Aug. 20, 1935. S. C. WINGER 2,011,788

SNAP SWITCH

Filed Oct. 19, 1931 2 Sheets-Sheet 1

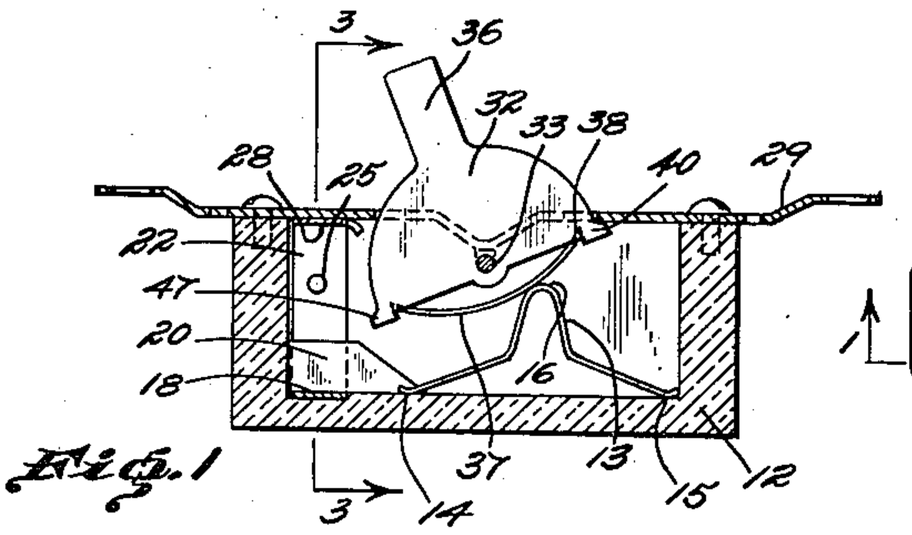


Fig. 1

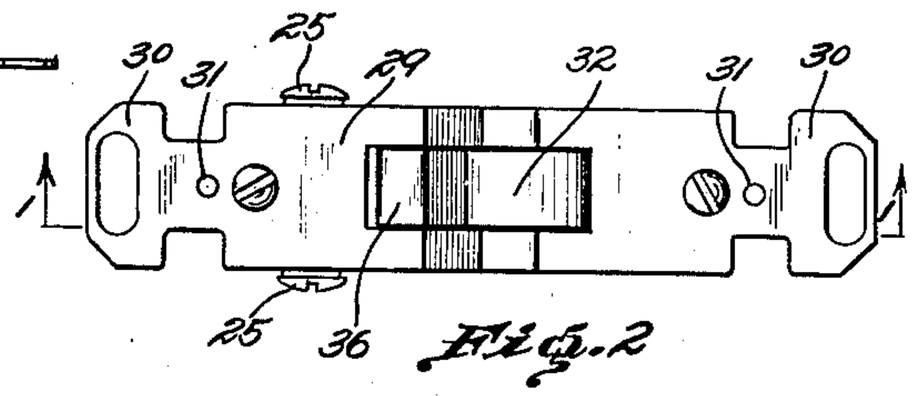


Fig. 2

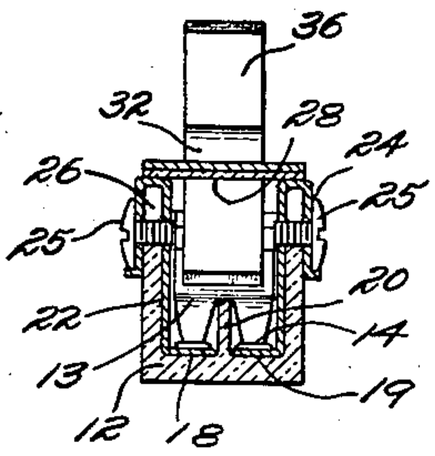


Fig. 3

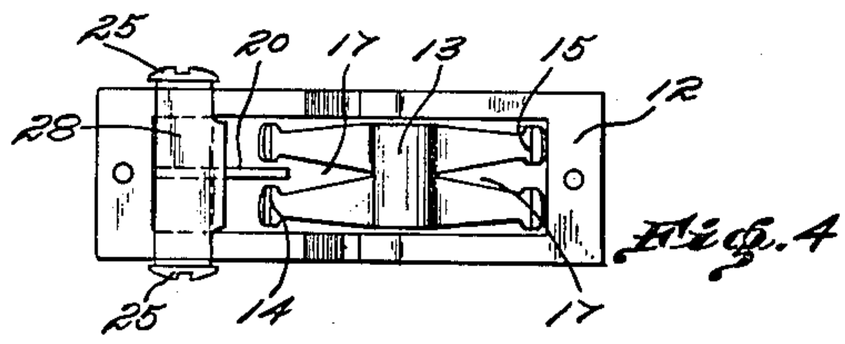


Fig. 4

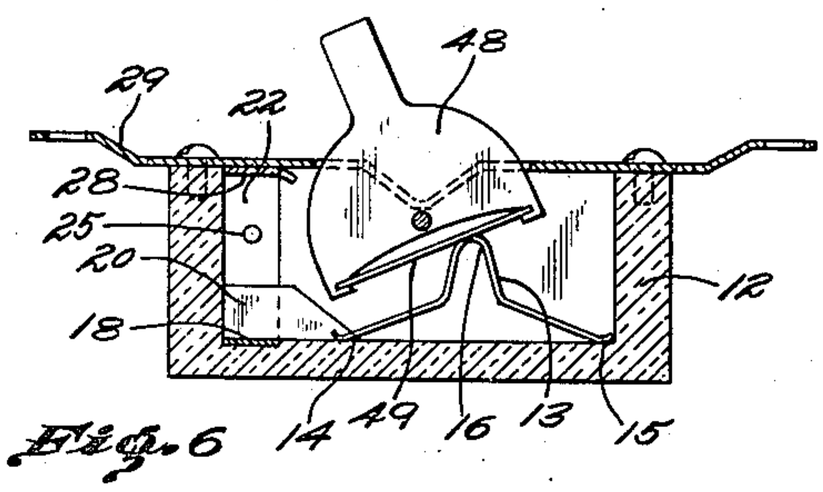


Fig. 6

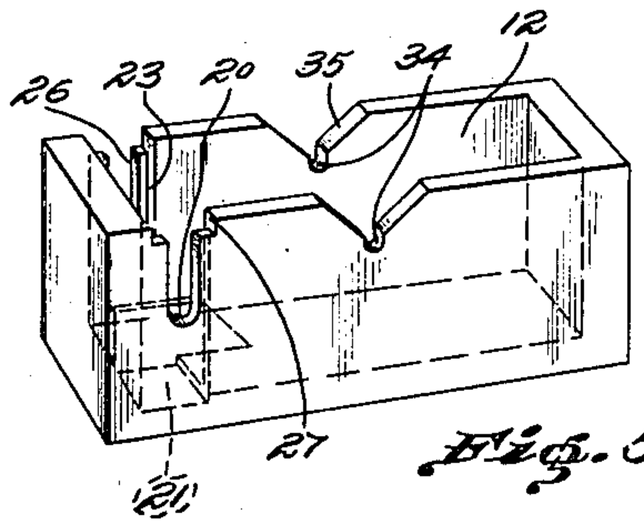


Fig. 5

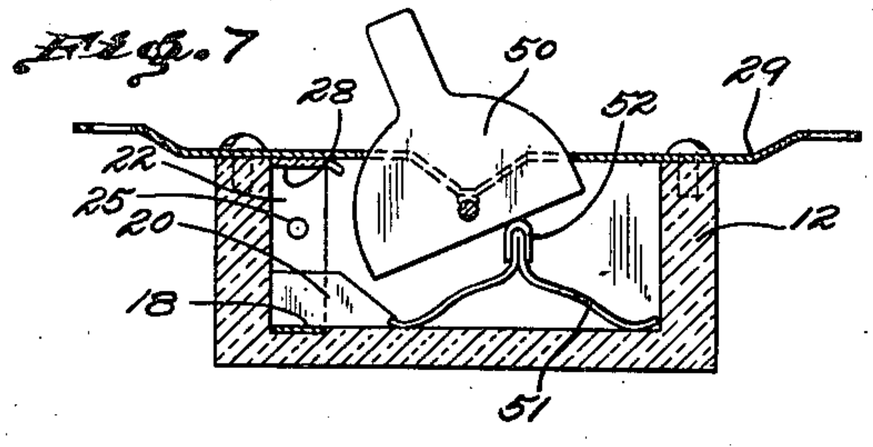


Fig. 7

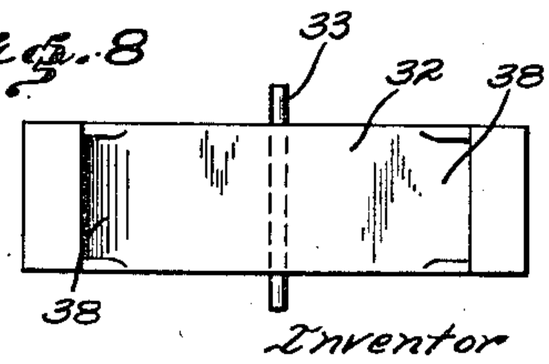


Fig. 8

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Aug. 20, 1935. S. C. WINGER 2,011,788

SNAP SWITCH

Filed Oct. 19, 1931 2 Sheets-Sheet 2

Fig. 9

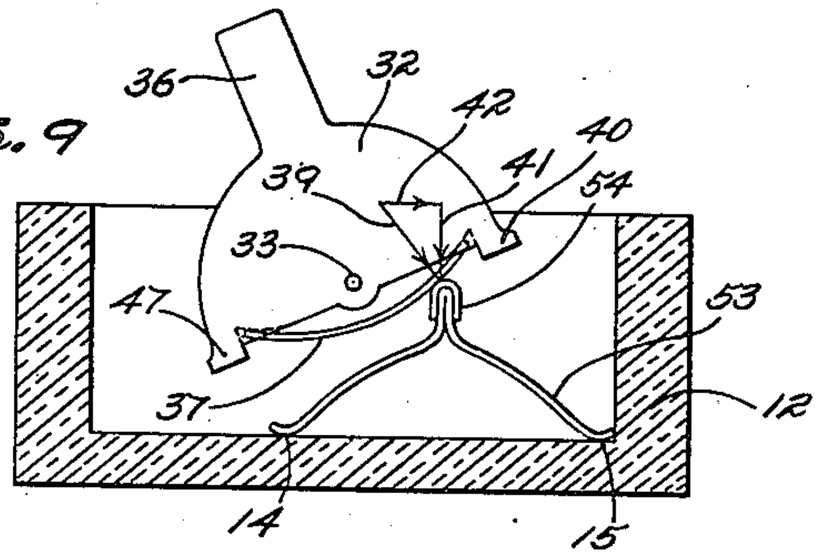



Fig. 10

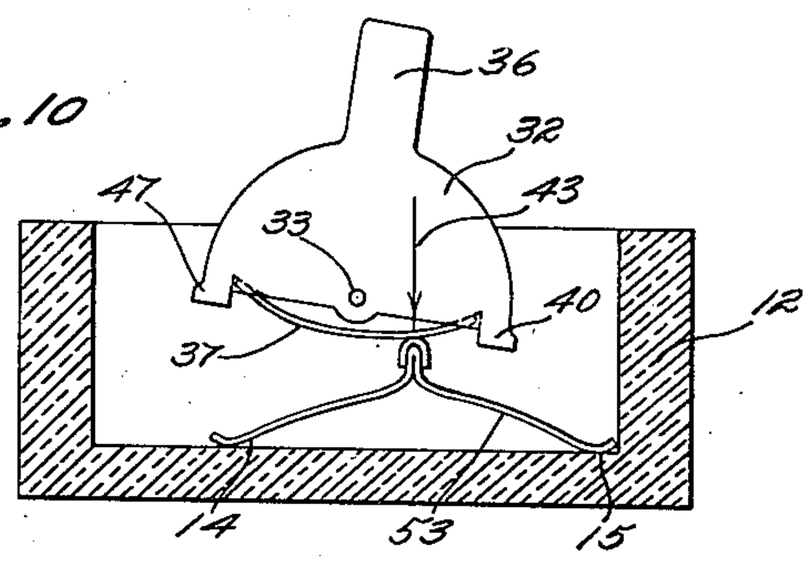
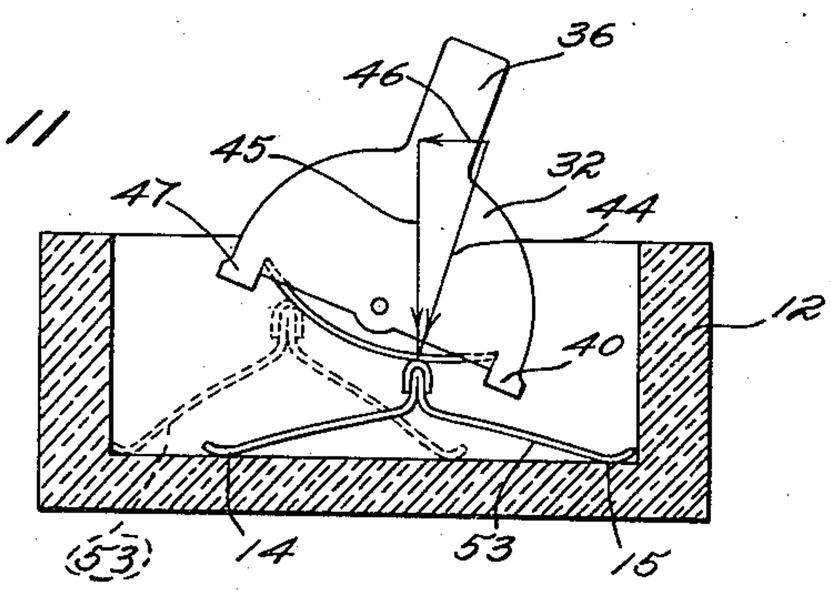



Fig. 11

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# UNITED STATES PATENT OFFICE

2,011,788

## SNAP SWITCH

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Application October 19, 1931, Serial No. 569,696

2 Claims. (Cl. 200—77)

This invention relates to a device for controlling electric circuits, such as the lighting circuit now commonly used.

Such circuit controllers, in order to be effective, should be so arranged that the contacts are rapidly made and broken; that is, a "snap" action is desirable. Switches to accomplish this result are now well-known. Usually they can be installed on the wall or on a pendant conductor, and incorporate one or more coil springs, bearings, toggles, levers and the like. This whole assembly, which must be encompassed in a small space, is difficult and expensive to manufacture. The parts are numerous and so arranged that some nicety must be exercised to get all of them together in operative relation.

It furthermore involves considerable work to manufacture all of the numerous parts, for which complicated dies and molds must be developed.

With such complex devices, the operation is apt to be faulty and the parts to break or become worn or misalined. Usually this involves discarding the device for a new one, as it is not worth while to replace or repair the parts.

It is accordingly one of the objects of my invention to obviate all of these difficulties encountered in prior devices.

This object I accomplish by a great simplification of the mechanism. It is possible to reduce the number of all of the moving parts to two or three, which are very easy to manufacture and assemble. The mechanism can be used effectively for a long period; and in the remote event of the necessity of repairs or replacement, this can be accomplished with facility.

It is another object of my invention to provide a switch that ensures a quick make and break by a direct sliding movement of the contacts. This sliding or wiping movement keeps the contact surfaces clean and smooth.

I accomplish these results by providing an operating member or actuator which creates two variable forces cn a contact member; one producing friction against sliding, and another producing the sliding. The force is so varied that gradually the frictional force is reduced, and the sliding force increased. The snap action occurs on the first increment of variation that causes the sliding force to overcome the gradually diminished friction, from which point on, the overpowering of the force of friction is accelerated.

My invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of several embodiments of my invention. For this purpose I have shown a few forms in the drawings accompanying and forming part of the present specification. I shall now proceed to describe these forms in detail, which illustrate the general principles of my invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of my invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a longitudinal section of a wall switch embodying my invention, taken along plane 1—1 of Fig. 2;

Fig. 2 is a plan view thereof;

Fig. 3 is a cross sectional view, taken along plane 3—3 of Fig. 1;

Fig. 4 is a plan view with some of the parts removed;

Fig. 5 is a perspective view of the main casing for the device;

Fig. 6 is a view similar to Fig. 1, of a slightly modified form of the invention;

Fig. 7 is a view similar to Fig. 1, of a still further modification;

Fig. 8 is a detail of the actuator; and

Figs. 9, 10 and 11 are diagrams illustrating the mode of operation of the device.

Substantially all of the operating parts of the device are enclosed in a casing 12, which can conveniently be made from some insulation material such as molded phenolic condensation product. Slidable on the bottom surface of this casing, there is a contact carrying member 13. This member, as shown in Fig. 1, can be limited in its sliding movement by having its ends or feet 14, 15 abutting respectively against the left and right hand walls of casing 12. These ends can be used to open or close a circuit near each limit of its movement.

In the present instance, member 13 is shown as made of thin resilient material, that is also a good conductor, such as phosphor bronze. It is of arched form, rising to an elevation 16. Each end or foot 14, 15 can be split as shown at 17 (Fig. 4). It is apparent that by exerting a downward force at the elevation 16, this elevation is reduced and the resilience of the member 13 is such that it offers a yielding force against the downwardly directed force.

Although the ends or feet 14, 15 can obviously serve directly as movable contacts, this is not essential, as there may be supplemental contacts carried thereby. Furthermore, either or both end positions of member 13 can be used to close a circuit. For example, in the form shown, a pair of contacts 18, 19 can be placed adjacent the left

hand end of the bottom of casing 12. These contacts extend, as shown in Fig. 3, from each side of casing 12 toward the center, and are separated by a central barrier 20 formed conveniently integrally with casing 12.

These contacts are so arranged that their top surfaces are flush with the bottom of the casing 12. This is accomplished by providing slight depressions 21 (Fig. 5) in the bottom of casing 12. Thus when member 13 is in its extreme left hand position, the barrier 20 enters into split 17, and the two halves of the end 14 engage these contacts respectively, completing the circuit between them through the body of member 13.

For convenience also, these contacts are supported adjacent the top edge of the side walls of casing 12. For this purpose, each contact is provided with an upright strip 22 also depressed to be flush with the inner sides of casing 12. For this purpose, the side walls of casing 12 are provided with recesses such as 23 (Fig. 5) for accommodating the strips 22. These strips have their ends bent down as shown at 24 to embrace the side walls of the casing 12 and to provide a place for a binding post 25 that passes through the wall and holds the entire contact member in place.

For convenience in making the casing 12 by a molding operation, and for obviating the necessity of coring, slots 26 are formed for the passage of the screws 25 in place of a simple through aperture. Furthermore, the top bend of strip 22 is accommodated in a recess 27 in the side wall of casing 12, which is deep enough to bring this top surface of strip 22 slightly below the top edge of the two side walls. An insulation strip 28 is placed over this top surface which strip extends entirely across the casing and has its top surface flush with the top surface of the casing. The usual supporting strip 29 is fastened to the top surface of the casing, and carries the usual ears 30 (Fig. 2) for fastening it to a support in a wall conduit box. Threaded holes 31 can also be provided for attaching a panel cover plate.

The movement of the member 13 from left to right and vice versa is accomplished by the aid of a rocking member or actuator 32. This rocking member is provided with a cross pin 33 which is journalled in a groove 34 (Fig. 5) in each side of casing 12. It is held in place by the bottom surface of support 29. This support can be bent transversely at about its center so as to enter the V shaped grooves 35 in the sides of chamber 12. The lower surface or apex of this bent portion is flattened and overlies and closes the narrow groove 34 in which pin 33 is accommodated.

The actuator 32 is formed with a handle member 36 and a wide body portion. Lengthwise of this body portion extends a bowed resilient member 37 that contacts with the arch 16 of member 13. It is held against removal by having its ends engaging in notches 38 formed at each end of the body portion. In this instance, member 37 has its convex surface opposed to the arch 16. The notches 38 as shown most clearly in Fig. 8, extend only partly across member 32. In this way, sidewise displacement of member 37 is prevented.

Rocking movement of member 32 about pivot 33 causes the member 13 to be snapped over from one end of casing 12 to the other end. How this snap action is accomplished will now be explained with the aid of the diagrams, Figs. 9, 10, and 11.

First of all, it is to be noted that the pivot pin 33 is located about centrally of the length of casing 12; and when member 13 is at the right as in Fig. 9, the pin is to the left of the crest of arch 16. When the actuator 32 is at rest in the position of Fig. 9, there is a yielding force exerted in the direction of arrow 39 by spring 37 on spring 53, because of the slight compression of both these springs. Spring 53 has the same function as spring 13, but is shown here as having a reinforcing clip 54 at the crest. There is a reaction from clip 54 to spring 37, tending to rotate member 32 in a counterclockwise direction, but prevented from doing so by the engagement of the stop 40 against the edge of the slot in strip 29 (Fig. 1).

The size and direction of the force acting on member 13 can be represented as a vector by arrow 39. This force is comparatively small, as both spring members are not materially compressed, but is sufficient nevertheless to keep the spring fingers or feet in close contact with the bottom of casing 12. One component 41 of force 39 is directed perpendicular to the bottom sliding surface of casing 12, and produces a static friction force. The other component 42 is parallel to the sliding surface and tends to move the member 13 to the right against the static force of friction, but is stopped in this instance by the end 15 of member 53, abutting the end wall of casing 12.

Now as a rotative force in a clockwise direction is applied to actuator 32, as by manipulation of handle 36, the size and direction of force 39 changes. Thus when the force is exactly perpendicular to the bottom surface, as in Fig. 10, all of it is used to produce a large frictional resistance to the movement of member 13. Accordingly, there is no motion possible of member 13. Furthermore, since this force must be sustained by spring 37, it as well as member 53 is more strongly compressed. The edges of spring 37 then extend more deeply into notches 38. The force now acting is represented by vector 43.

Now as member 32 is rotated still further, the direction of the force changes and takes a slanting direction toward the left. Such a condition is shown in Fig. 11, the force now being represented by vector 44. One component, such as 45, is useful as before to provide a compressive force, creating friction; but the other component 46 is now directed toward the left, tending to move the member 53 toward the left.

At the beginning of this stage of movement, the frictional resistance to movement of member 53 is so great that force 46 cannot overcome it; however, as member 32 turns farther and farther in a clockwise direction, the component 45 becomes less and less, and component 46 becomes greater and greater. As soon as an equilibrium between the resultant friction and force 46 is just passed, there is a rapid snap over motion, and member 53 takes the dotted line position; this motion is very rapid, and takes place almost instantaneously when the balance of the forces is reached.

The member 32 is stopped from rotating beyond the limit established by stop 47 which co-acts with the edge of the slot of support 29. In this position, contacts 18, 19 are engaged by foot 14 and the circuit is completed between them.

To open the circuit, the actuator 32 is rotated in a counterclockwise direction, and the forces act similarly to that described to return member 13 or 53 to the position of Fig. 9.

The resilient member 37 can take any of a number of forms. In Fig. 6, it is shown at 49 as flat, and due to the action of the forces, a slight

concavity is produced by it. To permit this, the actuator 48 can be made concave on the bottom.

The spring action of members 37, 49 is beneficial in providing a more smooth and rapid action of the device, but it is not absolutely essential. For example, in Fig. 7, the spring is entirely dispensed with. The actuator 50 merely has a smooth lower surface coacting with the yielding spring contact 51. This contact, in this instance, is provided with a wear shoe or plate 52 at its crest.

In all three forms it is apparent that the actuator also provides a sliding surface, the direction of which varies with relation to the bottom surface of casing 12. The member 13 or 53 slides between these two surfaces.

I claim:

1. In a circuit controller, means providing a sliding surface, a compressible sliding member on the surface, contacts controlled by said member, and an actuator for said member, comprising a member pivoted above said surface and on an axis transverse thereto, and a resilient contacting member carried by the pivoted member and engaging the sliding member.

2. In a circuit controller, means providing a sliding surface with limits at its ends, a compressible resilient contact controlling member slidable between the limits of the sliding surface, an actuator member, having a continuous resiliently yielding surface that contacts with the controlling member, and a stationary pivotal support for the actuator member at a point above the sliding surface and intermediate the limits.

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