

Feb. 15, 1944.

H. K. ANDREWS

2,341,837

SWITCH

Filed March 12, 1942

2 Sheets-Sheet 1

Fig. 1.

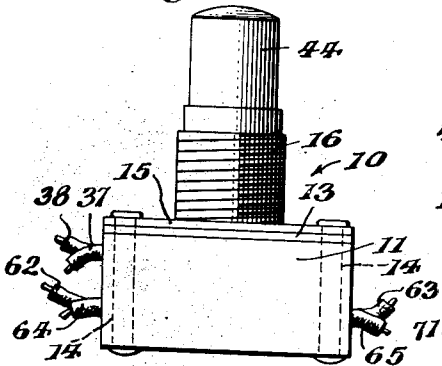


Fig. 2.

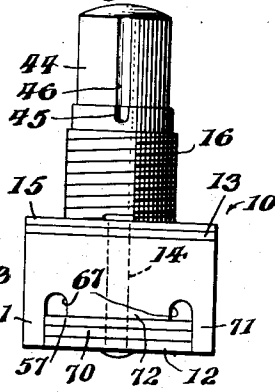


Fig. 3.

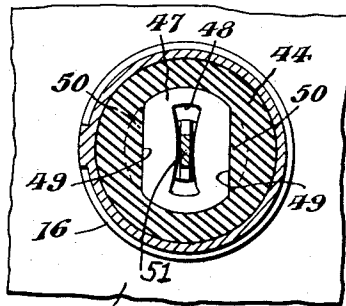
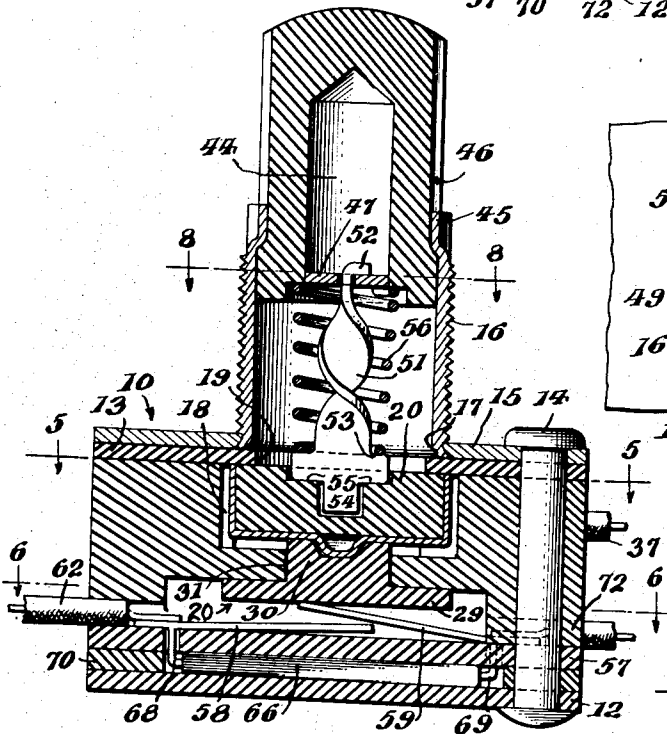
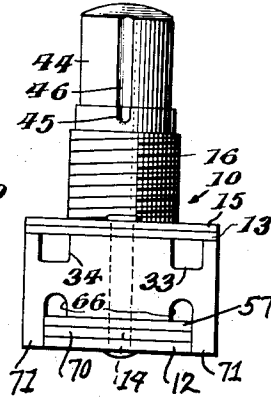


Fig. 8.

Fig. 4.

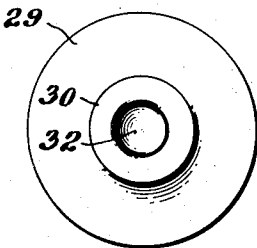


Fig. 7.

INVENTOR
Harold K. Andrews
BY
Johuff Haurahan
ATTORNEY

Feb. 15, 1944.

H. K. ANDREWS
SWITCH

2,341,837

Filed March 12, 1942

2 Sheets-Sheet 2

Fig. 5.

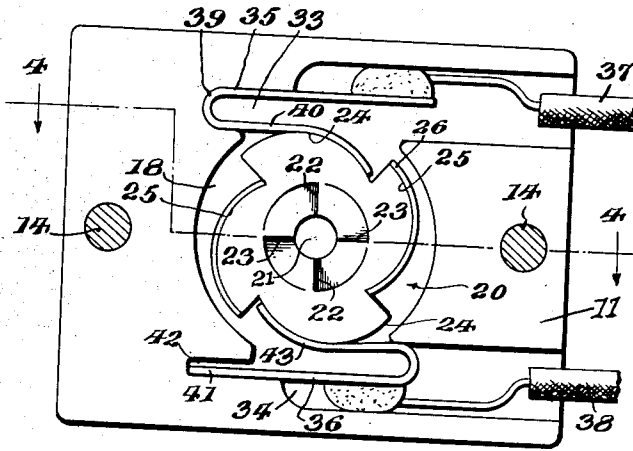


Fig. 6.

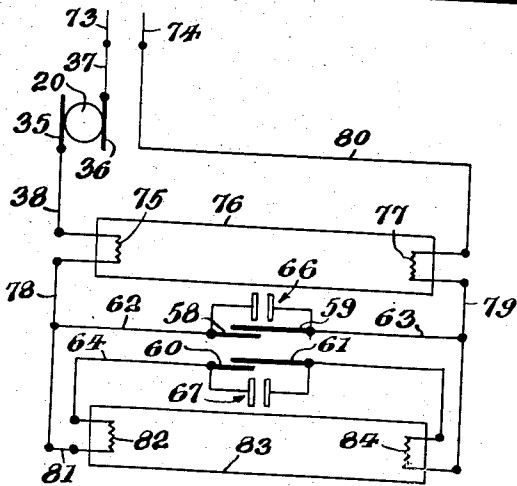
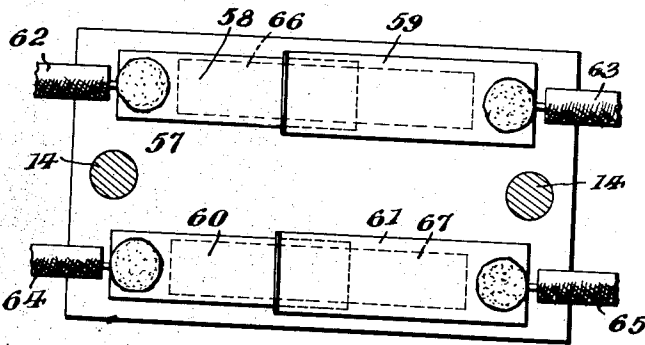
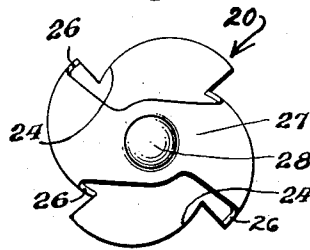


Fig. 10.

Fig. 9.



INVENTOR
Harold K. Andrews
BY
John H. Hawrah
ATTORNEY

UNITED STATES PATENT OFFICE

2,341,837

SWITCH

Harold K. Andrews, Stratford, Conn., assignor to
Edwin G. Gaynor, Fairfield, Conn.

Application March 12, 1942, Serial No. 434,319

5 Claims. (Cl. 200—4)

This invention relates to new and useful improvements in switches and has particular relation to a switch for the control of lighting systems employing fluorescent lamps.

An object of the invention is to provide a switch for the purpose stated and which is designed for the starting or stopping of the functioning of the lamp and which includes but a single manual and which leaves the line circuit to the fluorescent lamp fully open when the lamp is extinguished or when functioning of the lamp is stopped.

Other objects and advantages of the invention will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings—

Fig. 1 is a side elevational view, on a scale greater than actual size, of a switch made in accordance with the invention;

Fig. 2 is an end elevational view of the switch the view being taken as looking from the right of Fig. 1;

Fig. 3 is a view similar to Fig. 2 but showing the opposite end of the switch;

Fig. 4 is a vertical sectional view, on a further enlarged scale, taken as along the plane of the line 4—4 of Fig. 5, but through a complete switch;

Fig. 5 is a sectional view taken as along the plane of the line 5—5 of Fig. 4;

Fig. 6 is a sectional view taken as along the plane of the line 6—6 of Fig. 4;

Fig. 7 is a plan view of a support removed from the switch;

Fig. 8 is a sectional view taken along the plane of the line 8—8 of Fig. 4;

Fig. 9 is a bottom plan view of an element and a bridging piece carried thereby, the parts being removed from the switch; and

Fig. 10 shows a wiring diagram with the switch incorporated in a fluorescent lighting system in accordance with the invention.

Referring in detail to the drawings the switch of the invention comprises a housing generally designated 10 and including a body 11, a lower or inner closure plate 12, and an upper or outer closure plate 13. All of these parts are of insulating material. The closure plates 12 and 13 are held against the body 11 by rivets 14 passing

through the end portions of the parts. These rivets also pass through and secure in place a metal plate 15 carrying a tubular neck-like portion 16 which may be threaded on its outer surface for the reception of a clamping nut or the like (not shown) used for mounting the switch on any suitable support through which the said portion 16 has been passed. As here shown neck-like portion 16 passes through the metal plate 15 substantially centrally thereof and is spun or turned over at 17 whereby the portion and plate are securely connected. However, it is to be understood that this particular structure is not controlling and that other structures may be used.

Body 11 in its outer side is provided with a recess 18 the axial center of which is substantially in alignment with the axial center of an opening 19 through the outer closure 13, as well as that of the opening through plate 15 and the neck-like portion 16. Turnably or rotatably mounted in the recess 18 (in a manner to be described) is an element 20 of insulating material. In its upper or outer surface the element 20 is provided with a centrally arranged socket 21 and in its outer face about said socket the element is provided with tapered depressions terminating in pairs of diametrically opposite vertical shoulders 22 and 23. The peripheral edge of the element 20 is of ratchet-like construction comprising diametrically opposite pairs of spiral surface portions 24 and 25.

Mounted on element 20 is a contact bridging member comprising contact engaging portion 26 disposed against the spiral peripheral portions 25 of the element and a connecting portion 27 between portions 26 and disposed at the under side of the element. Substantially midway its ends the connecting portion 26 is provided with a rounded projection 28 which functions as a bearing portion for the mounting of element 20.

To the latter purpose a support 29 has a button-like extension 30 projecting through an opening 31 entering recess 18 through the lower wall thereof. Extension 30 has a shallow depression 32 in its upper end and such depression is rounded as shown and receives the rounded projection 28 on the connecting portion 27 of the bridging member. It is to be understood that the element 20 and the bridging means are supported by the extension 31 for turning movement relative thereto and to the body 11. The opening 19 is of less diameter than that of element 20 whereby portions of closure 13 about such opening overlies the edge portions of the element and retain it in

relation to the button-like extension 30 above mentioned.

In the outer face of the body 11 at opposite sides of and entering the recess 18 are elongated sockets 33 and 34. These sockets receive contacts 35 and 36 respectively and extend through one end of the body for the accommodation of lead wires 37 and 38 soldered or otherwise secured to the respective contacts 35 and 36. Contact 35 is bent upon itself intermediate its ends whereby it includes a bight portion 39 and a spring arm 40 the latter extending into the recess 18. Preferably the entire contact is of spring metal and its bight portion 39 has a tight fit in the inner end portion of the socket 33 whereby the spring contact arm 40 is limited in its movement into the recess 18.

Contact 36 is also of spring metal and includes an end portion 41 forced into a slot-like end portion 42 of the socket 34 and a spring arm 43 entering somewhat into the recess 18. From Fig. 5 it will be clear that the contact arms 40 and 43 press against the ratchet-like peripheral edge of the element 20 and it will be clear that as said contact arms engage the edge portions 24 of the element 20 there is a gap between the contacts 35 and 36 but that when the element 20 is given a turning movement to bring the portions 26 of the bridging piece 27 into positions to be engaged by said contact arms a circuit is closed between the said contacts and the lead wires 37 and 38.

Reciprocable in the neck 16 is a manually-operated member 44 in the form of a hollow push button open through its inner end. Inwardly pressed lugs 45 in the neck 16 enter into grooves 46 in the sides of the push button whereby it is restrained against any turning movement in the neck and the said lugs in cooperation with the inner ends of the grooves 46 limit movement of the push button outwardly of the neck. Fixed against turning movement in the inner open end of the push button 44 is a flat plate or washer 47 having a slot-like opening 48 therethrough. Plate 47 has flat or straight edge portions 49 disposed against similar edge portions of lugs 50 secured to or integral with the button and in this way the plate is held against turning movement in the button.

A spiral member 51 is formed by twisting a piece of flat strip stock and one end of this member is bent over to provide a hook-like part 52 entered into the button 44 through the slot 48 in the plate 47. Toward its lower or inner end the element 51 is provided with lateral shoulders 53 and at its inner end with a tab 54 entering into the socket 21 in the turnable element 20. Laterally of tab 54 the element 51 is provided with a pair of shoulders 55 which are adapted to successively engage the pairs of shoulders 22 and 23 on the turnable element 20 when the tab 54 is in the socket 21 and successive turning rotary movements are imparted to the spiral element 51 as will be described.

A coil spring 56 surrounds the spiral member 51 and bears at its outer end against the plate 47 and at its inner end against the shoulders 53 of the spiral member whereby the inner end of the latter is maintained in position with its tab 54 in the socket 21 and with its shoulders 55 against the element 20 and in positions engaging or to engage the shoulders 22 and 23 of the latter. Coil spring 56 also serves to return the manual or push button 44 to its projected

normal position on being released following movement from such position.

When the push button 44 is depressed or pushed inwardly it is held against turning movement in the neck 16 as above described. However, at this time the spiral member 51 is only held against turning movement due to the engagement of its shoulders 55 with either the pair of shoulders 22 or the pair 23 and the element 20 is held against turning movement by frictional engagement of contacts arms 40 and 43 therewith and by slight frictional engagement with the outer cover member 13 about the edges of the opening 19.

Therefore as the push button is depressed it is forced over the spiral member 51 and the latter must enter the push button through the slot 48 in the plate 47 and the latter may not rotate relative to the push button. Owing to the spiral construction of member 51 some part or parts must rotate to permit of entrance of such member into the push button through the slot 48. As the member itself is not positively held against rotary or turning movement it is given a partial turning movement each time the push button is depressed and is given a turning movement. Owing to engagement of shoulder portions 55 of member 51 with either the pair of shoulders 22 or the pair 23 each time the push button is pushed inwardly the turning movement of member 51 causes a turning movement of the element 20 through an arc of approximately a quarter of a circle.

Then as the push button is released and is moved back to projected position by the coil spring 56 a reverse turning movement is imparted to member 51. On this reverse movement shoulder portions 55 have only to ride up the inclines leading to the shoulders 22 or 23 (as the case may be in any particular instance) and snap over the other of said pairs of shoulders into a position facing the same. Since there is little resistance to this reverse movement of the member 51 it is accomplished without any reverse turning of the element 20 and without the use of a heavy spring at 56.

Thus it will be understood that on successive inward movements of the push button 44 the shoulders 22 and 23 will be successively engaged and a step-by-step turning movement imparted to the element 20 so that the contact engaging portions 26 of the bridging piece 27 will alternately be brought into and moved out of circuit closing relation with the arms 40 and 43 of the contacts 35 and 36.

In the lower portion of the body 11 below and spaced from the support 29 is an insulating mounting plate 57 (see Figs. 4 and 6) on the upper side of which is mounted two pairs of contacts of which those of one pair are designated 58 and 59 while those of the other pair are designated 60 and 61. The contacts of the respective pairs are normally in open circuit relation and as shown 59 and 61 extend into spaced overlapping relation with contacts 58 and 60 respectively.

All four of these contacts may be of spring metal but at least contacts 59 and 61 are of such metal whereby they may be forced into engagement with contacts 58 and 60 and whereby they will thereafter move into open circuit relation with said contacts 58 and 60 when released. Leads 62 and 63 are soldered or otherwise secured to the contacts 58 and 59 while similar leads 64 and 65 are similarly secured with the contacts 60 and 61.

Channels or openings 66 are provided for the entrance of leads 62 and 64 into the body 11 and similar openings or channels 67 are provided for the leads 63 and 65. The pairs of contacts 58 and 59 and 60 and 61 are spaced from one another being located toward opposite edges of the mounting plate 57 but they are all overlapped by the base portion of the support 29 as best shown in Fig. 6. Spring contacts 59 and 61 are in engagement with the inner surface of support 29 and actually support the same in such position that the under side of the element 20 is in spaced relation to body 11 in the recess 18 as shown in Fig. 4.

Now it will be understood that when the push button 44 is depressed as the coil spring 56 is compressed a predetermined amount and a predetermined resistance is built up in such spring the pressure on the push button is transmitted through the element 20 to the support 29 and the latter along with the element 20 is forced or pressed inwardly of the body 11. Such movement of the support 29 results in the contacts 59 and 61 being flexed into circuit closing relation with the contacts 58 and 60 respectively. Then as push button 44 is released and returned to normal position the spring contacts 59 and 60 return to normal open circuit relation with the contacts 58 and 60 and at the same time serve to raise the support 29 and the element 20 to their normal positions.

It will now be understood that each time the push button 44 is pressed inwardly circuits are completed through the contacts 58 and 59 and also through the contacts 60 and 61 and that such circuits are only momentary or while the push button is held in position compressing the spring 56 the predetermined amount as determined by the strength of the contacts 59 and 61. While circuits are completed through the spring contacts 58-61 on each inward push of button 44 the circuit between contacts 35 and 36 are completed on one inward movement of the push button and positively opened on the next inward movement of such button.

Located at the under side of the insulating mounting plate 57 are a pair of condensers 66 and 67.

Leads 68 and 69 connect the respective ends of the condenser 66 with the contacts 58 and 59 and the respective ends of the condenser 67 are connected with the contacts 60 and 61 in a similar manner. Preferably the leads are somewhat rigid and are soldered or otherwise permanently connected with the contacts so that the contacts and the condensers are mounted on the mounting plate 57 to form a sub-assembly or unit therewith for ready mounting on the body 11. The condensers are mounted or connected across the switches, comprising the spring elements, to suppress radio broadcasting by the fluorescent lamps controlled by the switches as will appear.

Lower closure 12 is disposed at the under side of the condensers covering and protecting the same and as will be seen in Fig. 4 the rivets 14 pass through the end portions of the mounting plate 57 whereby it and the parts carried thereby are secured in the body 11. The end portions of the lower closure 12 may be thickened or fillers 70 may be used to close the end portions of the switch beyond the ends of the condensers 66 and 67. In Figs. 2 and 3 it will be noted that the mounting plate 57 and the closure 12 enter into the body 11 between lower side wall portions 71 thereof and that the movement of the mount-

ing plate 57 into housing or body is limited by end portions 72 thereof.

Referring to the diagram of Fig. 10, at 73 and 74 are shown lead-in wires from a source of current suitable for the present purpose. Connected with the wire 73 is the lead 37 to contact 36 which together with contact 35 is shown in association with the element 20 carrying the bridging piece as above described. Lead 38 from contact 35 is connected with the filament 75 of a fluorescent lamp 76 having a second filament 77 in spaced relation to the filament 75. From the other end of the filament 75 a wire 78 leads while wires 79 and 80 connect the filament 77 with the leads 63 and 74, respectively.

A branch 81 from wire 78 is connected with one end of a filament 82 of a second fluorescent lamp 83 while the other end of such filament is connected with the lead 64 to the contact 60. Filament 84 of the lamp 83 has the lead 65 to contact 61 connected with one of its ends and its other end is connected with the return wire 79 above mentioned. When the lamps 80 and 83 are not operating the element 20 will be related to the contacts 35 and 36 as shown in Fig. 5. To start the lamps the push button 44 is depressed and through coil spring 56, element 20 and support 29 forces the contacts 59 and 61 into engagement with the contacts 58 and 60. As element 20 is shifted to bring the bridging member into closed circuit relation with the contacts 35 and 36 circuits are completed through the filaments of the respective lamps and said filaments heat up the lamps rendering the latter operable.

Thereafter as the push button is released and moves back to its normal projected position contacts 59 and 61 are released and move out of engagement with contacts 58 and 60 opening the filament circuits. However the bridging piece stays in circuit closing relation to the contacts 35 and 36 and the lamps are in operation. To extinguish the lamps the push button is again depressed and while this operation again forces contacts 59 and 61 into engagement with contacts 58 and 60 that result is only incidental and is without consequences. However, the second operation of the push button causes the element 20 to be rotated another step with the result that the bridging piece is carried out of circuit closing relation with the contacts 35 and 36 whereby the line circuit to the lamps is opened. The lamp vapor cools and the lamps are extinguished and the line to the lamps is open and remains open until the push button 44 is next operated as above described.

Attention is directed to the fact that the invention provides a switch of simple and inexpensive construction, of positive operation, and including but a single manually-operated member, for the control of fluorescent lamps. Clearly when the switch is for the control of a single lamp the contacts 58 and 59 or the pair of contacts 60 and 61 may be omitted together with their condensers as but one pair of the contacts and associated parts are required for the control of a single lamp. Additional contacts may be added when the switch is to control more than two lamps.

It is further noted that not only does the switch of the invention provide for the control of a fluorescent lamp or for the control of fluorescent lamps through but a single manually operated member but it is particularly noted that the control is exercised through but one

motion of the member. In other words it is not necessary to impart two different motions to the manually-operated member to control the contacts on the mounting plate 57 and a second or different motion for the control of the element 20 carrying the bridging piece. A single motion or movement of the manually-operated member is all that is necessary.

Having thus set forth the nature of my invention, what I claim is:

1. In a switch, a body, a pair of horizontally spaced contacts in said body, an element mounted in said body between said contacts for turning movement relative thereto about a vertical axis, a bridging piece carried by said element and adapted in one position of the latter to engage both said contacts, a vertically movable push button above said element, a spring between the push button and the element and normally maintaining the push button in raised position, means operated by a downward movement of said push button for imparting turning movement to said element to have the latter carry said bridging piece into and out of bridging relationship with said contacts on successive downward movements of said push button, a depressible support on which said element rests, inner and outer normally spaced contacts at the inner side of said support with the inner contact yieldingly supporting said support and said element whereby on downward movement of the push button the pressure on the element resulting from compression of said spring depresses the element and said support to move the inner of said normally spaced contacts into engaging relation with the outer thereof.

2. In a switch, a housing, two pairs of spaced contacts in said housing, a push button associated with said housing, a spring normally maintaining said push button in a projected position, means bodily shiftable in the direction of movement of said push button on each inward movement of the latter to establish a closed circuit relation between one pair of said contacts and maintain such relation only while the push button is in position compressing said spring a predetermined amount, and other means operable to establish a closed circuit relation through the other pair of contacts on alternate inward movements of said push button and maintain such relation on release of said spring.

3. In a switch, a pair of spaced contacts, an element mounted between said contacts for turning movement relative thereto, a bridging piece carried by said element and in one position of the latter in circuit closing relation to said contacts and in the other position of the element in open circuit relation to said contacts, a push button at one side of said element, means for translating reciprocating movement of said push button into step-by-step rotary movement of said element whereby on successive movements of the push button in one direction the bridging piece is moved to and from circuit closing relation with

said contacts, a pair of contacts at the side of said element opposite that at which said push button is located and arranged in overlapping normally spaced open circuit relation, means movable in the direction of movement of said push button on depression of the latter, and said means mounting said element and adapted to be moved thereby in the direction of movement of said push button on depression of the latter to force the second pair of contacts into closed circuit relation.

4. In a switch, a body, a pair of horizontally spaced contacts in said body, an element mounted in said body between said contacts for turning movement relative thereto about a vertical axis, a bridging piece carried by said element and adapted in one position of the latter to engage both said contacts, a vertically movable push button above said element, a spring between the push button and the element and normally maintaining the push button in raised position, means operated by a downward movement of said push button for imparting turning movement to said element to have the latter carry said bridging piece into and out of bridging relation with said contacts on successive downward movements of said push button, a depressible support on which said element rests, two pair of normally spaced contacts inwardly of said support and each comprising an inner and an outer contact of which the inner yieldingly supports said support and said element whereby on downward movement of the push button the pressure on the element resulting from compression of said spring depresses the element and said support to move both of the inner contacts of said normally spaced pairs of contacts into engaging relation with the other contacts of the respective pairs.

5. In a switch, a body of insulating material having a recess in a side thereof and a pair of elongated sockets entering said recess at its opposite edges, a contact mounted in each of said sockets, a spring arm on each of said contacts and extending into said recess, an element in said recess and turnable therein between said spring contact arms, a bridging piece carried by said element and adapted to be moved thereby into and out of circuit closing relation with said spring contact arms, means for imparting a step-by-step turning movement to said element to carry said bridging piece into and out of circuit closing relation with said spring contact arms, a recess in said body at its side opposite the first mentioned recess, a pair of contacts in the second mentioned recess, a support entering both said recesses and yieldingly held by one of the pair of contacts in a position supporting said element, and said means for imparting turning movement to said element including means for pressing against the element whereby to have the latter press against said support and through the latter force said pair of contacts into circuit closing relation.

HAROLD K. ANDREWS.