Dec. 16, 1930. H. J. HAMMERLY 1,785,192

DOUBLE THROW SWITCH

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Fig. 1.

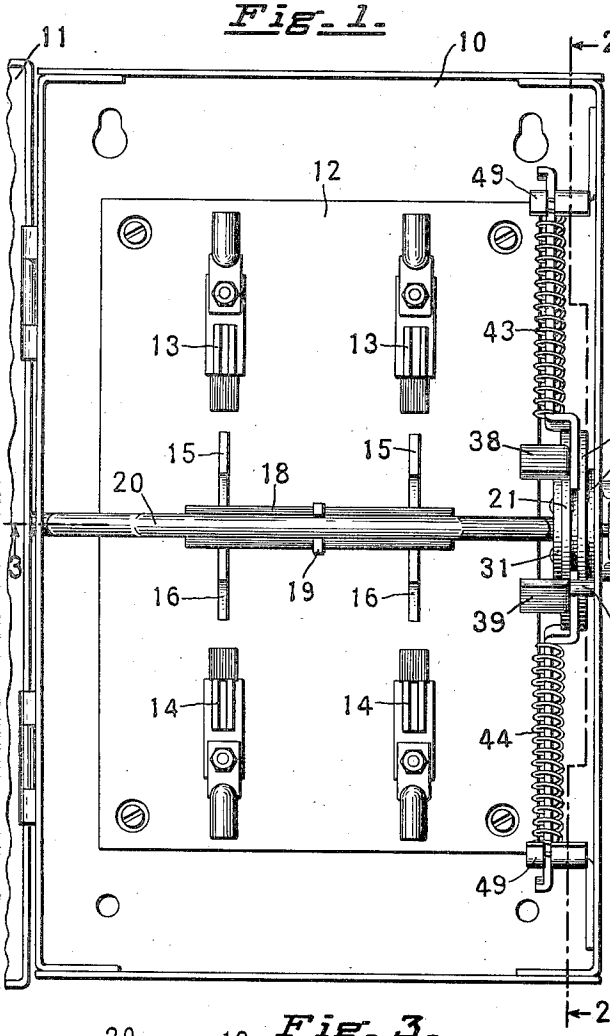


Fig. 2.

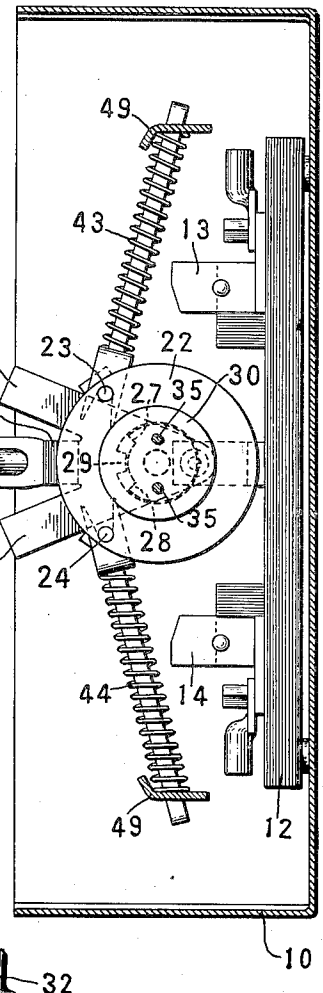
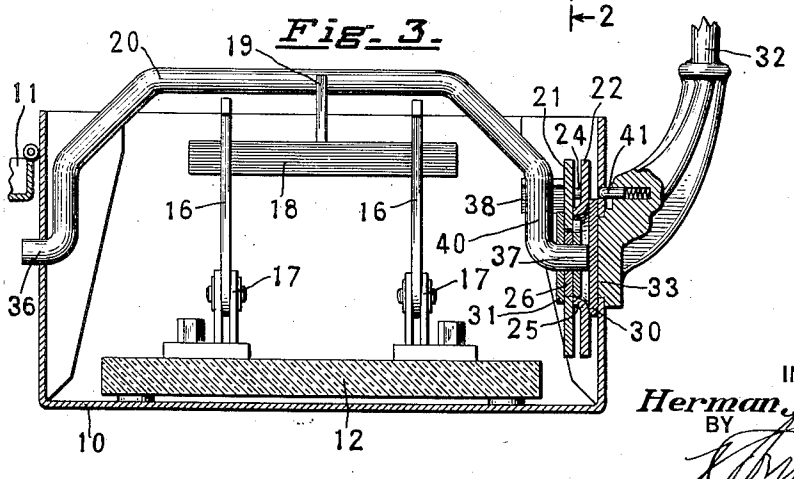


Fig. 3.



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Fig. 5.

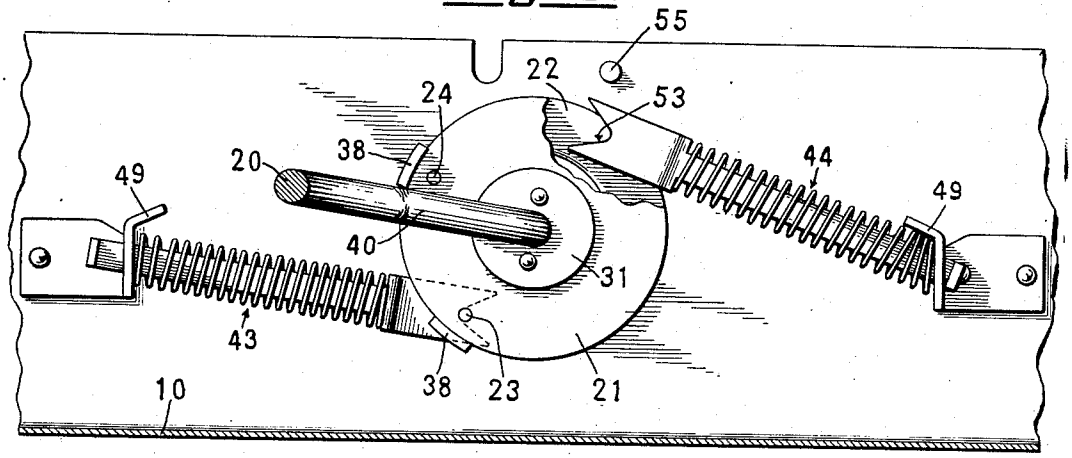


Fig. 4.

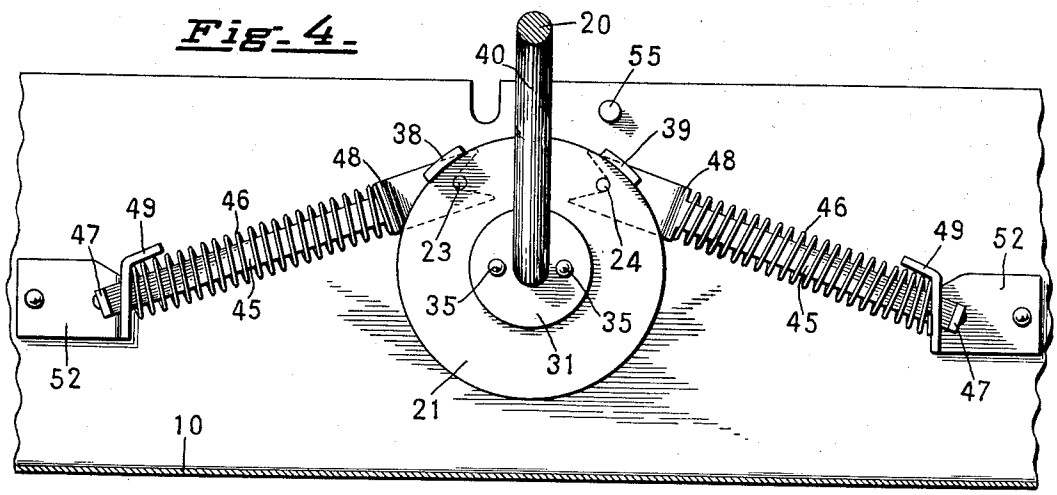
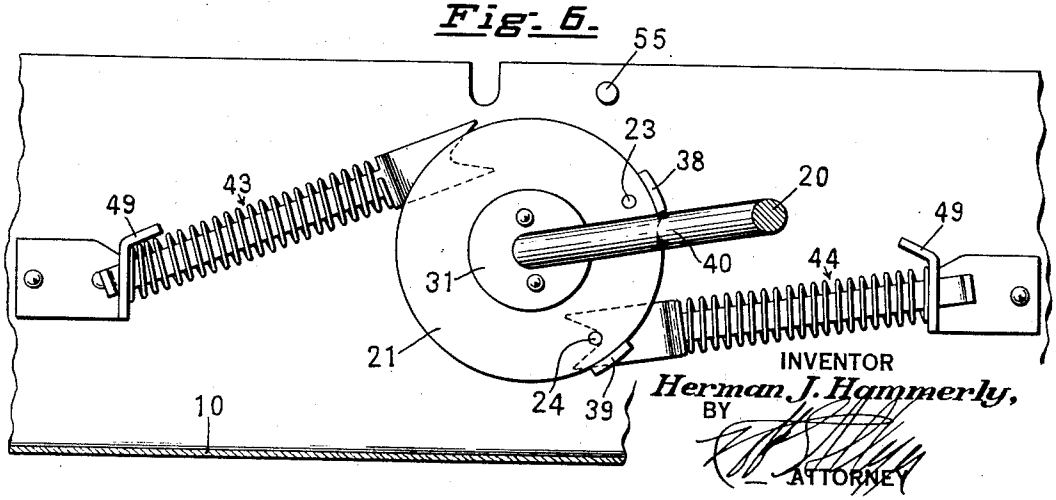


Fig. 6.



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DOUBLE THROW SWITCH

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Fig. 7.

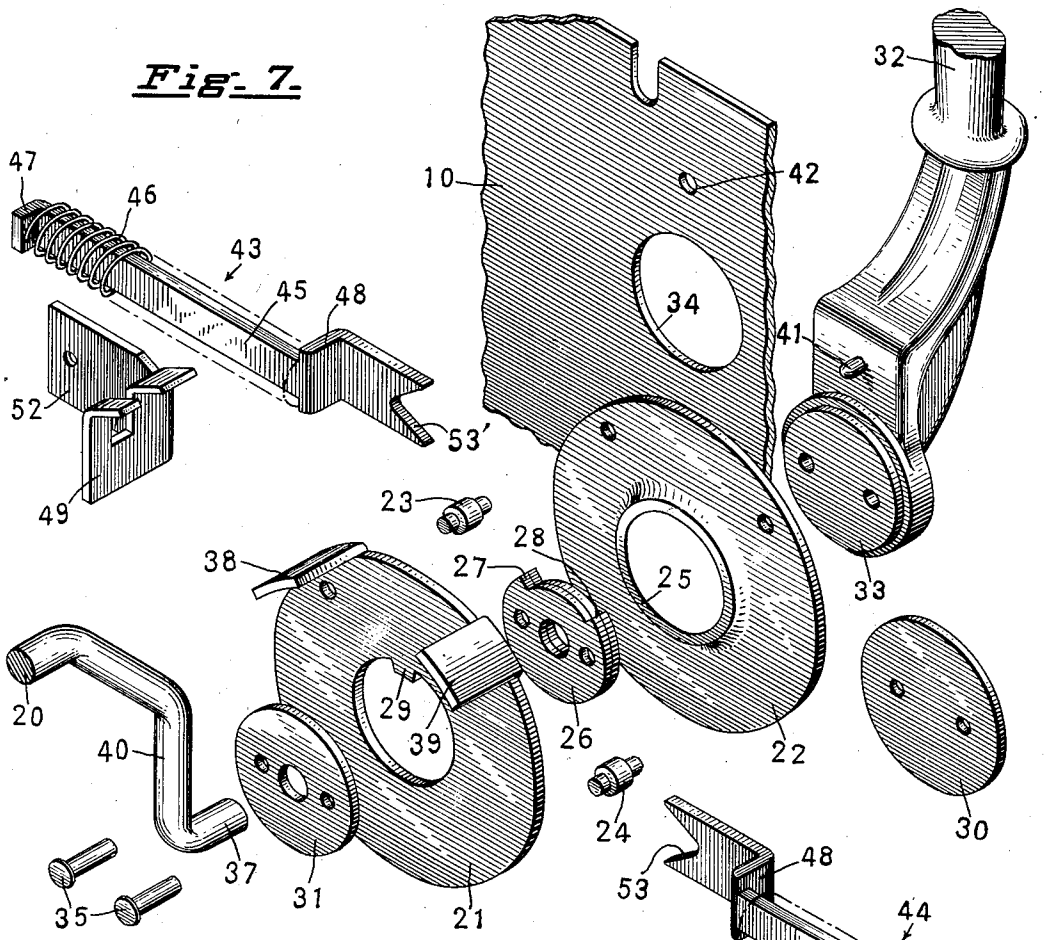
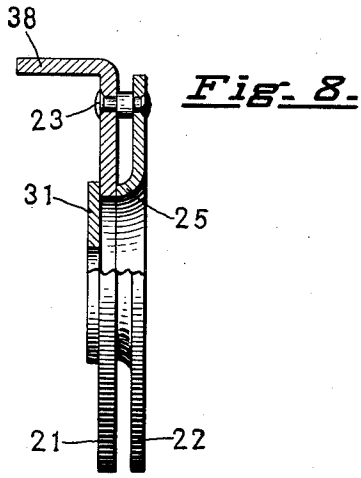


Fig. 8.



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UNITED STATES PATENT OFFICE

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DOUBLE-THROW SWITCH

Application filed July 18, 1928. Serial No. 293,670.

My invention relates to enclosed switches of what is known as the double-throw type, such switches being used, for instance, for reversing the circuit, for shifting the load from one circuit to another or for starting a motor on an unfused circuit and then shifting the load to a fused circuit.

One object of my invention is to provide a double-throw switch with quick-make and quick-break means for each normal movement of the switch.

Another object is to provide a quick-make and quick-break means of comparatively low cost yet of a rugged type which will be dependable in action.

Another object is to provide an enclosed quick-make and quick-break switch mechanism which may be operated by an external handle but will quickly complete its operating movement, after it has once been started, independently of the operating handle.

Another object is to provide a double-throw switch with a quick-make and quick-break means which will include a separate throwing spring for each throw of the switch and a novel construction by means of which each of the springs remains at rest in its least tensioned position while the other spring is going through its cycle of operating movement.

Another object is to provide a quick-make and quick-break mechanism including two operating springs so co-related with the switch per se and other parts, as to exert their tension to maintain the switch blades and parts of the quick-break mechanism in neutral position when the switch is off, and to provide further means for maintaining the operating handle in neutral position when the switch is off.

Another object is to provide a novel construction by means of which the operating springs exert their tension to maintain themselves in operative relation with the quick-break mechanism yet may be readily removed for replacement by a stronger or a weaker spring or by a new spring.

Fig. 1 is a front view of one form of switch embodying my invention the cover being open and broken away and the parts of the switch being in the open circuit position.

Fig. 2 is a side elevation and vertical sectional view on the plane of the line 2—2 of Fig. 1.

Fig. 3 is a horizontal section on the plane of the line 3—3 of Fig. 1 looking upwardly.

Fig. 4 is a side view on a larger scale showing the parts of the quick-make and break mechanism in the open circuit position.

Fig. 5 is a similar view showing the parts in the position they would occupy when closing the circuit through one set of stationary contacts.

Fig. 6 is a similar view of the parts showing the position they would occupy when closing the circuit with the other set of stationary contacts.

Fig. 7 is an exploded perspective view showing the various parts of the quick-break and operating mechanism.

Fig. 8 is a detail view partly in section showing part of the quick-break mechanism.

In its preferred form the construction includes a box or receptacle 10 having a hinged cover 11. It also usually has an insulating base 12 on which the electric contacts are mounted. These contacts include one or more upper contacts 13 and one or more corresponding lower contacts 14 of suitable construction suitably secured to the base. Between the upper and lower contacts is mounted the movable switch member having a number of blades corresponding to the number of upper and lower contacts. Each blade is preferably provided with two arms such as 15 and 16 and pivotally supported by a post or standard 17. These movable switch members are preferably connected by an insulating cross bar 18 which is provided with a forked member 19 for connection with the operating crank shaft 20. It should be understood however that the switch mechanism per se may be of any suitable character.

The quick-break mechanism consists of a hub member having a lost motion connection with the handle and two throwing members provided with springs and coacting with the hub member which has a lost motion connection with the crank shaft.

The hub member consists of two discs 21 and 22 connected together by a number of pins such as 23 and 24. One of these discs may have a flange 25 projecting toward the other disc so as to space them apart as shown in Fig. 8. Inside the discs is mounted a washer-like member 26 which is supported within the central openings of the discs and is provided with shoulders 27 and 28 spaced apart to allow a lost motion connection with the lug 29 which projects inwardly in one of the discs.

The washers 30 and 31 are located on opposite sides of the discs and constitute a part of the hub and close the openings on opposite sides of the discs.

The handle member 32 may be of any suitable construction and is preferably provided with a boss 33 which fits within the opening 34 in the side of the box. The washers 31, 26, and 30 are secured together and to the handle by rivets 35 or other suitable securing means so that the parts of the hub are supported from the side of the box and may be oscillated by the handle 32.

The crank shaft 20 has one end supported in a wall of the box as shown at 36 in Fig. 3. The other end 37 is supported in the parts of the hub.

One of the oscillating disc members is provided with lugs 38 and 39 spaced apart from each other and adapted to engage the arm 40 of the crank shaft member. The handle and hub parts are yieldingly held in the neutral or off position by means of a spring-pressed plunger 41 which engages in a recess or perforation 42 in the side of the box.

The throwing members 43 and 44 coact with the oscillating discs to make and break the circuit with a snap action depending upon the direction in which the handle is thrown. Each throwing member has a bar 45 and a spring 46. One end of the bar is bent transversely at 47 to serve as an abutment for the spring when the parts are disengaged from the box. The offset 48 serves as an abutment for the other end of the spring. When the parts are assembled in the box the bracket 49 serves as an abutment for one end of the spring and as a guide for the bar 45 in the fork 50. The upper ends of the bracket 51 are bent over to prevent the bar from jumping out. The bracket has an arm 52 which is riveted or otherwise suitably secured to one wall of the box. The inner end of each bar is forked at 53 to engage one of the pins 23 or 24 of the disc as shown in Fig. 4. The offset 48 rides on the outer edge of the disc 21 and the spring 46, by reason of the angular engagement of the bracket 49 as shown in Fig. 4, tends to hold the inner ends of the bars of the throwing members against the edge of the disc 21.

For simplicity I have described and applied the reference numerals only to the lower throwing member but it will be understood that the upper throwing member 43 is similarly constructed and supported.

When it is desired to close the circuit through either set of contacts, namely, the upper contacts 13 or the lower contacts 14, the handle 32 is moved in the corresponding direction. For instance, as the handle is moved upwardly it rotates the notched washer 26 which picks up the lug 29 in the disc 21 and rotates the disc left-handed as viewed in Figs. 4 and 5. The pin 23 accordingly presses against the forked end 53′ of the upper throwing member and compresses its spring as it tilts the throwing member from the position of Fig. 4 toward the position of Fig. 5. At the same time the lug 39 of the disc 21 picks up the arm 40 of the crank shaft and as the pin 23 passes the center line the spring of the upper throwing member (left hand as viewed in Fig. 4) throws the parts to the closed circuit position. During this time the lower or right-hand throwing member remains in the position of Fig. 5 without tensioning its spring.

To open the circuit the operating handle is moved to a vertical position and in the process of this movement the notched washer 26 picks up the lug 29 of the disc 21 so that the disc is rotated counter-clockwise and the spring of the left-hand throwing device is placed under tension and the lug 38 engages the arm 40 of the crank shaft 20 and swings the movable switch contacts to the open circuit position as soon as the throwing member passes the center line. As soon as the pin 24 engages the forked end of the right-hand throwing member the disc and attached parts are brought yieldingly to rest. The spring-pressed plunger 41 also at the same time is seated in the recess 42. To close the circuit in the other direction it is simply necessary to move the handle 32 downwardly from the neutral position whereupon the right-hand throwing member is brought into action to close the circuit free from the control of the operator. Stops such as 55 may be employed if desired to hold the forked end of the throwing member in the slot between the edges of the discs 21 and 22.

It will be seen from the foregoing that the parts are simple and few and can be readily assembled. It will also be seen that the apparatus functions well and is durable and unlikely to get out of order.

I claim:

1. An electric switch including an operating crank, supporting means therefor, an operating handle, quick-make and break mechanism coacting between said handle and said crank and including two independent and detachably mounted throwing members each of which has a lost motion connection with the other movable parts of the said mechanism, and detachable means of connection be-

tween said throwing members and the means coacting therewith.

2. A quick-make and quick-break double throw switch including appurtenant stationary and movable contacts and a pair of discs having operable connection with said movable contacts, a handle having lost motion means of connection with said discs, and two detachably mounted and independently operable throwing springs having operable connection between said discs.

3. A double throw switch including a pair of spaced discs, two bearing abutment in the space between said discs, two spring supporting members coacting with said abutments between said discs, a compression spring on each supporting member, and an operating handle having a lost motion connection with said discs.

4. An electric switch including an oscillating member having a bearing abutment, a box enclosing the switch, a bracket secured to said box, a throwing member comprising a bar guided in said bracket at one end and having a lost motion means of connection with said abutment at the other end and a spring on said bar bearing at one of its ends at an angle against said bracket so that said spring is laterally stressed to press the end of said bar laterally against the periphery of said disc.

5. A quick-make and quick-break electric switch including a box, a bracket secured therein, a pair of discs pivotally mounted in said box, a spring-supporting bar guided at one end in said bracket and between said discs at the other end and having an offset portion bearing against the periphery of said discs and a spring on said bar between said offset and said bracket.

6. An enclosed quick-make and quick-break switch including a box, an oscillating disc having two peripheral bearing abutments within said box, two brackets secured in said box, two independent throwing members each comprising a bar guided in one bracket at one end and having a lost motion means of connection with one of said bearing abutments at the other end and a spring on each bar coacting with its bracket so that said springs are tensioned laterally to press said bars laterally against the periphery of said disc.

7. A quick-make and quick-break double throw switch construction including a pair of discs having a space between them with two bearing abutments in said space, two spring supporting bars engageable with said abutments between said discs, an operating handle having a lost motion connection with said discs, and two separate switch throwing springs mounted on said bars.

8. In a double throw switch, a housing, a hub pivoted in said housing, a handle connected to said hub, a switch operating crank pivoted in said hub, a disc mounted to rock on said hub and having two lugs spaced apart from opposite sides of said crank, lost-motion means of connection between said hub and said disc and two oppositely disposed throwing devices having a lost-motion connection with said disc.

9. A quick make and quick break switch including a pair of rotatably mounted discs spaced apart from each other, a pair of pins spaced apart from each other and connecting said discs, two spring supporting bars, means for guiding one end of each bar, a spring on each bar, one end of each bar being forked and located between said discs for engaging said pins, an operating handle and means of connection between said handle and said discs.

10. A quick make and quick break switch including a box, brackets secured therein, a disc pivotally supported between said brackets and having projecting pins, a spring supporting bar guided in each bracket, each bar having a forked end adapted to engage one of said pins, a handle member supported in said box and having a lost motion connection with said disc, and a switch operating crank having a lost motion connection with said disc.

11. A quick make and quick break switch including a box, a bracket supported therein having an open ended slot, a bar guided in said slot, a spring on said bar, an oscillating disc mounted in said box and having a peripheral bearing edge, a pin projecting from said disc, said bar having one end provided with an open notch adapted to engage said pin, said bar resting upon the peripheral edge of said disc and said spring biasing said bar towards said disc.

12. A quick make and quick break switch including a box, a handle having a hub pivotally mounted in said box, a switch operating crank pivotally mounted in said hub, said hub including a member having a cutaway portion, a disc mounted on said member and having a lost motion connection therewith, said disc having lugs providing a lost motion means of connection with said crank, pins projecting laterally from said disc, guide bars having one end of each supported by said box, the opposite end of each bar resting upon the periphery of said disc and provided with a forked portion adapted to engage one of said pins, and springs on said bars for the purpose specified.

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