

Dec. 8, 1931.

H. J. HAMMERLY

1,835,982

INCLOSED SWITCH

Original Filed May 23, 1928 2 Sheets-Sheet 1

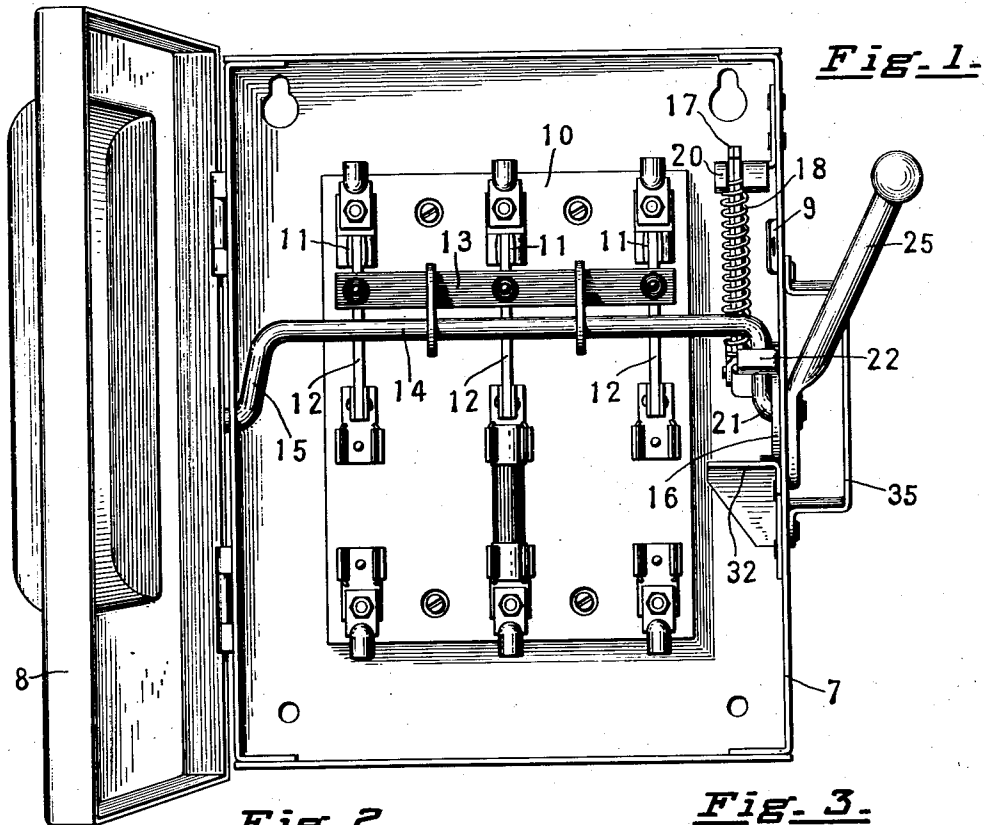
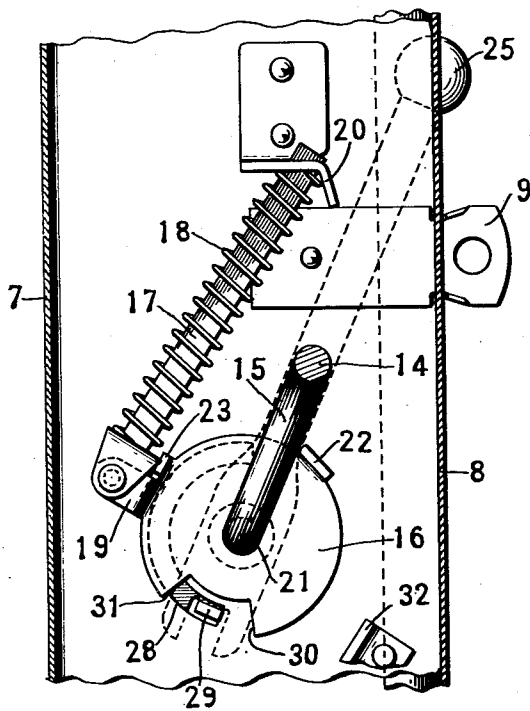
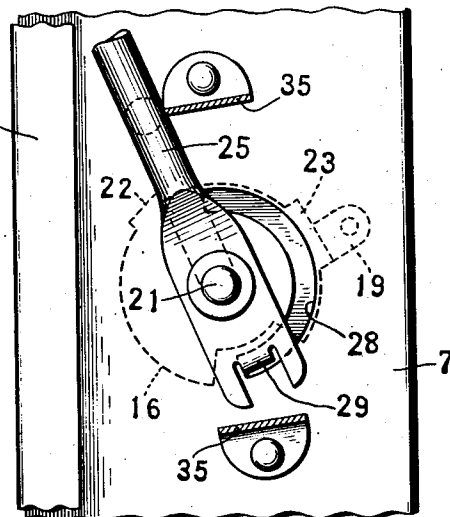


Fig. 2.

Fig. 3.



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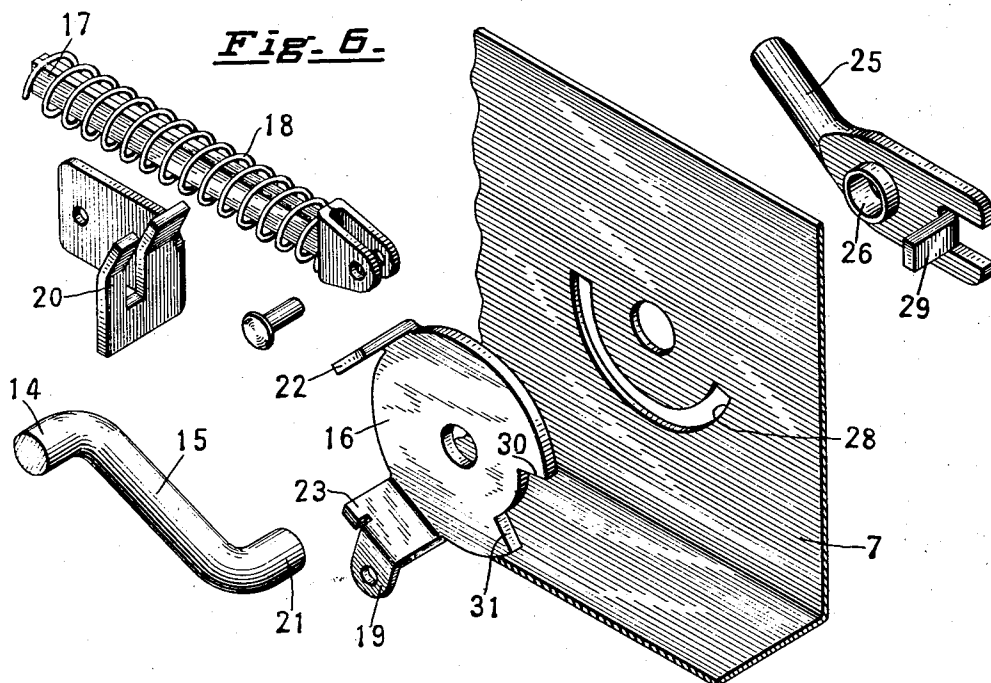


Fig. 4.

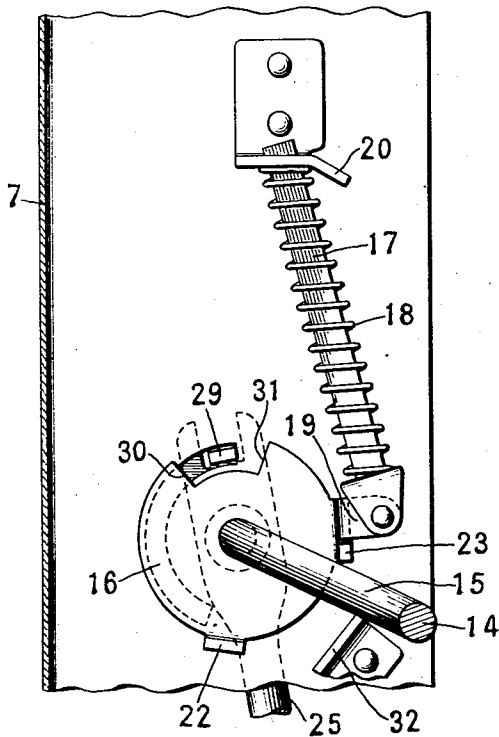
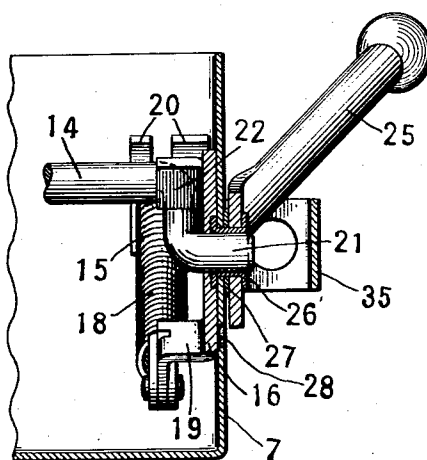


Fig. 5.



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UNITED STATES PATENT OFFICE

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INCLOSED SWITCH

Application filed May 23, 1928, Serial No. 280,088. Renewed May 4, 1931.

This invention relates to the class of externally operated inclosed switches having means for causing the switch to automatically operate with a quick-make and quick-break movement by the normal manual movement of an external operating handle.

One object of my invention is to provide a simple, cheap and reliable means for causing a quick-make and quick-break movement of the movable contacts of a switch of this class.

Another object is to provide a construction which can be made with a minimum number of parts of such a simple nature that they may be stamped and formed with tools of a simple and cheap nature.

Another object is to provide a quick-make and quick-break mechanism in which the movement once started, will complete its full operation independently of the operator.

Another object is to provide a switch construction in which the operating crank may be inserted into bearing holes in the sides of the box and one end of the crank may be utilized as a bearing for the free movement element as well as the sole means for securing the element in operable position.

Another object is to provide a simple construction of the foregoing character in which the operating handle is secured to the box so that the crank shaft can be inserted and removed without disturbing the handle.

In the preferred form a bail-shaped operating crank shaft is pivoted in the opposite walls of the box, an oscillating disc or plate is preferably pivoted on the shaft next to the inner wall of the box and has spaced lugs adapted to engage an arm of the crank shaft. A snap action spring member has one end pivoted to the oscillating disc and adapted to throw it and the crank shaft from the off to the on position and vice versa. The handle is preferably secured to the box wall by a tubular rivet or sleeve which serves as a bearing for one end of the shaft and has a lug which projects through an arcuate slot in the box wall between two spaced shoulders formed in the oscillating disc to provide a lost motion switch throwing means.

Fig. 1 is a front view of an inclosed switch

embodying my invention, the cover being shown open and the switch closed.

Fig. 2 is a sectional view and inside elevation showing the parts of the quick-break mechanism which are inside of the box, the parts being shown in the closed circuit position, the cover being closed.

Fig. 3 is a side view from the outside showing the handle and its connection with the actuating mechanism, parts being broken away.

Fig. 4 is a view similar to Fig. 2 but showing the parts in the open circuit position.

Fig. 5 is a transverse sectional view showing the connection between the handle and operating crank and quick-make and break device.

Fig. 6 is an exploded perspective view showing the principal parts involving my invention.

The box 7 may be of any suitable construction and have a cover 8 secured in any suitable manner. Usually a spring latch 9 is provided for structures of this character to hold the cover closed.

The switch mechanism per se may be of any suitable character. In the form shown the insulating base 10 is secured in the bottom of the box and provided with the usual circuit terminals and stationary and movable switch contacts such as the usual stationary jaws 11 and hinged blades 12. Usually there are two or more of these blades connected by a cross bar 13 for simultaneously operating them.

The operating crank 14 has its ends supported in opposite sides of the box in any suitable manner and its central portion connected to the arms 15 which in turn are connected to the cross bar 13.

The quick-break and make mechanism includes the disc or plate 16, rod 17 and spring 18, the rod being hinged at one end to the lug 19 which projects from the disc 16 and having, at the other end, the forked abutment 20 which is secured to the inner wall of the box. The disc 16 constitutes the oscillating member of the snap-action mechanism and is preferably pivoted on the end 21 of the crank shaft and has lugs 22 and 23 spaced

apart from each other and adapted to engage the arm 15 of the crank shaft.

Obviously the plate 16 may be mounted in other ways with respect to the end 21 of the crank shaft and to the rivet members 26 or 26' but such other ways do not depart from the spirit of my invention so long as the lugs and shoulders of the plate are substantially concentric with the end of the crank shaft and so long as the arm 15 of the crank shaft is secured in such relation with the plate 16 as to assure an operable relation with respect to the arm 15 and the co-operating lugs 22 and 23''.

The operating handle 25 is mounted outside of the box and is preferably pivoted coaxially with the operating crank shaft either directly on the end 21 of the shaft or on a tubular member 26 which may be integral with the handle 25 as shown in Fig. 6 or it may be a separate member as indicated by 26' in Fig. 5 and by either of which means the handle may be secured to the wall of the box. A washer 27 may be interposed between the shank of the handle and the box if desired.

The wall of the box is provided with an opening preferably of the form of an arcuate slot 28 concentric with the handle and shaft and the handle is provided with a lug 29 which projects inwardly through this slot and between two shoulders 30 and 31 formed in the edge of the disc 16. The ends of this slot 28 may form stops for the handle in its respective on and off positions.

When the switch is in the closed circuit position the blades 12 are of course seated in the stationary contacts but in some instances further stop means for the on or closed position of the blades may be provided if desired. The stop 32 serves to limit the opening movement of the operating crank.

To open the circuit, that is to move the parts from the position shown in Figs. 1, 2, 3 and 5 to the position shown in Fig. 4, the handle 25 is drawn downwardly or counter-clockwise from the position shown in Fig. 1. The lug 29 on the handle first meets the shoulder 31 on the disc 16 and rotates the disc on the shaft end 21 so as to compress the spring 18 between the head of the rod 17 and the bracket 20. This continues until the spring of the quick-break mechanism passes the center line of its movement and begins to exert pressure to open the circuit by rotating the disc 16 clockwise as viewed in Fig. 2 to the position shown in Fig. 4. On account of the lost-motion permissible between the lug 29 and the shoulders 30 and 31 and between the crank arm 15 and the lugs 22 and 23 the switch will quickly snap to fully open position when once it starts to open regardless of any effort on the part of the operator to prevent such snap action.

The operation of closing the switch is af-

fectured in the reverse order with the snap-action starting with the upward movement of the handle which causes the lug 29 to engage the shoulder 30 and rotate the disc 16 and compress the spring 18 until it passes the center line of its movement. The disc 16 is preferably of sufficient diameter to substantially cover the slot 28 whether the switch is closed or open.

A strap 35 may be secured to the outside of the box to serve as a stop for the handle 25 if desired.

This construction it will be seen is very simple and can be cheaply manufactured and readily applied to almost any type of switch. It is sturdy and efficient, easily assembled and easy to repair. Although I have shown the invention as applied to the knife blade type switch in which it has patentable advantages it is obvious that the basic principles are applicable to other types of mechanism.

I claim:

1. A switch construction including a box having a shaft bearing and an arcuate slot concentric therewith, a crank shaft in said bearing, a plate pivoted directly on said shaft and having spaced shoulders and bearing directly against an inner wall of the box and covering at least a part of said slot, a quick-break spring connected to said plate inside the box and a handle pivoted on said shaft outside of said box and having a lug extending through said slot and operable between said shoulders.

2. A switch construction including a box having a bearing in one of its side walls and an arcuate slot concentric therewith, a crank shaft in said box, a plate pivotally mounted on said shaft and having two integral spaced lugs projecting inwardly, a quick-break spring connected to said plate inside the box, said shaft having an integral arm operable between said lugs and a pivotally mounted handle outside of said box, said plate having two integral shoulders inside the box and said handle having an integral lug movable through said slot and operable between the shoulders on said plate.

3. A switch construction including a box having a shaft opening and an arcuate slot concentric therewith, a crank shaft in said opening, a plate pivoted coaxially with said shaft inside said box, a handle pivotally mounted outside of said box, an eyelet extending through said box and securing said handle in place and affording a bearing for said shaft, one of said members having a lug projecting through said slot for engaging the other member with a lost motion engagement and a quick-break spring connected to said plate inside the box, said plate having spaced lugs inside the box and said crank shaft having an arm movable between the said spaced lugs.

4. An inclosed switch including a box, a

switch within the box, an operating crank having its ends mounted in the opposite sides of said box, an oscillating member mounted on one end of said crank against an inner wall of the box and having two integral spaced shoulders and two integral inwardly projecting spaced lugs and an offset arm, a snap-action spring inside of said box and connected with the offset arm of said oscillating member, lost-motion means of connection between the projecting lugs on said oscillating member and a portion of the said crank, a handle mounted coaxially with said crank outside of said box and having an integral lug providing lost-motion connection with the shoulders on said oscillating member.

5. An inclosed switch including a box, a switch crank having offset ends supported in opposite side-walls of said box, an oscillating member mounted against an inner wall of the box and having an offset arm, a snap-action spring inside of said box connected with the offset arm of said oscillating member, lost-motion means of connection between said oscillating member and said crank, a handle outside of said box and pivotally mounted on a wall thereof and lost-motion means of connection between said handle and said oscillating member.

6. A switch construction including a box having a bearing in one of its side walls and an arcuate slot concentric therewith, a crank shaft in said box, a plate pivoted on said shaft inside said box and having two spaced shoulders and partially closing said slot, a handle pivoted outside of said box and having an integral lug projecting through said slot for engaging the shoulders on said plate and a quick-break spring connected to said plate inside the box, said plate having two integral inwardly projecting spaced lugs and said crank shaft having an integral portion adapted for lost motion engagement with the said spaced lugs on said plate.

7. An inclosed switch including a box, a crank having shaft ends mounted in the opposite sides thereof, an oscillating member concentrically mounted on one end of said crank within the box and having an offset arm, said box having a slot concentric with said shaft end, a snap-action spring inside of said box connected with said offset arm of said oscillating member, lost-motion means of connection between said oscillating member and said crank, a handle concentrically mounted with respect to the end of said crank shaft outside of said box and having a lug projecting through said slot to provide a lost-motion means of connection between said handle and said oscillating member and an eyelet affording a bearing for one end of said crank shaft and having its outer end riveted over to secure the handle in place.

HERMAN J. HAMMERLY.