Oct. 31, 1933. H. J. HAMMERLY 1,932,966

ELECTRIC SWITCH

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Fig. 1.

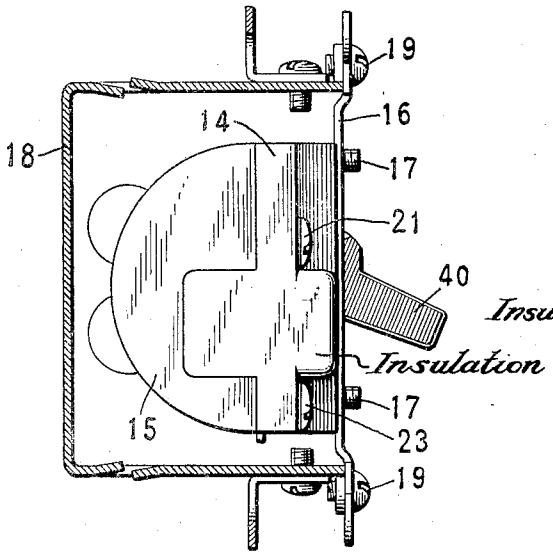


Fig. 2.

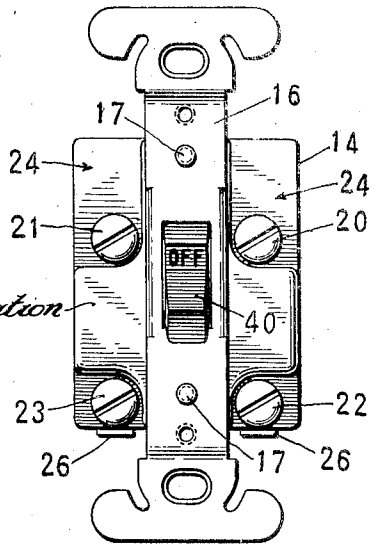


Fig. 3.

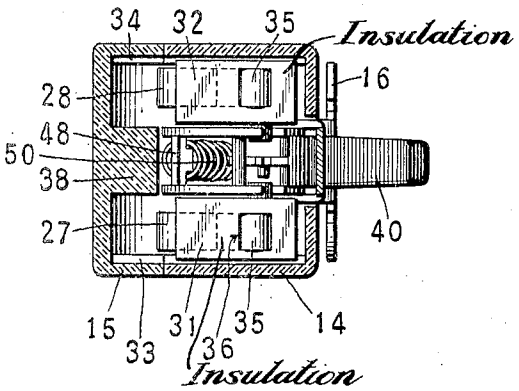
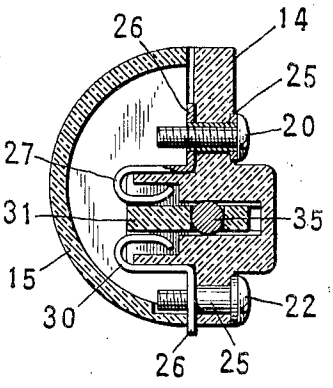


Fig. 4.



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Fig. 6.

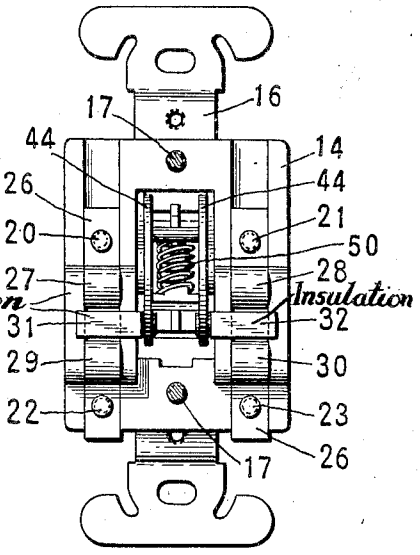


Fig. 8.

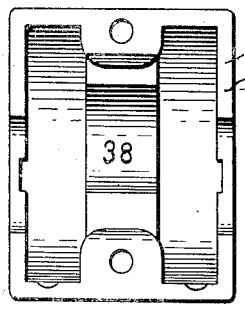


Fig. 9.

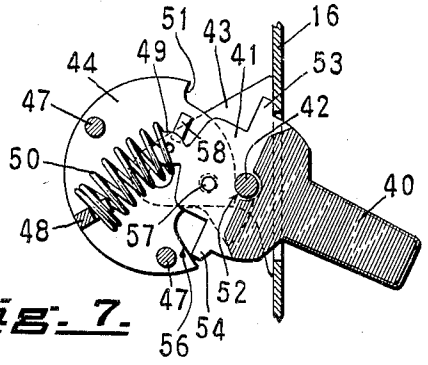


Fig. 5.

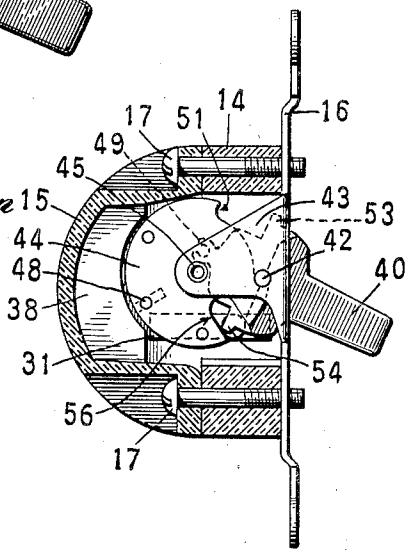
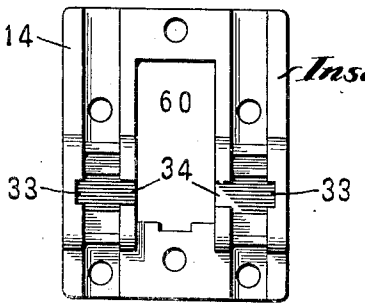


Fig. 7.



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Fig. 10.

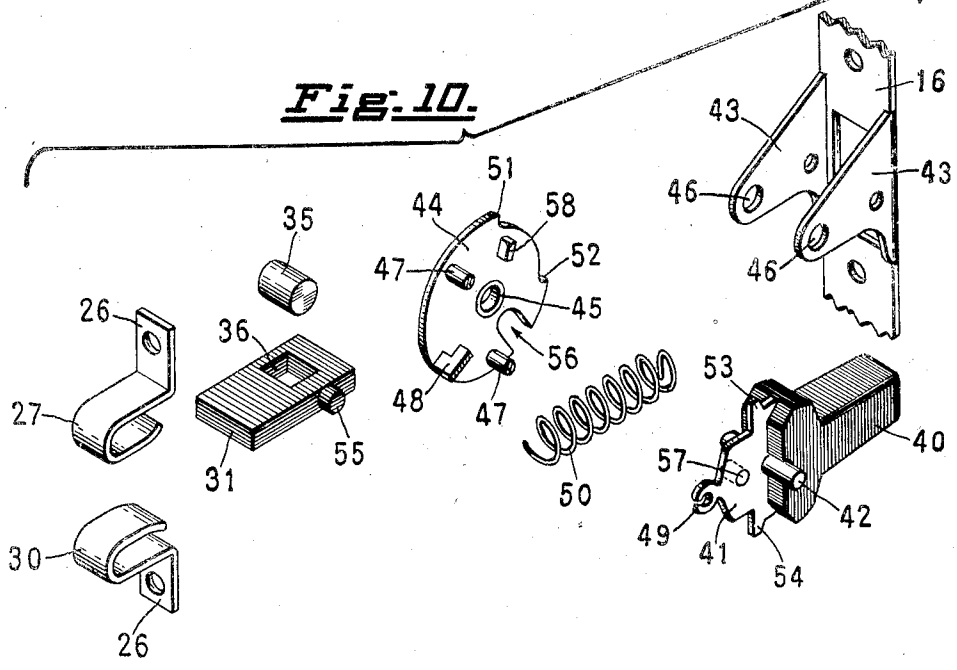


Fig. 11.

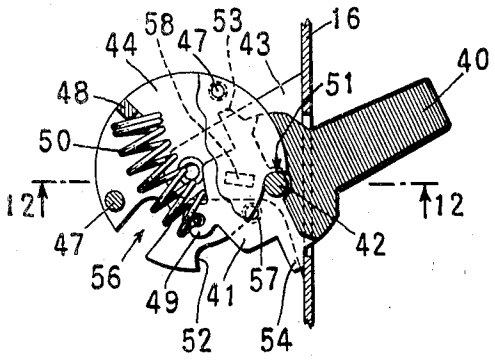
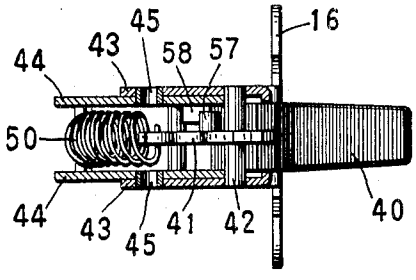


Fig. 12.



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UNITED STATES PATENT OFFICE

1,932,966

ELECTRIC SWITCH

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Application February 18, 1933
Serial No. 657,354

18 Claims. (Cl. 200—67)

My invention relates to electrical switches and particularly to the type of switches which are commonly described as snap action or quick make and break switches.

One object is to provide a rugged and compact construction capable of carrying a comparatively heavy load and safely opening the circuit.

Another object is to provide a switch of the roller contact type which is entirely enclosed and which is adapted to be mounted in an ordinary outlet box.

Another object is to provide a snap action toggle or lever action switch of the completely enclosed type and which includes an insulating slide adapted to be interposed between a pair of opposed stationary contacts when the switch is in the off position.

Another object is to provide a construction of the character set forth, which has comparatively few parts and which parts are comparatively free of bends or other forming operations which usually cause a variation in the parts and in their relative adjustment.

Another object is to provide a compact but durable and reliable quick make, quick break and double break toggle action switch.

Another object is to provide a toggle action switch which is capable of carrying a comparatively heavy load and of opening or closing the circuit with an unusual degree of safety.

In carrying out the invention I provide an insulating housing or body which entirely encloses the stationary switch contacts and a reciprocating switch roller contact carrier between the stationary contacts.

This movable switch member is actuated by an oscillating wheel-like member and controlled by a swinging lever.

The construction is so designed as to facilitate the mounting of the switch in a conventional type of outlet box.

Fig. 1 is a side view of a construction embodying my invention, shown mounted in an outlet box which is shown in cross section.

Fig. 2 is a front view of the construction of my invention.

Fig. 3 is a transverse sectional view showing the movable switch contacts and the insulating slides on which they are mounted.

Fig. 4 is a vertical sectional view showing one set of stationary switch contacts and one of the movable roller contacts in the off position.

Fig. 5 is a vertical sectional view showing the operating lever and oscillating wheel.

Fig. 6 is a rear view of the front part of the body of the switch, the rear part of the body being omitted.

In Figs. 1 to 6, inclusive, the parts of the switch are all in the open circuit or off position.

Fig. 7 is a rear view of the front part of the body without the conducting parts.

Fig. 8 is a front view of the rear part of the body of the housing.

Fig. 9 is a detail sectional view on a somewhat larger scale showing the operating handle and the oscillating wheel-like member in the off position.

Fig. 10 is an exploded perspective view showing parts of the switch.

Fig. 11 is a view similar to Fig. 9 of the operating lever and wheel but in the on position.

Fig. 12 is an edge and sectional view of the parts shown in Fig. 11 taken on the plane of the line 12—12.

The body of the housing is made up of the main front portion 14 and the rear portion 15. The frame member 16 which carries the movable parts of the switch is secured to the housing by screws 17, 17, which also serve to connect the parts of the housing together. The form of construction herein shown is primarily intended to be mounted in an outlet box 18, to which it will be secured by screws such as 19, 19 in the usual manner.

It will be noted that the rear of the housing is semi-cylindrical and that it is so supported on the frame member that, when mounted in the outlet box, there is a maximum amount of available space in rear of the housing to accommodate the wiring connections. For convenience in wiring the parts are also preferably so arranged as to provide a greater amount of space at one end of the switch or above the housing when it is mounted in the box, as shown in Fig. 1.

The binding screws 20 and 21 serve to connect the line wires to the switch and the screws 22 and 23 serve to connect the load terminals. The heads of these screws are preferably protected in pockets or recesses such as 24, formed in the front part of the housing. Each screw is seated in a sleeve such as 25 which serves to anchor the foot 26 of the corresponding stationary switch contact. Each of the stationary contacts 27, 28, 29 and 30 is in the form of a U-shaped spring with its tip turned inwardly so that there is a passage between the spring finger ends of the contacts of each pair, as for instance between the contacts 27 and 30, as shown in Fig. 4. In these passages are arranged slides 31 and 32 formed of insulating material and each guided in grooves

such as 33 and 34, formed in the insulating material of the base or body portion of the switch. Each of these slides carries a roller 35 which is loosely supported in an opening 36 in the slide and adapted to travel between the adjacent spring fingers of the stationary contacts 27 and 30.

When the switch is open the movable contact or switch member 35 is in the position shown in Fig. 4 where it is positioned in the groove in the insulating member 14. When the insulating slide 31 is in this position it will be seen that there is a solid part of the insulation located between the spring contact fingers 27 and 30. The barrier 38 divides the rear part of the housing into two separate chambers for the two sets of switch members.

The operating lever 40 is of insulating material and has a metallic arm 41 and a hinge or pivot pin 42. This pin is supported in the ears 43 of the frame 16.

The snap action wheel consists of the two discs 44—44 which are provided with hubs such as 45 supported in bearings 46 in the ears 43. These two discs are connected by a number of rivets 47—47 and an abutment member 48. The toggle lever arm 41 is provided with a notched rear end 49 and a spring 50 is interposed between this notched portion 49 and the abutment 48. The discs 44 are provided with shoulders 51 and 52 which are adapted to engage the ends of the shaft or hinge pin 42.

The arm 41 is provided with lugs 53 and 54 adapted to engage the rear of the frame member 16. When the parts are in the position shown in Fig. 9, it will be seen that the spring 50 is pressing against the members 48 and 49 tending to rotate the toggle lever 40 clockwise so that the lug 53 engages the back of the frame plate 16.

The spring also pressing against the abutment 48 tends to rotate the disc 44 anti-clockwise so that the shoulder 52 abuts against the hinge pin 42. When the outer end of the lever 40 is raised the inner end 49 moves downwardly as viewed in this figure and compresses the spring 50 until the end 49 passes below the center line, whereupon the spring reverses the action and turns the disc 44 clockwise with a snap action, which movement is terminated by the shoulder 51 engaging the end of the pivot shaft 42. As soon as the turning movement of the disc 44 starts it will be seen that it is out of control of the operator. The parts then take up the position shown in Fig. 11 which is the on position. The connection between the slides 31 and 32 and the oscillating wheel is effected by the projecting studs 55 which engage in the respective notches 56 of the disc so that as the wheel is rotated as above mentioned the slides which carry the movable switch rollers are reciprocated with a snap action to the off and on positions, respectively. When the parts are in the on position shown in Fig. 11 the circuit may be opened by pulling downwardly on the outer end of the toggle lever 40 which causes the action of the spring 50 in the reverse direction to that above mentioned. To facilitate the starting movement in opening the switch I preferably provide the arm 41 with a pin 57 and I provide the disc 44 with a projection 58. When the lever 40 is drawn downwardly the pin 57 engages the projection 58 and positively starts the movement of the oscillating wheel even before the spring reverses the tension and thus prevents the parts from sticking.

As the parts are shown in the drawings, it will be noted in Figs. 9 and 11 that the pivotal center of the toggle lever 40 is somewhat below the horizontal pivotal center line of the oscillating wheel when the parts are in the position which they usually occupy when the switch is in use. This results in providing a greater throwing power of the spring 50 when moving the switch to the closed circuit position, thus creating a more rapid movement to close the switch than when opening the switch. This additional power or force is desirable because of the arrangement of the spring contacts which, of course, offers considerable resistance to the movement of the switch member 35.

It will be seen from the foregoing that the stationary contacts and terminals are all fixed to the rear of the front part of the housing where they can be inspected and adjusted to accommodate the movable contact rollers and their carrying slides. The operating mechanism including the finger lever 40 and the oscillating throwing wheel is carried by the frame member 16 and can be assembled and tested as a unit. The insulating block 14 is provided with an opening 60 into which the throwing wheel and attached parts can be readily inserted from the front. For the purpose of assembly the switch operating lever should be turned to the on position so that the slots 56 face to the rear, as shown in Fig. 11, so as to permit the interlocking of the studs 55 in the notches 56. This requires a slight tilting of the frame 16 and when the frame is secured in place by the screws 17 the switch slides are held in position so that they can not be removed while the frame is secured to the insulating block.

The parts of the switch can be readily separated in reverse order by removing the screws 17 and then withdrawing the frame with the attached finger lever and oscillating throwing wheel, whereupon the contact slides and contacts are free to be removed.

I claim:

1. A snap switch construction including an insulating housing formed of two parts with two pairs of stationary switch contacts arranged in opposite sides of the housing, a reciprocating slide and a contact carried thereby and movable between the contacts of each of the respective pairs of stationary contacts in a direction substantially at right angles to the plane of the front face of the switch, a centrally pivoted oscillating wheel having open notches in its periphery into which integral portions of the slides project for operable connection therewith, a finger lever, and a spring for actuating said wheel with a snap action.

2. A snap switch construction including an insulating housing, a pair of stationary switch contacts mounted therein and arranged in each of the opposite sides of the housing, a reciprocating slide vertically movable in a direction substantially at right angles to the plane of the front face of the switch between each of the respective pairs of stationary contacts, a contact carried by each slide, an oscillating member composed of two discs having notches in their respective peripheries into which portions of the slides project for operable connection therewith, a finger lever, and a spring connecting the lever and said oscillating member for actuating said reciprocating slide and contact with a snap action.

3. A snap switch construction including an insulating support, two pairs of stationary switch contacts carried thereby, a reciprocating slide

and a roller contact movable in a direction substantially at right angles to the plane of the front face of the switch between each of the respective pairs of stationary contacts, an oscillating wheel composed of two discs arranged between the slides, each of said slides having a slidably movable and readily detachable connection with one of said discs, and a finger lever pivoted to said support and connected to said wheel for actuating the wheel and the slides.

4. A snap switch construction including an insulating support, two pairs of stationary switch contacts with spring fingers arranged on opposite sides of said support, a slide and a contact carried thereby and reciprocable between each of the respective pairs of stationary contacts in a direction substantially at right angles to the face of the switch, an oscillating wheel movable between the slides and detachably connected to each of the slides, a finger lever and a spring for actuating said wheel and slides with a snap action to the on and off positions of the switch.

5. A snap switch construction including an insulating body having two guide slots extending substantially at right angles to the plane of the face of the switch and spaced apart from each other, a switch member slidable lengthwise in each slot, a switch contact secured to the body adjacent each slot to coact with the switch member therein, an oscillating snap action actuator mounted between the switch members and connected thereto, and a finger piece for moving the actuator.

6. A snap action switch including an insulating body having a recess open toward the front and having a guide slot at one side of the recess and open at the rear, a contact mounted on each side of the slot, an insulating member inserted into said slot from the rear and having a switch member slidable between the contacts in a direction at right angles to the plane of the front of the switch, an oscillating actuator inserted into said recess from the front and having an open slot to receive a part of the insulating member when inserted and a finger lever pivoted in the front of the recess and having a toggle spring connection with the actuator.

7. A switch construction including an insulating body with a recess open at the front and guide slots open at the rear and communicating with opposite sides of the recess, a contact mounted at one side of each slot, a switch member slidable into each slot from the rear to coact with the adjacent contact, a front plate, a pivoted finger lever and an oscillating actuator carried by the front plate, a toggle action spring connecting the lever and actuator, the actuator and switch members having coacting interconnecting parts adapted to be automatically connected when the actuator is inserted between the switch members into the recess from the front of the body, said switch members being guided in the slots in the body on opposite sides of the actuator.

8. A switch including an insulating body having a central recess open at the front and rear and having rearwardly projecting integral portions with guide slots on opposite sides of the recess, a contact secured to the rear of the body on each side of each slot, an insulating member mounted to slide in each slot between its contacts at right angles to the plane of the front of the body, an oscillating actuator mounted in the recess between the sliding members and connected thereto, a finger piece pivoted in the front of the recess, a toggle spring connecting the finger piece and the actuator, a rear body part of insulating material having guides for said sliding members and entirely enclosing the rear of the actuator and the contacts, and circuit terminals accessible at the front of the body and connected to the respective contacts in the rear.

9. A switch construction including an insulating body formed of two parts, a metallic frame having a front plate extending across a part of the front of the body and having ears projecting rearwardly into the front part of the body, a finger lever pivoted in said ears and projecting forwardly from said plate, an actuating wheel pivoted to said ears in rear of said lever, a toggle spring connecting the inner end of said lever and a rear part of said wheel, a contact mounted in the body on each side of said wheel, an insulating bar mounted to slide in the body in a direction substantially at right angles to the plane of the front plate and at least partially guided by one side of said wheel, a switch member carried by each bar and coacting with the adjacent contact, and circuit terminals accessible at the front of the body on opposite sides of the front plate and connected to said contacts within said body, the rear part of the body enclosing said wheel and said contacts.

10. In a snap switch an insulating support having a passage extending through from front to rear thereof and grooves at the opposite sides of said passage, a pair of contacts secured to the rear of the support adjacent each of said grooves, a slide reciprocable in each groove and carrying a conducting member for engaging the respective contacts, a frame mounted on the front of said support and having ears extending into said passage, a finger lever pivoted to said ears in said passage and an oscillating wheel carried by said ears and operably connected to said slides, and operable means for connection between said lever and said wheel.

11. In an electric switch, a two-part insulating housing formed of front and back parts, the front part having a passage extending from the front through to the rear thereof, a frame secured to the front part and having ears projecting into said passage, two pairs of contacts supported in the housing, a reciprocable switch member coacting with each pair of contacts, an oscillating wheel carried by said ears and connected to said switch members for actuating the same, and a finger lever carried by said ears and operably connected to said wheel.

12. In an electric switch, two reciprocating switch members, a frame, a finger lever, a hinge pin for supporting said finger lever in said frame, an oscillating wheel connected to said switch members and having stop shoulders coacting with said hinge pin to limit the movement of the wheel, and a throwing spring connecting said lever with said wheel.

13. In an electric switch, an insulating housing formed of a front part and a semi-cylindrical rear part, a frame member having supporting ears projecting into the front part, screws connecting the two parts of the housing to the frame, a pair of slidably movable switch members mounted in the housing, an oscillating wheel supported by said ears and operably connected to said switch members, a finger lever supported by said ears, and a spring connecting said finger lever and said wheel.

14. In an electric switch, a metallic supporting frame, a finger lever pivotally supported in said frame, an oscillating wheel pivotally supported by said frame, switch members slidably actuated by said wheel in a relatively vertical direction, a spring connecting said lever with said wheel to operate the same with a snap action when the finger lever is operated, said wheel and said lever having cooperating projections whereby the lever may positively move the wheel before the snap action of the spring takes place.

15. In a snap switch, a frame having side arms and a face plate, a toggle lever hinged to said side arms and provided with stop shoulders abutting against the back of the face plate, a hinge pin for said lever, an oscillating member pivoted to said side arms at one side of a normal to the face plate passing through the hinge pin and provided with shoulders adapted to abut against said pin, a spring connecting the inner end of said lever with a point near the periphery of said oscillating member behind its pivot to provide a snap action of the oscillating member when the toggle lever is actuated, a stationary contact and a sliding switch member driven by the snap action of the oscillating member to make and break the circuit.

16. In a snap switch, an insulating support having a passage extending through from front to rear thereof and with grooves at the opposite sides of said passage, a pair of spring contacts secured to the support adjacent each of said grooves, a slide reciprocable in each groove and carrying a conducting member for engaging between the respective contacts, a frame having a face plate and having ears extending into said passage, a finger lever pivoted to said ears in said passage and an oscillating wheel carried by said ears and connected to said slides, and spring means of connection between said lever and said wheel, the line of centers between the axes of the wheel and the lever being at an acute angle to the face plate.

17. In an electric switch, two spring contacts, a reciprocating switch member between said spring contacts, a frame, a finger lever, a hinge pin for supporting said finger lever in said frame, said lever having stop shoulders abutting against a part of the frame, an oscillating wheel connected to said switch members and having stop shoulders coacting with said hinge pin to limit the movement of the wheel, and a throwing spring connecting said lever with said wheel.

18. In an electric switch, a supporting frame, a finger lever pivotally supported in said frame, an oscillating wheel pivotally supported by said frame, a pair of spring contacts, a switch member actuated by said wheel and slidable between the contacts in a direction at right angles to the plane of said frame, a spring connecting said lever with said wheel to operate the same with a snap action when the finger lever is operated, said wheel and said lever having cooperating projections whereby the lever may positively move the wheel before the snap action of the spring takes place, the wheel, lever and spring having means of connection such that the switch member is moved with greater force when going into position between the contacts than when being retracted therefrom.

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