March 23, 1943. B. E. SHAW 2,314,465

SWITCH

Original Filed Feb. 12, 1940

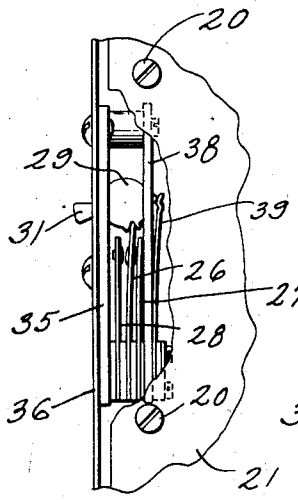


Fig. 1.

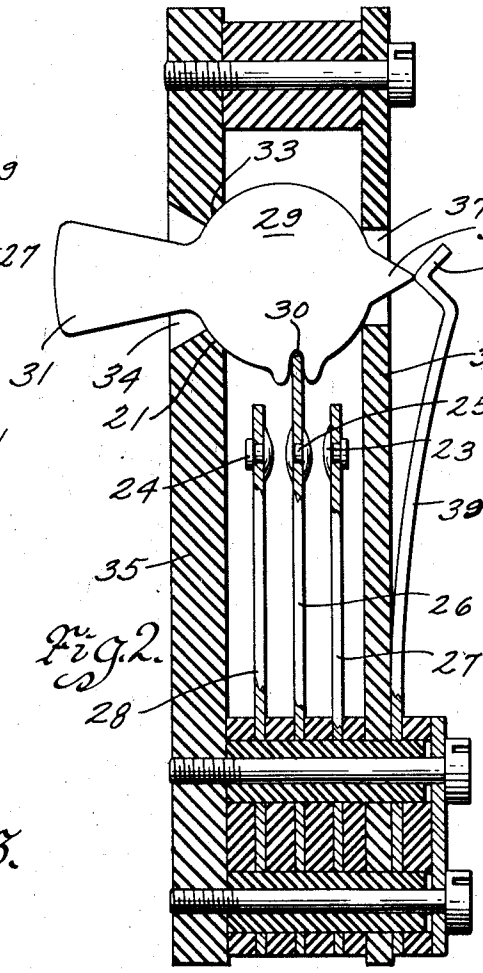


Fig. 2.

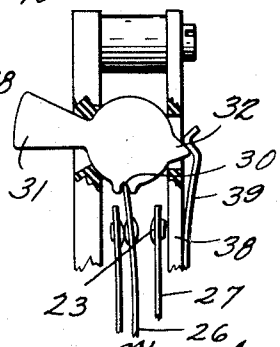


Fig. 4.

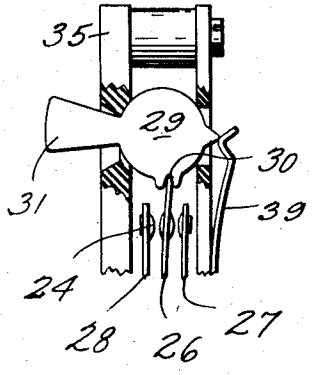


Fig. 3.

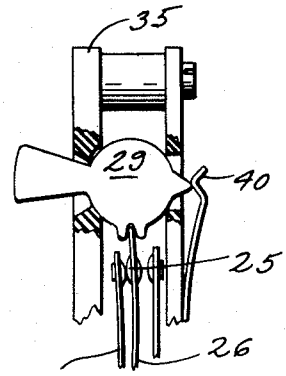


Fig. 5.

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Patented Mar. 23, 1943 2,314,465

UNITED STATES PATENT OFFICE

2,314,465

SWITCH

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Original application February 12, 1940, Serial No. 318,530. Divided and this application July 14, 1942, Serial No. 450,863

7 Claims. (Cl. 200—154)

My present invention relates to a manual switch of the contact spring type, with a novel arrangement of toggle lever to secure snap action of the contacts, the present application being a division of my copending application Serial No. 318,530, filed February 12, 1940.

One object of the invention is to provide a switch which is inexpensive to manufacture and which may be quickly assembled, and which involves the use of a minimum of metallic parts.

Another object is to provide a switch wherein snap action is secured in a contact leaf type of switch by means of a simple combination lever and cam coacting with one of the switch blades and a leaf spring coacting with the cam.

Still a further object is to provide a switch structure wherein a cam disk is floatingly mounted in a pair of slots in spaced supporting plates in such manner that a lever projecting through one of the slots may be engaged and moved either one way or the other for shifting the cam disk to a position where its load so coacts with the leaf spring that snap action results.

With the foregoing and other contemplated as well as obvious objects in view, the invention comprises the combination of elements and arrangement of parts so combined as to cooperate with each other in the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawing, wherein:

Figure 1 is a front elevation of a portion of a controller such as shown in my parent application, with a panel thereof broken away to show a side elevation of my present switch;

Figure 2 is an enlarged vertical sectional view through the switch, showing it in neutral position;

Figure 3 is a similar view on a reduced scale, showing the switch being shifted toward one position;

Figure 4 is a similar view, showing the movement of the switch to said one position being completed; and

Figure 5 is a similar view showing the switch being shifted back toward neutral or its opposite position.

The switch illustrated is of single pole, double-throw type, having an intermediate or movable switch blade **26** carrying a contact **25** for engagement selectively with contacts **23** and **24** of a pair of switch blades **27** and **28**. When the circuit is established across the contacts **23** and **25** of the switch blades **26** and **27**, one circuit is closed, whereas engagement of the contact **25** with the contact **24** will close another circuit across the switch blades **26** and **28**.

The switch is of simple construction, making it possible to use a leaf spring type of switch and yet secure snap action. This is accomplished by providing a toggle disk **29** having a notch at **30** to loosely receive the upper end of the leaf spring **26**. A handle **31** and a V-shaped cam lug **32** are formed on the disk **29**. The disk and its parts **31** and **32** may be cut from a thick sheet of insulating material, such as fibre or the like.

The periphery of the disk **29** is normally seated in a slot **34** having an arcuate portion providing seats **21** and **33** in which the disk can rotate. The lever **31** projects through the slot **34** to the exterior of a sheet or plate of insulation **35** in which the seats **21** and **33** and the slot **34** are formed. The lever **31** may then project on through a wall **36** of a casing to a position exterior thereof where the switch can be manipulated without opening the door on the casing, as disclosed in my parent application. The switch may further be concealed behind a panel **21** secured in the casing by screws **20**.

The cam lug **32** passes slidably through a slot **37** in another plate of insulation **38** supported in spaced relation to the plate **35**. A cam spring **39** has a V-shaped cam end **40** coacting with the cam lug **32**. Such coaction effects the desired snap action, as will now be described.

Referring to Figure 2, the springs **26**, **27** and **28** are untensioned, and the disk **29** is in center or neutral position, effected by the spring **39** holding the disk seated in both seats **21** and **33**. In Figure 4 the switch lever **31** has been moved upwardly to its extreme position for closing the circuit across **26**, **25**, **24** and **28**. In moving to this position the initial upward pressure on the lever **31** will lift the disk **29** off the seat **21**, as shown in Figure 3, until the cam lobe **32** passes the apex of the V-shaped cam end **40** of the spring **39**, and then the coaction of this V-shaped cam end with the cam lobe **32** quickly swings the disk **29** clockwise from the position of Figure 3 to the position of Figure 4. This produces a snap action suitable for preventing arcing at the contacts that are separated from each other and at the contacts that are engaged with each other. I have accordingly found that line voltage of 110 or 220 volts may thereby be carried in a switch of this character when the amperage is not above that required by a two or three horsepower motor.

When changing from the position of Figure 4 to the opposite position (with the lever **31** down)

the initial downward pressure on the lever rotates the disk 29 counterclockwise, first separating its periphery from the seat 33 due to the coaction at 32—40 resisting rotary movement of the disk. Since the spring 28 is slightly tensioned its contact 24 will remain engaged with the contact 25 until the point of the lobe 32 passes the point of the V-member 40. The spring 39 will then quickly force the disk 29 back into its seats 21 and 33 and cause its rotation counter-clockwise to the position shown in Figure 1. This movement separates the contact 25 from the contact 23 and engages it with the contact 24. The engagement occurs with snap action which is secured in a very simple manner with a switch of the contact spring type. A switch of this character is inexpensive to manufacture, yet secures the desired quick action for controlling line voltage in a spring blade type of switch.

I have illustrated and described my improvement in an embodiment which I have found very satisfactory. I have not attempted to illustrate or describe certain adaptations or modifications which I contemplate for the various uses and adjustments possible, as it is believed that the foregoing disclosure will enable those skilled in the art to which this invention appertains to embody or adapt my improvements as may be desired.

Having thus described my invention, I now claim and desire to secure by Letters Patent:

1. A double-throw switch comprising a pair of switch blades, a contact making switch blade therebetween for selective engagement with said first switch blades, and means to move said contact making switch blade to either of its engaged positions with snap action comprising a floating disk operatively connected therewith and having a handle and a cam lobe, a pair of seats for the periphery of said disk, a spring arm engaging said cam lobe and normally seating said disk in said seats, a pair of supporting plates each having a slot in which said disk is mounted and said seats being formed in one of said plates, said disk being rotatable relative to said seats and said spring arm coacting with said lobe to effect initial unseating of said disk from one of said seats when said handle is moved from one position toward the other one, whereupon passage of the cam lobe past the spring arm effects quick reseating of the disk and rotation thereof to its opposite position.

2. In a switch of the character described, a pair of switch blades, a movable switch blade therebetween for selective engagement with said pair of switch blades, and means to move said movable switch blade with snap action comprising a floating disk having a notch to receive the end of said movable switch blades for operatively connecting said disk to said blade, said disk having a handle and a cam lobe, a pair of seats for the periphery of said disk, a spring arm engaging said cam lobe and normally seating said disk in said seats, said disk being rotatable relative to said seats and said spring arm coacting with said lobe to effect initial unseating of said disk from one of said seats when said handle is moved from one position toward the other one, whereby passage of the cam lobe past the spring arm effects quick reseating of the disk to secure said snap action.

3. A switch comprising switch blades, one of which is movable, and means to move said movable switch blade to either of two opposite positions with snap action comprising a floating disk operatively connected therewith and having a handle and a cam lobe, a seat for the periphery of said disk, said disk being rotatable relative to said seat and a spring arm coacting with said cam lobe to effect initial and partial unseating of said disk from said seat when said handle is moved from one position toward the other and upon passage of the cam lobe past the spring arm effecting quick reseating of the disk and rotation thereof to its opposite position.

4. In a double-throw switch, a pair of switch blades, a movable switch blade therebetween for selective engagement with said first switch blades, and means to move said movable switch blade to either of said positions with snap action comprising a disk operatively connected therewith and having a handle and a cam lobe, a seat for the periphery of said disk, a spring arm engaging said cam lobe and normally seating said disk in said seat, said disk being rotatable relative to said seat with said spring arm effecting initial unseating of said disk partially from said seat when said handle is moved from one position toward the other and quick reseating of the disk and rotation thereof to its opposite position after passage of said cam lobe past said spring arm.

5. A switch structure including a switch blade, and means to move said switch blade to either of two opposite positions with snap action comprising a disk having a handle, a cam lobe, and a notch to receive the end of said switch blade, a seat for the periphery of said disk, and a spring arm engaging said cam lobe and normally seating said disk in said seat.

6. A switch structure including a movable switch blade, and means to move said movable switch blade with snap action comprising a floating disk operatively connected therewith and having a handle and a cam lobe, a pair of spaced supporting plates for said disk having a slot for said handle and a pair of seats for said disk, and the other having a slot for said cam lobe, a spring arm, said disk being rotatable relative to said seats and said spring arm coacting with said cam lobe to effect initial unseating of said disk from said seat when said handle is moved from one position toward the other and upon passage of the cam lobe past the spring arm effecting quick reseating of the disk and rotation thereof to another position.

7. A switch comprising a pair of switch blades, a movable switch blade therebetween for selective engagement with said first switch blades, and means to move said movable switch blade to either of said positions with snap action comprising a disk operatively connected therewith and having a handle and a cam lobe, a pair of supporting plates each having a slot in which said disk is floatingly mounted, a pair of seats formed in one of said plates, said disk being rotatable relative to said seats and said spring arm coacting with said cam lobe to normally effect seating of said disk in said seats.

BURTON E. SHAW.