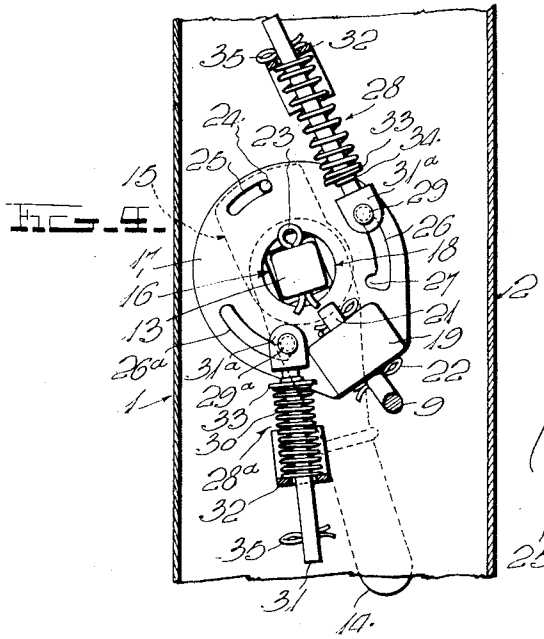


Fig. 4.

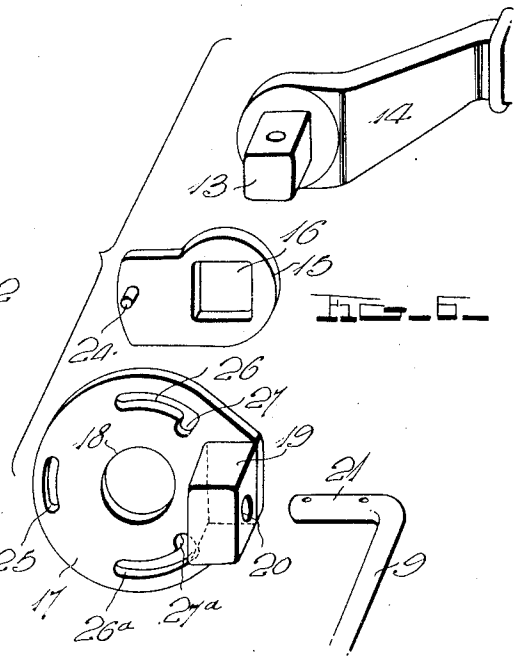


Fig. 6.

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# UNITED STATES PATENT OFFICE.

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## DOUBLE-THROW SWITCH.

Application filed July 18, 1925. Serial No. 44,520.

My invention relates primarily to improvements in double throw switches and has reference more particularly to operating means therefor, the invention however being usable also in connection with single throw switches, if desired.

The principal object of the invention is to provide a simple and inexpensive switch-operating mechanism embodying spring means operative at either side of a dead center position to either hold the switch closed or rapidly complete opening thereof, after initial starting toward open position, and also embodying novel bumper means for checking the parts when the switch has been thrown to its open position by the first named spring means.

A further object of the invention is to provide a construction in which the above-named spring means and the bumper means are duplicates, so that either one of them may act either as a bumper, or as means for holding the switch closed or rapidly completing the opening movement thereof.

A still further object is to provide a construction which will require very few changes in the well-known types of switches now on the market.

A still further aim is to provide a unique construction which is well adapted for use in connection with encased switches.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a perspective view of an encased, double-throw switch embodying my improvements.

Figure 2 is a detail horizontal sectional view on a plane which will be obvious from an inspection of Fig. 1.

Figure 3 is a sectional view on the plane indicated by line 3—3 of Fig. 2..

Figure 4 is a view similar to Fig. 3, with the exception that it illustrates the switch-operating means in one switch-closed position. In all of the preceding views, the switch and its operating mechanism are shown in neutral, switch-open position.

Figure 5 is an additional sectional view on the plane of line 5—5 of Fig. 2.

Figure 6 is a perspective view showing a number of the switch-operating parts in juxtaposition.

In the drawings above briefly described, showing the preferred form of the invention and its application to an encased double-throw switch, the numeral 1 designates the switch casing having an appropriate hinged door 2. Mounted in the back of this casing, is an insulating base 3 which carries two sets of load contacts 4 and a set of intermediate posts or the like 5 to which the line wires are connected. A plurality of pairs of switch blades 6 are provided, one pair being pivoted to each of the posts 5. The blades of each pair are held in angular relation with each other by an insulating plate 7 riveted or otherwise secured thereto, and the outer edges of the several plates 7 are formed with notches 8 which receive a switch-operating rod 9, one end of which is directed laterally and pivoted to the side wall 10 of the casing, in any desired manner. The opposite side wall 11 of this casing is formed with a circular opening 12 through which a hub 13 on an external operating handle 14 passes. A plate 15 is disposed at the inner side of the wall 11 and is formed with an opening 16 through which the hub 13 passes, said hub and plate being so connected that the latter may be turned by means of the handle 14. This connection is preferably established by giving a flat-sided formation to the hub 13 and correspondingly forming the opening 16, the latter however being preferably somewhat larger than the hub, so that some degree of lost-motion is provided between the handle and the plate.

A switch-operating plate 17 is disposed at the inner side of the plate 15 and is formed with an opening 18 through which the hub 13 passes rotatably, said plate 17 being provided at an off-center point, with a lug 19 which projects laterally inward and is provided with an opening 20, in which the laterally turned end 21 of the rod 9 is secured, cotter pins or the like 22 being preferably passed through the rod end 21, at opposite sides of the lug 19, normally preventing movement of said rod end in the opening 20, while permitting removal if necessary. Another cotter pin 23 or some analogous device, passes through an opening in the inner end of the hub 13 and engages the inner side

of the switch-operating plate 17, so that the parts 11, 13, 14, 15 and 17 are held in assembled relation, yet may be quickly and easily disassembled if desired.

A lost-motion connection is provided between the plate 15 and the plate 17, such connection preferably comprising a stud 24 on one plate, received in a slot 25 in the other plate. The function of this lost-motion connection and the similar connection established between the hub 13 and the plate 15, will hereinafter become apparent.

In the construction illustrated, the plate 17 is provided, at opposite sides of its pivot (the hub 13) with two elongated guideways in the form of slots 26 and 26ª, these slots being disposed at angles to an imaginary line extending diametrically of said plate. Moreover, in the construction illustrated, the two slots are arcuate, and they are in diverging relation with each other. At their closely spaced or inner ends, the slots 26 and 26ª are formed with inward offsets 27 and 27ª in the form of notches. Two spring devices 28 and 28ª are disposed at opposite sides of the pivotal axis of the plate 17, and in the form of construction herein illustrated, these spring devices diverge with respect to each other in the same general direction as that in which the slots 26 and 26ª diverge, the divergence of said spring devices however, being wider than the divergence of said slots. These spring devices are provided at their inner ends with shoes 29 and 29ª, which shoes are slidably received in the slots 26 and 26ª and are disposed at the inner ends of said slots, when the switch is in the open position, shown for instance in Figs. 1, 2 and 3. Means are provided for holding the outer ends of the spring devices 28 and 28ª, in substantially a stationary manner, and in the preferred construction, the details described below are followed. Each of the above-named spring devices comprises a coiled compression spring 30 and a rod 31 passing therethrough, the inner end of this rod being provided with an offset head 31ª which carries the shoe 29 or 29ª, which shoe may well be in the form of a rivet. The outer end of the rod 31 passes slidably and rather loosely through an opening in an L-shaped bracket 32 which is connected with the casing wall 11. The outer end of the spring 30 bears against the bracket 32, while its inner end preferably abuts a washer 33 on the rod 31, said washer in turn abutting a cotter pin or the like 34. Thus, the spring will exert its force to move the shoe 29 or 29ª inwardly, but the extent of inward movement is limited by a cotter pin or like 35 passing through the rod 31 and adapted to engage the bracket 32.

In moving the switch from its neutral position, the operation is as follows:

The handle 14 is swung toward either set of the contacts 4, as may be required, and for illustrative purposes, Fig. 4 illustrates said handle swung in a manner to strain the spring device 28ª. Upon initial movement of the handle in this direction, from the neutral position shown in Figs. 1, 2 and 3, the hub 13 first picks up and turns the plate 15. Then, when this plate has turned to the limit allowed by the pin and slot connection 24—25, it in turn picks up and turns the plate 17. When this plate starts to move, the shoe 29ª immediately seats in the offset 27ª of the slot 26ª, and the shoe 29 at the same time is free of the offset 27 of the slot 26. Thus, as the plate is further moved, the device 28 will remain inert, but the spring 30 of the spring device 28ª will be placed under compression until the shoe 29ª passes a dead center line extending through the axis of the hub 13 and the opening of the bracket 32. After this line is passed however, the spring 30 of the device 28ª again expands to some extent and exerts its force to hold the switch in the closed position to which it has been moved. The spring device 28 still remains inert but stands in readiness to check the plate 17 and associated parts, when the switch is opened.

To perform this opening operation, the handle 14 is moved in the reverse direction from which it was moved to close the switch. After idling of the handle to the extent permitted by the lost-motion connecting means between said handle and the plate 17, this plate is started to switch-open position by the handle, the rod 9 then serving to positively start the switch blades out of engagement with the co-acting contacts. By the time the shoe 29ª passes the dead center line, the device 28ª quickly expands, thus rapidly forcing the plate 17 and associated parts to switch-open position, so that a quick break is produced. During this quick break action, the lost-motion connecting means between the operating handle and the plate 17, insures that said handle shall not jerk the operator's hand. As soon as the plate 17 reaches switch-open position, the inner end of the slot 26 strikes the shoe 29, so that the device 28ª comes into play to yieldably check the movement of said plate 17 and the switch parts connected therewith.

When the handle 14 is moved in its other switch-closing direction, the device 28 functions in the same manner as above stated with regard to the spring device 28ª, and the device 28ª remains inert, but stands in readiness to check the movement of the plate 17 and associated parts, when the switch is again opened.

It will be seen from the foregoing that an extremely simple and inexpensive construction has been provided for carrying out the objects of the invention, and while the details disclosed have proven of excel-

lent merit in actual use, it is to be understood that the invention is by no means restricted to such details. Furthermore, while the improved switch-operating means is shown in connection with an encased switch (its preferred application), it might well be employed in some instances, with exposed switches. Moreover, while my primary intent is to utilize the improved switch-operating means in connection with double-throw switches, it is equally adaptable to single-throw switches, in which instance, one of the spring devices would always act to hold the switch closed or to rapidly complete its opening after initial starting, whereas the other spring device would always remain in readiness to yieldably check the switch parts when moved to open position.

I claim:

1. In a switch-operating means, a handle-controlled pivotally-mounted switch-actuating member, two springs slidably connected with said member in a manner to cause turning of said member in either of two switch-closing directions to strain one spring and leave the other inert, the connecting point between said member and the strained spring being adapted to move past a dead center line to hold said member in switch-closed position, the strained spring being also adapted to quickly throw the member to switch-open position when said member is initially started, the inert spring standing in readiness to yieldably check said member when the latter reaches switch-open position.

2. In a switch-operating means, a handle-controlled pivotally-mounted switch-actuating plate having two elongated guideways at opposite sides of its pivot and disposed at angles to a diametrical line through said pivot, two compression springs at said opposite sides of the plate pivot and extending in directions at angles to said guideways, and means for holding the outer ends of said springs substantially stationarily, the inner ends of said springs being provided with shoes slidably engaged with said guideways, either of said shoes being adapted to remain stationary with respect to its respective guideway when switch-closing movement is imparted to the plate in a direction to compress the other spring, the shoe of said other spring being then adapted to move with its co-acting guideway to a position past dead center to hold the switch closed.

3. In a switch-operating means, a handle-controlled pivotally mounted switch-actuating plate having two elongated guideways at opposite sides of its pivot and disposed at angles to a diametrical line through said pivot, said guideways having inward offsets at one end, a pair of compression springs at said opposite sides of the plate pivot converging with said guideways toward the offsets of the latter, and means for holding the outer ends of the springs substantially stationarily, the inner ends of said springs being provided with shoes slidable in said guideways and disposed at the offsets thereof when the switch stands open, the shoe of either spring being adapted to remain stationary with respect to its respective guideway when switch-closing movement is imparted to the plate in a direction to compress the other spring, the shoe of said other spring being then adapted to seat in its co-acting offset and move therewith past a dead center position to hold the switch closed.

4. In a switch-operating means, a handle-controlled pivotally-mounted switch-actuating plate having two elongated guideways positioned at opposite sides of its pivot and disposed in diverging relation with each other, said guideways having inward offsets at their inner ends, two compression springs positioned at said opposite sides of the plate pivot and diverging in the same general direction as but more widely than said guideways, and means for holding the outer ends of said springs substantially stationarily, the inner ends of said springs being provided with shoes slidable in said guideways and disposed at the inner ends of the latter when the switch stands open, the shoe of either spring being adapted to remain stationary with respect to its co-acting guideway when switch-closing movement is imparted to the plate in a direction to compress the other spring, the shoe of said other spring being then adapted to seat in its co-acting offset and move therewith past a dead center position to hold the switch closed.

5. In a switch-operating means, a handle-controlled pivotally-mounted switch-actuating member, spring means connected with said member and active on opposite sides of a dead center line to either hold the switch closed or to rapidly complete opening of the switch when said member is initially started, and a bumper spring slidably connected to said member and adapted to remain inert when said member is moved to close the switch, said bumper spring standing in readiness to yieldably check said member when the latter is thrown to switch-open position by the first named spring means.

6. In a switch-operating means, a handle-controlled pivotally-mounted switch-actuating plate, spring means connected with said plate and active on opposite sides of a dead center line to either hold the switch closed or to rapidly complete opening of the switch when initially started, said plate having an elongated guideway at an angle to a line radiating from its pivot, a plate-checking bumper spring provided with a shoe at one end slidably engaged with said guideway,

and means for holding the other end of the spring substantially stationarily, said shoe being stationary with respect to the guideway during switch-opening and switch-closing movement of the plate and abutting one end of said guideway to check the plate when thrown to switch-open position by the first named spring means.

7. A switch comprising a casing having an opening in one side wall, a handle at the exterior of said side wall having a hub passing rotatably through said opening, a plate at the inner side of said side wall having an opening through which said hub passes, said plate being connected with the hub to be turned by the handle, a second plate at the inner side of the first named plate having an opening through which the aforesaid hub passes rotatably, a lost-motion pin-and-slot connection between the two plates, a lug projecting laterally inward from the second plate at an off-center point, a switch-operating rod connected at one end with said lug, and spring means operatively associated with said second plate for rapidly completing movement of said rod after it has been initially started toward its destination.

In testimony whereof I have hereunto affixed my signature.

GEORGE LA MONTE HAMMANN.