

Jan. 19, 1937.

J. G. PETERSON

2,068,069

ELECTRIC SWITCH

Original Filed Jan. 10, 1933

Fig. 1.

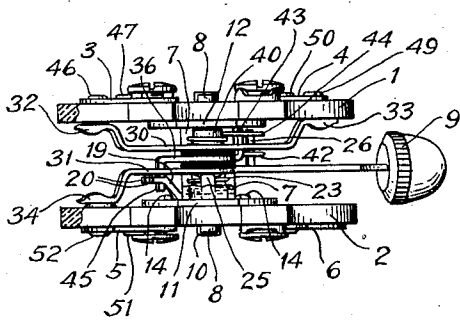


Fig. 2.

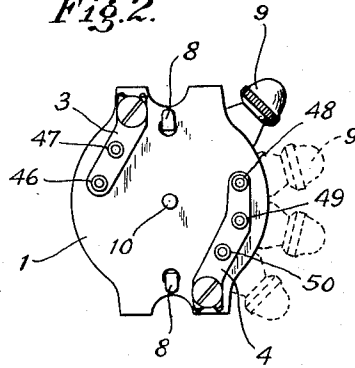


Fig. 4.

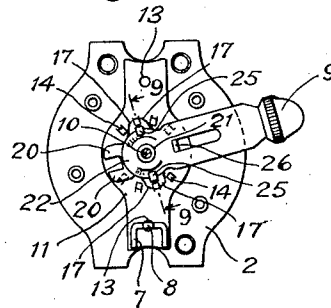


Fig. 3.

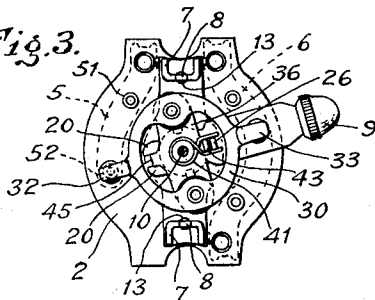


Fig. 5.

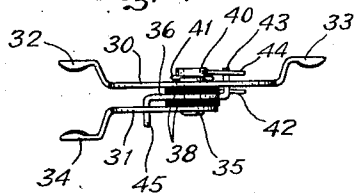


Fig. 6.

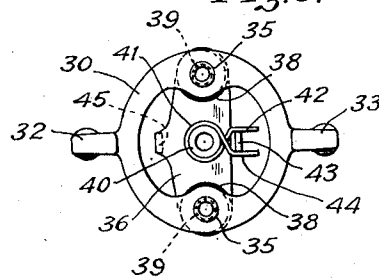


Fig. 7.

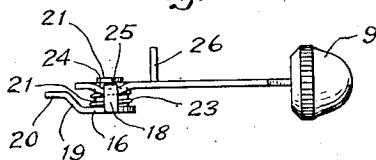


Fig. 8.

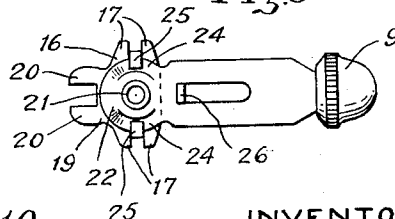


Fig. 9.

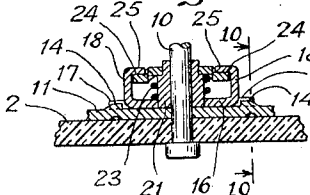
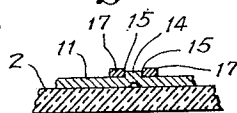


Fig. 10.



INVENTOR  
JOHANN G. PETERSON

BY

ATTORNEY.

## UNITED STATES PATENT OFFICE

2,068,069

## ELECTRIC SWITCH

Johann G. Peterson, West Hartford, Conn.

Application January 10, 1933, Serial No. 651,003

Renewed February 24, 1936

27 Claims. (Cl. 200—70)

My invention relates to electric switches.

It has for its object to provide an improved electric switch, and, more particularly, an improved switch unit of the single lever type adapted to make or break a plurality of circuits as said lever is moved in either direction. A further object of my invention is to provide an improved switch of the type in question, which is of an improved construction adapting the same to handle current beyond the capacity of my prior switches of that type, and which accordingly enables the possible field of use of such switches to be materially extended. A still further object of my invention is to provide such a switch having improved indexing, contact, and contact actuating mechanism operatively connected and actuated in an improved manner by the switch actuating member through improved means, all in such manner as to produce a switch of the type mentioned, which, while adapted to handle more current, is entirely safe in operation and also adapted to be inexpensively manufactured. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawing, I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In the drawing,—

Figure 1 is a side elevation of this form of my improved switch unit, the front connecting member of the unit being broken away and the upper and lower plates being partially in section, to facilitate illustration;

Fig. 2 is a top plan view of the unit with the actuating member shown in full or dotted lines in its various positions;

Fig. 3 is a top plan view after removal of the upper insulating plate shown in Fig. 2, the frame plate underlying the same also being shown in dotted lines to expose the contact carrying member;

Fig. 4 is a top plan view after removal of the contact member shown in Fig. 3 to expose the actuating member and the indexing member operated thereby, one of the connecting members here also being removed to facilitate illustration;

Fig. 5 is an enlarged detail elevation of the contact member;

Fig. 6 is an enlarged detail plan view of the contact member;

Fig. 7 is an enlarged detail side elevation of the actuating and indexing member;

Fig. 8 is an enlarged detail plan view of the same;

Fig. 9 is an enlarged detail sectional view on line 9—9 of Figure 4, and

Fig. 10 is an enlarged detail sectional view on line 10—10 of Figure 9.

The switch shown in this illustrative construction includes top and bottom insulating plates 1 and 2, of which plate 1 carries external terminal plates 3 and 4 while plate 2 carries on its exterior a terminal plate 5 and a through connection or plate 6, all of these plates being equipped with usual binding screws at their outer extremities. As shown herein, it will also be noted that the plates 1 and 2 are connected in such manner as to form a unit by spacing and connecting U-shaped members 7 having reduced fingers 8 on their opposite ends extending through said plates and bent over on the outside of each plate. Further, it will be noted that a switch mechanism of an improved construction hereinafter described, is disposed between these plates and has an actuating member 9 movable about a stationary stud 10, suitably seated in the plates as said member assumes its various positions indicated in full and dotted lines in Figure 2.

Considering the switch mechanism more in detail, it will be noted that the same is disposed in a metal frame inside the insulating members 1 and 2 and also held in place by the spacing and connecting members 7. Herein this frame includes top and bottom metal plates 11 and 12, which are provided with suitable apertures 13 at their ends, adapted to receive the fingers 8 on the members 7 so that when the plates are disposed on the body portions of the members 7 inside the insulating plates 1 and 2, a rigid frame is formed when the fingers 8 are bent over on the members 1 and 2, as shown in Figure 2. As illustrated herein, the stud 10, on which the actuating member 9 is pivoted, extends vertically through both of the plates 11 and 12 and also the plates 1 and 2, while the switch mechanism is disposed between the plates 11 and 12 and operated as the actuating lever 9 moves about this stud 10. It will also be noted that one of these plates, herein the plate 12, is a plain plate, while the plate 11, which co-operates with the indexing mechanism of the switch, is provided with a plurality of series of upstanding indexing lugs 14 on the upper face thereof. Herein, these lugs are disposed on opposite sides of the stud, while each series comprises four lugs and each series is disposed in an arc between the axis and the adjacent member 7. Attention is

also directed to the fact that the lugs 14 are each provided with vertical sides 15, as illustrated in Figure 10.

Co-operating with these lugs 14 is improved unitary indexing mechanism actuated by the actuating member 9. Herein this mechanism includes a movable indexing member 16, provided with slotted portions or spaced lugs 17 on opposite sides of its bottom and each providing between the same a slot adapted to receive one of the lugs 14 in the different positions of the indexing member around the stud 10. Herein, it will also be noted that these lugs 17 are formed by bending up extensions 18, hereafter described, on opposite sides of the member 16. Further, it will be noted that the member 16 is provided herein at right angles to a line passing between the pairs of lugs 17, with an upwardly bent and laterally extending portion 19 having spaced lugs 20 thereon. Attention is also particularly directed to the fact that the member 16 is rotatably and vertically movable on the lower end of a sleeve member 21 which is, in turn, rotatable about the stationary stud 10. Herein, the inner end 22 of the actuating member 9 is rotatable on the stud and fixed on the upper end of this sleeve 21, herein on a reduced portion thereon, and a coiled spring 23 is disposed around the sleeve between the end 22 and the body of the member 16 in such manner as normally to hold the lugs 17 down against the plate 11 with the lugs of each pair on opposite sides of selected lugs 14. Further, it will be noted that the end 22 of the actuating member is provided on each side of its axis with flattened V-shaped upper cam surfaces 24, and that these are engaged by laterally extending co-operating portions 25 on the upper ends of the portions 18. Attention is also directed to the fact that the actuating member is provided with an upwardly extending lug, herein in the form of a struck-up lug 26 extending upward therefrom adjacent the sleeve and between the same and the free end of the actuating member. Thus it will be evident that when the actuating member 9 is moved to move its cams 24, the lugs 17 will be lifted up to release their lugs 14 and compress the spring 23, while when the member 16 is moved angularly, the lugs 17 will move down again into engagement with other lugs 14.

Co-operating with the mechanism just described, is also improved contact mechanism and actuating mechanism therefor. Herein, this contact mechanism is in the form of a commutator unit shown in Figures 5 and 6 and adapted to be received upon the end of the stud 10 projecting through the sleeve 21. As shown, it comprises two contact carrying members 30 and 31, of which the upper member 30 is in the form of a ring and provided with oppositely disposed raised spring contacts 32 and 33, while the member 31 corresponds to and underlies one-half of the member 30 while being provided with a single depending spring contact member 34. Herein, these members 30, 31 are spaced apart, with their bodies in different horizontal planes and both are riveted together, as by conducting rivets 35 also passing through the ends of an intermediate plate 36 forming a journal therefor. In this construction, the rivets 35, while electrically connecting the members 30 and 31, are suitably insulated from the plate 36, as, for example, by insulating washers 38 disposed between the members 30 and 31 and the opposite sides of the plate 36, and by also providing enlarged apertures 39 in the ends of the plate 36 so that the rivets will

not contact with the latter plate. Attention is also directed to the fact that the plate 36 is provided with an upwardly projecting axial sleeve portion 40 fixed thereon and adapted to receive the stud 10 and thus dispose the contact unit for rotation about the stud. As shown, a spring 41 is also coiled about this upwardly projecting sleeve and has one end 42 disposed on one side of an upstanding lug 43 on the member 36 adjacent the sleeve 40, and another end 44 engaging the opposite side of this lug, while the ends 42 and 44 of the spring also project on opposite sides of the lug 26 on the actuating member 9. Attention is also directed to the fact that a depending lug 45 is provided on the opposite side of the plate 36 from the upstanding lug 43, and that this depending lug passes between the lugs 20 on the member 16. Thus it will be evident that when the actuating member 9 is moved about the stud 10, and as it is releasing the index mechanism heretofore described, the spring 41 will be tensioned in such manner that, when the indexing mechanism is released, it will cause the contact unit to be swung with a snap action about the stud 10 into a different position. Further, it will be evident that this position will be automatically determined by the indexing mechanism, the spring of which, as soon as the lugs 17 are above the spaces on opposite sides of the next lugs 14, will automatically cause these lugs 17 to be pressed down into this new position until they again engage the plate 11.

Co-operating with the improved contact unit heretofore described, are stationary contacts carried on the insulating plates 1 and 2. Herein it will be noted that the terminal plate 3 is connected to the insulating plate 1 by rivets 46 and 47 which extend through the plate 1 and form on the inner face thereof, contacts engageable with the movable contact 32 of the contact member 30, while the terminal plate 4 is connected thereto by similar rivets 48, 49 and 50 which form similar contacts for the oppositely disposed movable contact 33 of the same contact member 30. Further, it will be noted that the terminal 5 on the insulating plate 2 is attached to the latter by similar rivets 51 and 52 which are similarly engageable by the contact 34 on the movable contact member 31. Accordingly, while no current will flow when the parts are in the position illustrated in full lines in Figure 2, when the actuating member 9 is moved from this full line position down into the next lower dotted line position, the movable contact 33 will engage the stationary contact 48, while the movable contact 34 will engage the stationary contact 52. Similarly, when the member 9 is moved further down, i. e. into the second dotted line position shown in Figure 2, the movable contact 33 will engage the movable contact 49, while the movable contact 32 will then engage the stationary contact 46. Also, when the actuating member is moved still further down, i. e. to the bottom dotted line position shown in Figure 2, the movable contact 33 will engage the stationary contact 50, while the movable contacts 32 and 34 will respectively engage the stationary contacts 47 and 51. Thus it will be evident that with the binding posts on the members 3, 4, 5 and 6 connected in a usual manner to the line and a device to be controlled, as, for example, a vacuum cleaner motor, it is possible to obtain an "off" position, as shown in the full line position of the mem-

ber 9 in Figure 2, a "low" speed position in the next lower dotted line position of the actuating member, a "medium" speed position in the second lower dotted line position of the actuating member, and a "high" speed position in the bottom dotted line position of the actuating member, with the actuating member moving progressively step by step in the same direction from "off" to "high" speed position, and, of course, also reversely operable.

In the operation of the structure as a whole, it will be evident that when the actuating member 9 is moved as described above from its inoperative or full line position in Figure 2, the indexing member 16 will first be actuated to cause its lugs 17 to release the lugs 14, this due to the action of the cams 24 upon the portions 25 carried on the member 16. Further, it will be evident that the lugs 17 will be raised in such manner as to release the lugs 14, as heretofore described, as the members 25 move up opposite halves of the cams 24, and be again forced down astride the next pair of lugs 14 when the member 17 has been moved angularly about the stud, the members 25 then moving reversely down the same portions of the cams. Further, it will be evident that an angular movement will immediately follow the release of the first pair of lugs 14, due to the action of the spring 41 and the interconnection of this spring 41 with the actuating member 9 through the lug 26 and the interconnection between the actuating member 9 and the indexing member 16 through the co-operating cam means 24. It will also be evident that, through the same spring 41, the movable contact unit comprising the members 30 and 31 will also be swung due to the action of the spring 41 on the lug 43 on this member and the interengagement of the lugs 45 on this member with the lugs 20 on the member 16. Also, of course, the spring 23 will again seat the lugs 17 in a new indexing position as soon as the lugs 17 have been rotated into this new position, the spring 23 being tensioned by the raising movement of the members 16 which is required to release the same and accordingly acting automatically upon the latter member as soon as it reaches a new indexing position. Thus it will be evident that the various circuits will be made and broken successively with a snap action as the actuating member 9 moves from one position to another. Further, it will, of course, be evident that a like operation will occur when the member 9 is moved reversely, the only important difference in operation being that the member 25 will then move up the other halves of the cams 24 to releasing position, and down those halves upon release.

As a result of my improved construction, it will be noted that arcing is minimized in such manner as to adapt the switch to uses requiring substantial current capacity with safety and while continuing to utilize the general structure of my prior patents. Attention is further directed to the fact that I have improved the structure of the indexing mechanism and provided improved cam type actuating mechanism therefor actuated by an improved cam on the actuating member of the switch, while also making it possible to utilize a stationary stud. Attention is also directed to the improved construction of the contact member unit wherein the contact members, although electrically connected to each other, are insulated from the rest of the unit. It will also be noted that the inner frame including the members 11, 12 and 7, is not in

circuit and that one of these frame members 11 herein also forms a part of the indexing mechanism, although it will, of course, be evident that, if desired, the lugs 14 thereon may be provided on a spring member or disc seated on this member 11. Of course, also, it will be evident that I may, if desired, use only one series of lugs 14 and omit one pair of lugs 17 although I prefer to use the plurality of series of the same as shown herein on account of the better balancing of the mechanisms. These and other advantages of my improved construction will, however, be clearly apparent to those skilled in the art.

While I have, in this application, specifically described one embodiment which my invention may assume in practice, it will be understood that this form is shown for illustrative purposes, and that the structure may be modified and embodied in other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:—

1. In an electric switch, stationary and movable contact means, an actuating member, separable indexing means actuated by said actuating member and controlling said movable contact means inhibiting movement thereof until said indexing means are disengaged, including a movable indexing member disposed on the opposite side of said actuating member from said movable contact means, and means operable upon disengagement of said indexing means for actuating said movable contact means with a snap action.

2. In an electric switch, stationary and movable contacts including a movable contact member, an indexing member including stationary indexing means and a co-operating indexing member movable vertically out of engagement with said stationary means and rotatable with said contact member, a pivoted actuating member disposed between said movable contact and said movable indexing member, means for moving said indexing member vertically to release it from said stationary means upon each actuation of said actuating member disposed between said actuating member and movable indexing member, and means operable upon release of said indexing member for actuating said movable contact member with a snap action.

3. In an electric switch, stationary and movable contacts including a movable contact member, a stationary stud on which the latter is rotatable, indexing mechanism including stationary indexing means and a co-operating indexing member movable vertically on said stud and rotatable with said contact member, an actuating member rotatable about said stud, means for moving said indexing member vertically to release it from said stationary means upon each actuation of said actuating member, and means operable upon release of said indexing member for actuating said movable contact member with a snap action.

4. In an electric switch, stationary and movable contacts including a movable contact member, a stationary stud on which the latter is rotatable, indexing mechanism including a stationary plate having lugs thereon and a co-operating indexing member having co-operating lugs and movable vertically on said stud and rotatable with said contact member, an actuating member movable about said stud, cam means between said actuating member and indexing member for releasing the latter upon each actua-

tion of said actuating member, and means operable upon release of said indexing member for actuating said movable contact member with a snap action.

5 5. In an electric switch, stationary and movable contacts including a movable contact member, a stationary stud on which the latter is journaled, indexing mechanism including stationary indexing means and an indexing member  
10 movable vertically on said stud and rotatable with said contact member, an actuating member movable about said stud progressively into a plurality of operative positions longitudinally of the switch, means between said actuating member  
15 and indexing member for releasing the latter upon each actuation of said actuating member, and means operable upon release of said indexing member for actuating said movable contact member with a snap action as said actuating  
20 member is progressively moved into its different operative positions.

6. In an electric switch, stationary and movable contacts including a movable contact member, a stationary stud on which said member is  
25 journaled, indexing mechanism including stationary indexing means and an indexing member movable longitudinally of said stud and rotatable with said movable contact member, an actuating member rotatable about said stud, oppositely inclined cams on said actuating member and movable about said stud, a cam engaging member on  
30 said indexing member selectively engageable with said cams upon reverse operations of said actuating member to release said indexing member, spring resetting means for said indexing member  
35 tensioned upon actuation of said actuating member, and spring means likewise tensioned by said actuating member and throwing said movable contact member with a snap action when said  
40 indexing member is released.

7. In an electric switch, a stud, a movable indexing member, a sleeve on said stud on which said indexing member is longitudinally and  
45 rotatably movable, an actuating member rotatable on said stud having cam means rotatable relative to the latter, co-operating cam means on said indexing member, and spring means surrounding said sleeve and acting on said indexing member and tensioned as the latter is actuated.  
50 8. In an electric switch, a stud, a movable indexing member, a sleeve on said stud on which said indexing member is longitudinally and rotatably movable, an actuating member rotatable on said stud having cam means rotatable relative  
55 to the latter, co-operating cam means on said indexing member, and spring means surrounding said sleeve and acting on said indexing member and tensioned as the latter is actuated, said cam means comprising oppositely inclined cam surfaces selectively engageable by said co-operating  
60 cam means as said actuating member is moved in opposite directions.

9. In an electric switch, a stud, a movable indexing member, a sleeve on said stud on which  
65 said indexing member is longitudinally and rotatably movable, an actuating member rotatable on said stud having cam means rotatable relative to the latter including oppositely inclined cams, co-operating cam means on said indexing member  
70 selectively actuated by different cams as said actuating member is moved in opposite directions, spring means surrounding said sleeve and acting on said indexing member and tensioned as the latter is actuated, a stationary indexing member  
75 having upstanding lugs thereon, and lugs on said

movable indexing member co-operating with said lugs.

10. In an electric switch, a movable indexing member, a sleeve on which said indexing member is longitudinally and rotatably movable, an actuating member rotatable on said sleeve and carrying cam means, co-operating cam means on  
5 said indexing member, and spring means surrounding said sleeve between said indexing member and actuating member, said indexing member being automatically movable toward and from the actuating member by said cam means as said actuating member is operated.

11. In an electric switch, a movable indexing member having indexing means thereon, a sleeve  
15 on which said indexing member is longitudinally and rotatably movable, an actuating member rotatable on said sleeve and carrying cam means, co-operating cam means on said indexing member, spring means surrounding said sleeve between  
20 said indexing member and actuating member, said indexing member being automatically movable toward and from the actuating member by said cam means as said actuating member is operated, and a stationary indexing member  
25 presenting pivot means for said sleeve and co-operating indexing means.

12. In an electric switch, an actuating member having pivot means at one end thereof and cam means on opposite sides of said pivot means, each  
30 comprising a depressed cam portion having oppositely disposed inclined sides and both disposed in arcs around said pivot means.

13. In an electric switch, an indexing member having pivot means therein and oppositely extending spaced lugs on opposite sides of said  
35 pivot means, and upstanding fingers between the lugs on each side of the same and each having an overhanging upper end extending toward said pivot means.

14. In an electric switch, a contact unit comprising a plurality of superimposed electrically connected contact members, and means insulated from said members and disposed therebetween  
40 carrying axial pivot means therefor.

15. In an electric switch, a contact unit comprising a plurality of superimposed electrically connected contact members, one of said members carrying a plurality of contacts and the other a single contact and both of said members presenting an axial aperture through said unit, and a carrying plate for said members and insulated therefrom having pivoting means in said aperture.  
50

16. In an electric switch, a contact unit comprising a plurality of superimposed electrically connected contact members carrying a plurality of contacts, both of said members presenting an axial aperture through said unit, and a carrying plate between said members and insulated therefrom having pivoting means in said aperture and also having oppositely projecting lugs in said aperture projecting through different contact members.  
55

17. In an electric switch, insulating means carrying terminals, frame means within said insulating means, and switch mechanism in said frame means and operable from the exterior of said insulating means having movable contact means insulated from said frame means and electrically connected to said terminals.  
60

18. In an electric switch, a plurality of spaced external insulating plates carrying terminals, frame means between said plates, switch mechanism in said frame means and operable from the  
65 75

exterior of said plates having movable contact means insulated from said frame means and electrically connected to said terminals, indexing means on said frame means, and a co-operating movable indexing member engageable with said means and actuated upon each actuation of said switch mechanism to release the same.

19. In an electric switch, a frame comprising co-operating operatively connected spaced plate members one having radially disposed stationary indexing means, axially located stationary pivot means in said frame, a movable indexing member pivoted on said pivot means and having movable indexing means co-operating with said stationary indexing means, cam means in said movable indexing member and pivoted on said pivot means and co-operating to disengage said movable indexing means from said stationary indexing means, means for swinging said movable indexing member upon said disengagement, and means for reengaging said movable indexing means following swinging thereof.

20. In an electric switch, a frame comprising co-operating operatively connected spaced plate members one having radially disposed stationary indexing means, axially located stationary pivot means in said frame, a movable indexing member pivoted on said pivot means and having movable indexing means co-operating with said stationary indexing means, cam means on said movable indexing member and pivoted on said pivot means and co-operating to disengage said movable indexing means from said stationary indexing means, means for swinging said movable indexing means upon disengagement, means for reengaging said indexing means following swinging thereof, and a movable contact member between said cam means and one of said plates positioned by said movable indexing means and swung by said swinging means with a snap action.

21. In an electric switch, a frame comprising co-operating operatively connected spaced plate members one having radially disposed stationary indexing means, axially located pivot means in said frame, a movable indexing member pivoted on said pivot means and having movable indexing means co-operating with said stationary indexing means, cam means on said movable indexing member and pivoted on said pivot means and co-operating to disengage said movable indexing means from said stationary indexing means, means for swinging said movable indexing means upon disengagement, means for reengaging said movable indexing means following swinging thereof, a movable contact member likewise between said plates positioned by said movable indexing means and swung by said swinging means with a snap action, and spaced external insulating members enclosing said frame and connected thereto and carrying contacts engageable by said movable contact member and terminals on the outer faces of said insulating members connected to said contacts.

22. In an electric switch, stationary and movable contacts including a pivoted contact carrying member having an actuating spring, indexing mechanism including a stationary indexing member and a movable indexing member having actuating cam means, a movable actuating member, and actuating mechanism for successively releasing said movable indexing member and actuating said contact carrying member with a snap action including cam means on said actuating member cooperating with the cam means for said movable indexing member to release the

latter and spring tensioning means on said actuating member and tensioning the actuating spring for said movable contact member.

23. In an electric switch, stationary and movable contacts including a pivoted contact carrying member having an actuating spring, indexing mechanism including a stationary indexing member and a movable indexing member having cam means thereon, a swinging actuating member, and actuating mechanism for successively releasing said movable indexing member and actuating said contact carrying member with a snap action including a cam on said actuating member cooperating with the cam means on said movable indexing member to release the latter and a spring tensioning arm also on said actuating member and tensioning the actuating spring for said movable contact member, said contact carrying member, movable indexing member and actuating member being coaxially disposed and having a stationary pivot member extending there-through.

24. In an electric switch, stationary and movable contacts including a pivoted contact carrying member having an actuating spring, indexing mechanism including a stationary indexing member and a movable indexing member having cam means thereon, a swinging actuating member, and actuating mechanism for successively releasing said movable indexing member and actuating said contact carrying member with a snap action including a cam on said actuating member cooperating with the cam means on said movable indexing member to release the latter and a spring tensioning arm also on said actuating member and tensioning the actuating spring for said movable contact member, said actuating member and movable indexing member having cam means selectively engageable when said actuating member is moved in opposite directions and said actuating spring being tensioned in either direction of movement of said actuating member.

25. In a switch, the combination with a plurality of fixed contacts, of a movable contact member having a swivelled mounting comprising a stationary member disposed substantially centrally of said frame, said contact member carrying peripheral contacts at opposite sides of its axis cooperating with said fixed contacts in different circuit establishing relations in different angular positions of said member, a pivoted operating member for said movable contact member swingable in a plane parallel to a plane in which the latter moves and having a manual actuating portion projecting from the frame at one side thereof, and mechanism cooperating with said operating member and said movable contact member for imparting a snap action to the latter when said operating member is actuated, one of said movable contacts being at that side of said contact member which is disposed toward the manual actuating portion of said operating member.

26. In a switch, the combination of a frame, a commutator member having a swiveled mounting within the frame and carrying a plurality of peripheral contacts, the swiveled mounting of said member comprising a stud member fixed against rotation in said frame and about which said member is adapted to rotate, said contacts disposed on opposite sides of the axis of said commutator member and projecting laterally from the periphery of said member, fixed contacts adapted to be contacted by said movable contacts

to establish different circuits, a pivoted operating member movable in a plane parallel to a plane in which said commutator member is movable and having a projecting manually operable actuating portion, and means for actuating said commutator member from said operating member with a snap action, one of said movable contacts being located on a side portion of the commutator member which is disposed toward the actuating portion of said operating member.

27. In a switch, the combination with a frame, of a commutator member, a fixed stud member on which said commutator member is swivelled substantially centrally of said frame and substantially centrally of said commutator member, said commutator member carrying peripheral con-

tacts including contacts at opposite sides of its axis, fixed contacts cooperating with said commutator contacts and arranged at opposite sides of the axis of said commutator member, a pivoted operating member for said commutator member movable in a plane parallel to a plane in which said commutator member moves and having a projecting actuating portion at one side of the frame, one of the fixed contacts being located at that side of the frame which is disposed toward the actuating portion of said operating member, and means for imparting a snap action to said commutator member, including shifting means connected to said member at a point inside the orbit of said movable contacts.

JOHANN G. PETERSON.