H. J. MOREY.

ELECTRIC SWITCH.

APPLICATION FILED MAR. 28, 1912.

1,213,933.

Patented Jan. 30, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

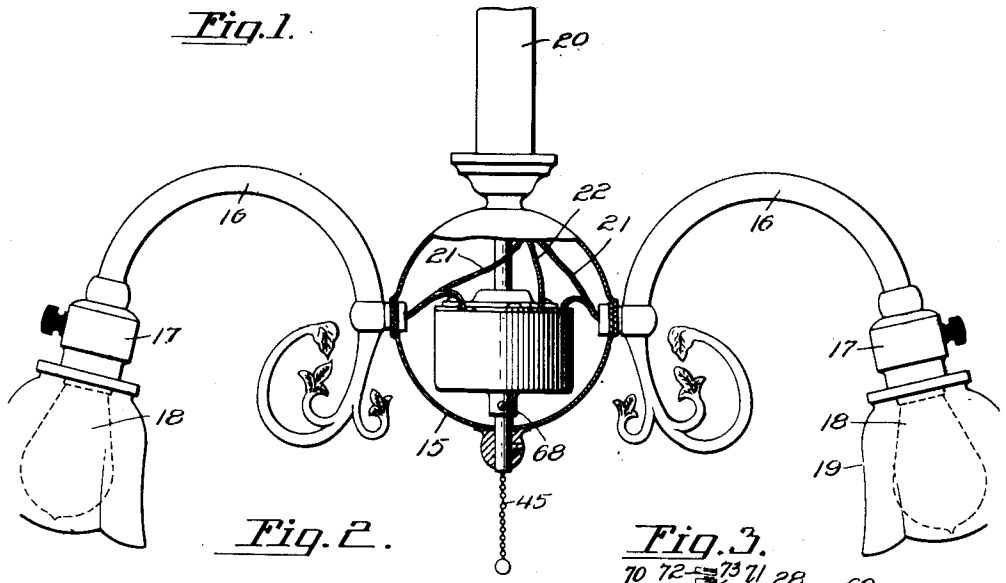


Fig. 2.

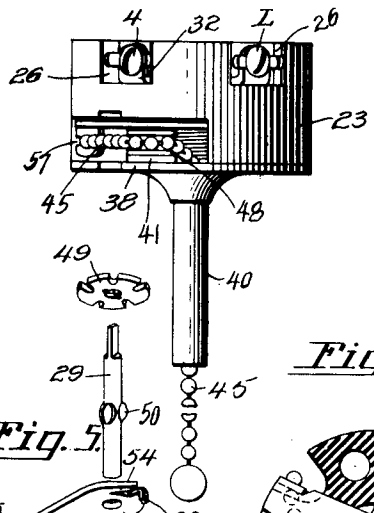


Fig. 3.

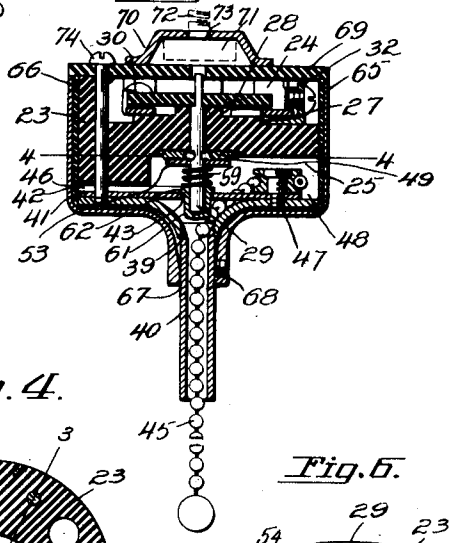


Fig. 4.

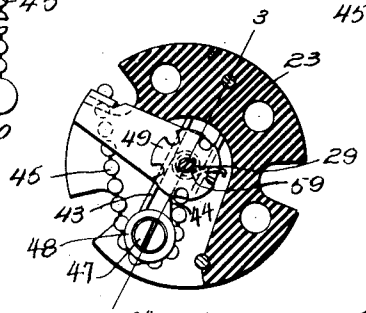


Fig. 5.

Fig. 6.

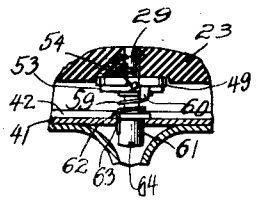
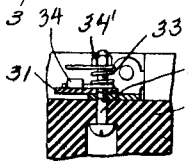


Fig. 7.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 8.

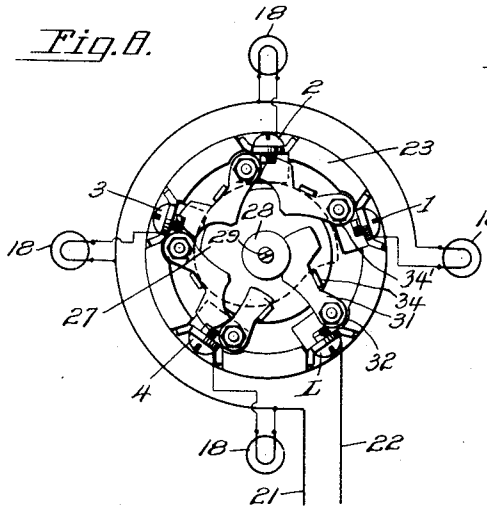


Fig. 9.

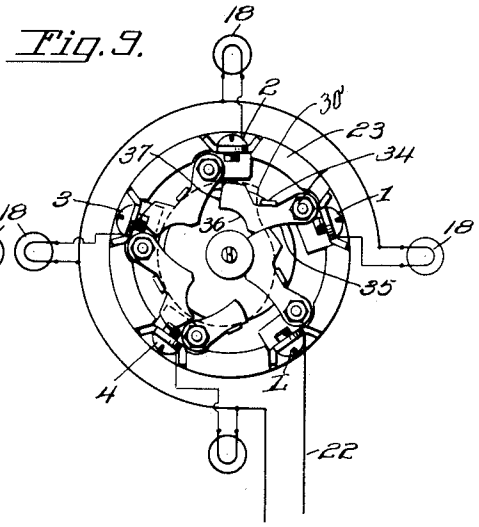


Fig. 10.

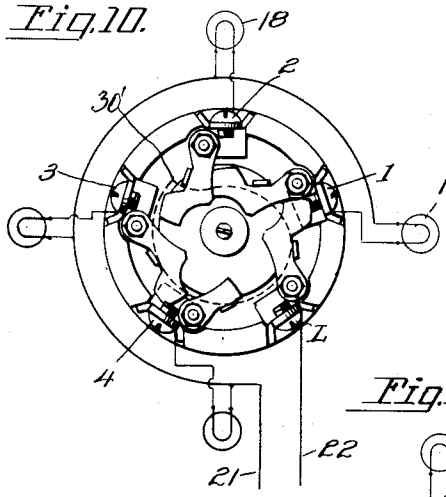


Fig. 11.

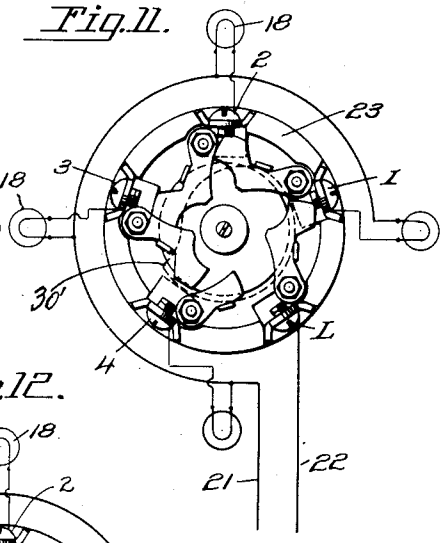
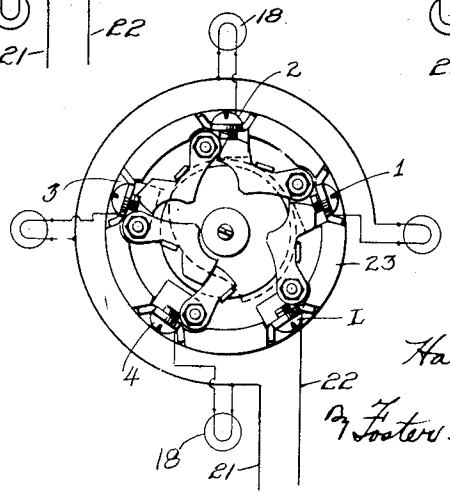


Fig. 12.



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UNITED STATES PATENT OFFICE.

HARRY J. MOREY, OF SYRACUSE, NEW YORK, ASSIGNOR TO PASS & SEYMOUR, INC., OF SOLVAY, NEW YORK, A CORPORATION OF NEW YORK.

ELECTRIC SWITCH.

1,213,933. Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed March 28, 1912. Serial No. 686,806.

To all whom it may concern:

Be it known that I, HARRY J. MOREY, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

This invention relates to electric switches and more particularly to pull-cord switches adapted to be mounted on fixtures, brackets, walls or other suitable and convenient places for the purpose of connecting energy and current carrying circuits, to the translating device or devices connected to the switch terminals.

It is an object of this invention to provide an efficient switch to meet the above requirements.

In carrying out my invention I provide an insulating base upon which are mounted a plural number of terminals connected with circuit wires. By means of suitable operating mechanism the said terminals are adapted to be successively connected to a branch of an electric main and thereby supply energy to translating devices connected to the other branch of the main.

The switch may be utilized in light, heat and power circuits with various kinds of translating devices, but as shown in Figure 1 of the drawings, is used as a finial switch in connection with a chandelier.

Other objects and the novel features of the invention will be apparent from the following description taken in connection with the drawings, in which,

Fig. 1 is an elevation, partly in section, of a portion of a common form of fixture or chandelier showing my invention applied thereto; Fig. 2 is an elevation of the switch with the insulating cap and shell removed; Fig. 3 is a sectional view of the assembled switch taken along the line 3—3 of Fig. 4; Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3, showing the spindle rotating mechanism and connections; Fig. 5 is a detail view of the ratchet disk and ratchet plate or lever; Fig. 6 is a detail view of the ratchet disk, ratchet lever, spring and sleeve showing their attachment to the operating spindle; Fig. 7 is a detail view of one of the terminals showing a pivoted dog and the connection of the terminal and dog to the insulating block; Figs. 8 to 12 are plan views of the insulating block and terminals thereon showing the successive positions of the operating cam and dogs and diagrammatically, the condition of the translating devices connected to the terminals at each position of the cam.

In Fig. 1 I have shown a typical fixture which is provided with the usual canopy 15, from which extend the arms 16, carrying on their outer ends sockets 17. Depending from the sockets are the incandescent lamps 18 and secured to said sockets are the shades 19 which surround the incandescent lamps. The canopy 15, with its radiating arms, is suspended from the ceiling or wall by means of the pipe 20 which, as is usual, also serves as a conduit for the electric main, comprising the conductors 21 and 22. The switch, including its inclosing casing or shell may be secured to and positioned in the canopy 15, as is shown, or the said shell may form a part of the lower wall of the canopy. The switch in the drawings is shown as provided with the terminals for connection to the ordinary four-light fixture or chandelier, but it is to be understood that any desired number of terminals may be employed to conform to the number of lights on the fixture served.

The body of the switch comprises an insulating block 23, which may be of hard rubber, fiber or other suitable insulating material. The block 23 is preferably cylindrical in form and is provided in its opposite faces with recesses 24 and 25. The recess 24 has communicating therewith a plurality of smaller recesses 26 in the periphery of the block which accommodate the binding posts and feet of the terminals 1, 2, 3, 4 and L. It will be seen that an insulating wall is thereby provided around the switching contacts and their connections which completely insulates them from the inclosing member. As before noted, these terminals may be any desired number, including the line terminal L. When the switch is installed, the line terminal L is permanently connected to one branch 22 of the main and each of the terminals 1, 2, 3 and 4 is connected to one terminal of a translating device, as to lamps 18. The other terminal of each of the lamps is permanently connected to the other branch 21 of the electric main.

Extending centrally from the block 23 and integral therewith are the raised portions 27 and 28. The upper surface of the raised portion 27 is on a level with the feet of the binding posts and constitutes a surface over which the pivoted dogs or switching members may slide and from which they may slide into contact with the terminals without catching. The raised portion 28 constitutes a stop against which the pivoted dogs engage and whereby they are insulated from one another and from the spindle 29.

The spindle 29 extends centrally through the insulating block 23 and centrally through the raised portions 27 and 28, and projects from the opposite faces of the block into the recesses 24 and 25. The end of the spindle in the recess 24 is angular or squared off to engage a cam disk or tripping device 30, which is thereby secured to the disk. The said cam disk 30 may be of the form shown in the figures and made of fiber or other insulating material. The rotation of said spindle and cam disk actuates the switching mechanism. The switching mechanism comprises a plurality of elements, one of which is shown in detail in Fig. 7. Each of the said members comprises a dog 31, which is pivotally mounted on any one of the terminals 1, 2, 3, 4 or L. The said dogs 31 are pivoted on a post 32, which post extends through the insulating block 23 and constitutes the means whereby each terminal and dog together is secured to said block. The dogs are punched from a sheet of conducting material and the flat side of the dog rests against the foot of each terminal, while against the other side and surrounding the binding post 32 is a spiral spring 33, which is secured against movement off the post by the nuts 34′ which are threaded on the post 32. One end of the spring 33 engages against the inner wall of the recess 24, while the other end engages against a punched-up projection 34 on the dog. The spring 33 provides a quick break action when the dog is released by the cam, thus avoiding injurious arcing. With the exception of the dog on contact or terminal 4, each of the dogs is of sufficient length to bridge the distance between the terminal to which it is connected and the next one in advance. Each of the dogs is concaved along one edge, as at 35, and the continuation of the edge outwardly is also concaved, as at 36. A still further continuation is convex in form, as at 37.

When the projection 34 is engaged by the cam 30, the convex edge 37 of the dog, with the exception of the dog on terminal 4, engages the concave edge 35 of the dog next in advance. The concave edge 36 is of such contour as to rest flush against the raised portion 28 of the insulating block. The dog on contact or terminal 4 is shorter than the others, so that it will not bridge the space between contact 4 and the terminal L, thus avoiding a short circuit. As each dog lies flat on the foot of each contact and is pressed thereagainst by the spring 33, a good electrical connection is afforded. The insulating cam which engages the upwardly-extending and right-angled projection 34 on the dogs moves the said dogs outwardly and when the said projection passes the point 30′ on said cam the dog is tripped or released and the spring 33 forces the dogs inwardly. The shape of the dogs is such that the convex end of one fits on and has good sliding contact area with the concavity on the dog next in advance. Thus contact is continually had at each connection already completed during the further rotation of the cam 30 and until the circuit is broken when dog at terminal L is released. The springs 33 also hold the dogs in contact with one another while one slides over the other. When the dog on terminal L is released the concave end 36 of the same engages against the raised portion 28 and there is no current connection to the remaining terminals therefrom.

The mechanism for operating the cam 30 and spindle 29 is located in the recess 25 in the opposite face of the block 23 and is, therefore, insulated from the switching mechanism. The recess 25 is closed at the bottom by a face plate 38, which is provided with a central threaded aperture 39 and connected to said aperture is a threaded neck or tube 40 which may constitute the supporting means of the switch and serve as a guide for the pull-cord. The face plate 38 supports a channel plate 41. The channel plate 41 is provided with upstanding longitudinal edges or flanges 42 and has an aperture 43 in line with the spindle 29 and the tube 40. The said channel plate is also cut away, as at 44, to allow the pull chain or cord 45 to pass the same. The said pull chain 45 may be of any suitable flexible material. One end of the channel plate 41 is seated in a slot 46 in the insulating block 23, while the other end is secured to the face plate by means of a screw 47. The said screw is also the axis of a grooved roller 48. The grooved roller 48 rotates freely on the screw 47, and constitutes a guide for the pull cord 45.

The spindle 29 has mounted thereon a ratchet-disk 49 and to secure the ratchet-disk for rotation with the spindle, the latter has ears 50 punched therefrom which engage in recesses 51 of the ratchet-disk. The periphery of the ratchet-disk 49 has stamped therefrom a suitable number of teeth (see Fig. 5). To provide step-by-step rotation of the spindle and operate the ratchet-disk I employ a clutch-plate or lever 52 pivoted on the spindle. The said clutch-lever has a disk part 53 which has stamped up from it

a tooth 54 to mesh with the teeth on the clutch-disk 49. Extending radially or outwardly from the disk part 53 is an arm or lever part 55, which is provided at its outer end with a depending projection 56. The projection 56 has a slot 57 extending therein from the edge to receive one end of the pull chain or cord 45. The slot communicates with an enlarged portion 58 of smaller diameter than the end bead on the chain which opening provides a seat for the end bead on the chain. This arrangement also permits removing and replacing the chain or cord, since the cord intermediate the beads will pass through slot 57, while the beads will not. The other end of the pull cord 45 passes around the grooved roller 48 and through the cut-away portion 44 on the channel plate, then through the aperture 39 down the tube 40 and depends centrally from the mechanism and in line with the spindle 29.

To return the ratchet-lever 52 to its initial position after each pull or step of the ratchet-disk, I provide a retractile spring 59 which surrounds the spindle 29. The said spring bears against the ratchet-plate 52 on one side and one end thereof engages a projecting lug 60 punched from the ratchet-lever 52. The other end of the spring bears against a hollow guide and bearing sleeve 61. The sleeve 61 is secured against movement by means of the square or angular flange 62 intermediate its ends, which flange engages against the upstanding edges 42 of the channel plate 41. The angular flange has a hole 63 therein, which receives the other end of the spring and thereby holds the said end against movement.

In order to properly tension the spring when assembling the switch the lower end of the sleeve is closed and rounded off and constitutes a head which fits into the aperture 43 in the channel plate and is provided with a slot 64, adapted to be engaged by a screw-driver. When sufficiently tense the spring will force the sleeve outwardly and the head into the opening 43. The angular flange 62 will then fit against the upturned edges 42 of the plate 41 and prevent the said sleeve from turning due to the torsion on the spring. The face plate 38 is then secured to the supporting block 23, thereby holding the said channel plate 41 rigidly.

To completely insulate the switching mechanism, I provide an inclosing brass shell or casing 65. The shell or casing is provided with an insulating lining 66 and its lower wall is necked down and has a central opening 67 therein. The opening 67 is centrally in line with the opening in the face plate and the tube 40 connected to said plate extends through said opening 67. The casing and tube or face plate are secured against independent movement by the set screw 68. By this arrangement it will be seen that the pull cord depends in line with the spindle and centrally from the chandelier or fixture.

The recess 24 in which the switching mechanism is contained is closed at the top by means of the cap 69 of fiber or other insulating material. The said cap 69 has mounted thereon a member 70 by means of which the switch may be rigidly secured to the fixture, a pipe thereon or elsewhere. The member 70 is adapted to receive the head of a bolt 71, the body 72 of which is squared off and threaded and extends through an opening 73. The heads of the through screws 74 engage the cap 69 and extend through the supporting block 23 engaging the face plate 38 on the opposite side, thus providing a rigid structure. It will be seen that the switch terminals are perfectly insulated from the operating mechanism and pull chain, making a safe structure.

The operation of the device will be clear from the foregoing. Fig. 8 shows the position of the dogs in full lines and the tripping cam in dotted lines when the translating devices are deënergized. The dog at the terminal L, in this position, rests against the raised portion 28. As soon as one complete pull is given to the chain 45, the dog at terminal 1 is released and engages the outer end of the dog at terminal L, making contact therewith and energizing the lamp connected to terminal 1, as is shown in Fig. 9. Another complete pull of the chain steps the cam 30 around and when the point 30′ thereof passes the dog connected to terminal 2, the said dog is released and engages the end of the dog on terminal 1, thereby connecting energy to the lamp at terminal 2 (see Fig. 10). In the meantime, the edge of the cam has moved the dog on terminal L outwardly, yet the latter is always in sliding contact with the dog at terminal 1 and continually supplies energy thereto. In Figs. 11 and 12, lamps at terminals 3 and 4 are successively connected to terminal L in the same way. The dog at terminal 4 is provided with a similar concave surface 35, but as explained before, is somewhat shortened in order that it may not bridge the distance between the contact 4 and L. Another pull of the chain and step of the clutch-lever, disk and cam allows the point 30′ of the said cam to pass the projection 34 on the dog at terminal L, whereupon the dog will be released and the spring 33 will force the dog toward the center and break the circuit, deenergizing all of the translating devices.

It will be seen that I have provided a convenient means for successively energizing lamps and similar translating devices and that the principle may be applied in numerous ways. I have merely shown a typical application of my invention and as nu-

merous changes may be made within the scope of the appended claims without departing from the spirit of the invention, I do not wish to be limited to the exact details as shown.

Having described the invention what is claimed as new and desired to be secured by Letters-Patent is,

1. In a switch of the class described, the combination with a block of insulating material, of a series of separate circuit terminals secured thereto, means for interconnecting the terminals including an element carried by each of the terminals, and means for successively tripping said interconnecting elements to successively connect the terminals with one another.

2. In an electric switch the combination of a series of terminals, a plurality of switch elements mounted in the same plane, each of said terminals having one switch element pivoted thereon and the successive switch elements being adapted to slide in edge engagement, a cam for actuating said elements, and rotatable means for operating the cam.

3. In an electric switch, the combination of a plurality of terminals, pivoted switch elements electrically connected to said terminals and adapted to contact with one another, springs tending to move said elements into contact with one another, a cam adapted to normally hold said elements apart but adapted when operated to release said elements to permit said springs to move them into contact with each other, and means for operating said cam.

4. In an electric switch, the combination of two circuit terminals, a switch member pivoted on each of said terminals and rotating means for operating said switch members to open and close the circuit between said terminals, said switch members being adapted to engage and slide in contact with one another when actuated by said operating means.

5. In a switch of the class described, the combination with an insulating block, of a terminal thereon adapted to be connected to an electric main, a series of other terminals electrically independent and adapted to be connected to separate translating devices, means for successively connecting said other terminals to the main terminal comprising pivoted connecting members adapted to bridge the space between and electrically connect consecutive terminals, and means for actuating said connecting members.

6. In a switch of the class described, the combination with an insulating block, of a series of electrically independent terminals and a line terminal mounted on said block, said terminals being connected to separate translating devices, yieldingly mounted members for connecting said independent terminals in succession to said line terminal, and non-conducting means for contacting with and moving said connecting members, said connecting members being supported independently of the non-conducting means.

7. In an electric switch, the combination of a terminal adapted to be connected with an electric main, other terminals adapted to be connected to translating devices, means for connecting said other terminals successively to said main terminal comprising spring pressed plates electrically connected with said terminals, an insulating cam against which said plates are spring pressed, and means for turning said cam to cause the operation of said plates.

8. In a switch of the class described, the combination of an insulating base, a plurality of terminals mounted thereon, means for interconnecting the terminals comprising a conducting plate pivoted on each terminal for electrically connecting the same to an adjacent terminal, a rotatable cam of insulating material for actuating the interconnecting means, and means for operating the actuating cam.

9. In an electric switch, the combination of a plurality of circuit terminal plates, each of which is capable of being connected to a translating device, a main line terminal plate capable of being connected with one branch of a supply circuit, a dog pivoted on each terminal plate, and a device for tripping the dogs in succession, certain of the dogs being capable of contacting with one another when they are tripped.

10. In an electric switch, the combination of an insulating body, a plurality of separate circuit terminals secured to the upper side of said body, a plurality of substantially similar switch elements carried by said body and adapted to be moved into and out of engagement with one another, a spindle mounted in said body and having the ends thereof projecting from the upper and lower sides of the body, a member mounted on the upper end of the spindle for actuating said switch elements to successively move them into and out of engagement with one another, and means at the lower side of said body for operating said spindle.

11. In a switch of the class described, the combination with a supporting block of insulating material, of terminals mounted on said block, pivoted members connected to the terminals and tending to move into contact with one another, means for holding said members out of contact with one another and for releasing said pivoted members so that they may move into contact with and along one another, and means for operating the holding and releasing means.

12. In a switch of the class described, the

combination with a terminal adapted to be connected to an electric main, of another terminal adapted to be connected to a translating device, a member pivotally supported on the main terminal, a member pivotally supported on the other terminal, said members being normally out of contact, actuating means including a ratchet lever and a disk for moving said members into contact with one another to close the circuit and for releasing the members to open the circuit, and means on the members to hold the same in yieldable engagement with the actuating means.

13. In an electric switch, the combination of an insulating block, a series of terminal posts carrying binding screws mounted on said block, switch elements pivoted on the terminal posts, successive elements being movable into and out of engagement with one another, and means for actuating said switch elements comprising a rotatable insulating member, constantly engaging all of said elements and provided with means for actuating them successively as it rotates to cause successive elements to move into and out of engagement with one another.

14. In a switch of the class described, the combination of a terminal adapted to be connected to an electric main, another terminal adapted to be connected to a translating device, means on one terminal normally out of contact with the other terminal for connecting said terminals, a cam for moving said connecting means into contact with the other terminal and for releasing the connecting means, a spindle for the cam, a ratchet disk on the spindle, a ratchet lever for engaging and moving the ratchet disk, means for retracting the ratchet lever, and means for actuating the ratchet lever.

15. In an electric switch the combination of an insulating block, a series of terminal posts mounted on said block and carrying binding screws, switch elements mounted on the terminal posts, a rotatable spindle mounted in said block with its ends projecting from opposite sides thereof, a switch actuating cam of insulating material mounted on one end of said spindle and rotatable therewith and also engaging all of said switch elements, an operating lever pivoted on the other end of said spindle, means operated by said lever for rotating the spindle, and a pull chain attached to the operating lever for rotating the spindle, said pull chain depending in line with the spindle.

16. In an electric switch the combination of an insulating block, a series of terminal posts mounted on the upper side of said block and carrying binding screws, switch elements mounted on said terminal posts, a rotatable spindle mounted in said block with its ends projecting from the top and bottom sides thereof, a bearing secured to said block and receiving the lower end of said spindle, means above said bearing for rotating the spindle, and a cam secured to the upper end of the spindle and adapted to actuate said switch elements when the spindle is rotated.

17. In an electric switch, the combination of an insulating base, a terminal plate, a switch member, a pivot screw extending through the terminal plate and switch member and serving to secure said plate and member to the insulating base and serving as a pivot for the switch member, a spring surrounding said pivot screw and tending to rock said switch member on its pivot and also pressing the switch member against the terminal plate, and a rotatable operating cam against which said switch member is normally pressed by said spring, said cam being so designed as to cause the operation of the switch member when the cam is turned.

18. In a switch of the class described, the combination of an insulating block provided with recesses in opposite faces thereof, a series of terminals about the periphery of the block and in a recess in one face, one of said terminals being adapted to be connected to an electric main, the other terminals being adapted to be connected to translating devices, means for connecting the main terminal in succession to the other terminals, a member for actuating the connecting means, the connecting means and member being in said recess with the terminals, a spindle for said member extending through the block and means in a recess in the opposite face for rotating the spindle to operate said member, and successively connect said main terminal with the other terminals.

19. In a switch for successively energizing translating devices, the combination of terminals each adapted to be connected to a part of each of the translating devices, a terminal adapted to be connected to an electric main, means for connecting the main terminal to one of said terminals for the translating devices, means independent of said connecting means for interconnecting the remaining terminals, and means for tripping the connecting and interconnecting means.

20. In a switch, the combination of terminals, means for connecting the terminals and means for operating said connecting means comprising a rotatable disk, a spindle therefor, a guide bearing sleeve inclosing one end of the spindle, a ratchet-disk and ratchet-lever operatively connected to the spindle, a retracting spring connected to the guide sleeve and to the ratchet-lever, and means for actuating the ratchet-lever.

21. In a switch of the class described, the combination of circuit terminals, means for connecting the terminals comprising yieldingly mounted pivoted plates on the termi-

nals normally held out of contact with one another, means for actuating the connecting means comprising a cam of insulating material adapted to engage said plates and a spindle on which the cam is supported, and ratchet mechanism for rotating the spindle and the cam thereon.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY J. MOREY.

Witnesses:
JAMES S. CROSSLEY,
FAY A. BROGDEN.