Dec. 28, 1937. G. A. JOHNSON 2,103,986

ELECTRIC SWITCH

Original Filed Dec. 15, 1933

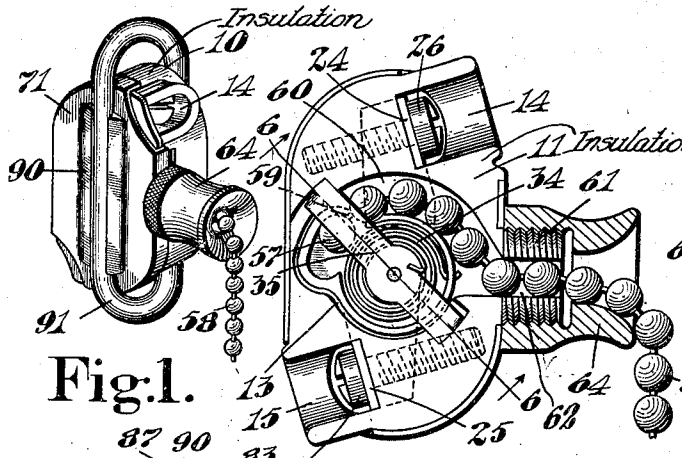


Fig.1.

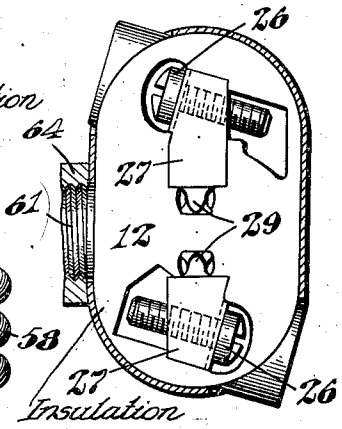


Fig.3.

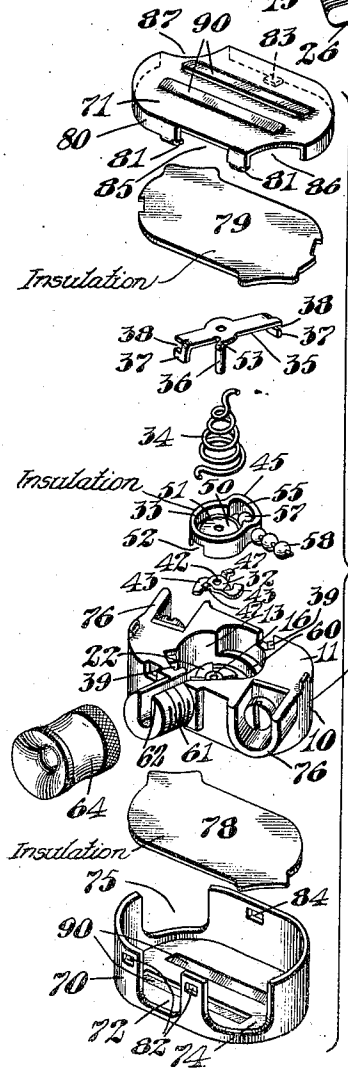


Fig.2.

Fig.4.

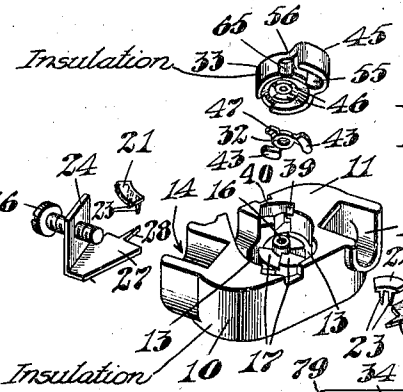


Fig.5.

Fig.6.

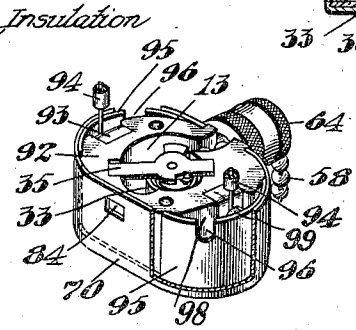


Fig.7.

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ELECTRIC SWITCH

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Renewed September 10, 1936

25 Claims. (Cl. 200—64)

This invention relates to electric switches, which although capable of general use, is exemplified herein an electrolier switch of the character commonly known as a link switch used in connection with an overhead lighting fixture.

One of the important objects of the invention is the provision of a switch structure which is capable of embodiment in a small compact structure permitting its use either in a canopy which affords a limited space therefor or on a chain or other fixture suspension means where a small device of unobstrusive appearance is especially desirable.

Another object of the invention is the provision of a switch construction which is simple and efficient, easily assembled without requiring the use of screws or rivets and which may be mounted in a suitable casing adapted to hold the parts together in assembled and operative relation.

Another object of the invention is the production of a switch in which the enclosing casing is so formed that it may be detachably mounted within a link of a fixture suspension chain in order to facilitate the insertion in or the removal from the link when desired.

A further object of the invention is the provision of a switch construction which permits the lead wires to be attached to the switch terminals without opening the casing which encloses the switch.

An additional object is the provision of simple means for holding the movable parts of the switch which means is adapted to be locked to the insulating body containing the switch by a simple turning movement without requiring other fastening means.

Another object of the invention is the provision, for returning the actuating member to initial position, of a spring capable of being compressed into flat form to avoid restricting the up and down play of the actuating member when rotated thereby permitting the depth of the insulating body to be reduced.

Various other objects of the invention will be in part obvious and in part described hereinafter.

My invention contemplates in its preferred form an insulating body enclosed in a suitable casing and having a recess in one face adapted to serve as a switch chamber for containing a pair of fixed contacts, a rotatable contact member for closing and opening a circuit by bridging engagement with and disengagement from said fixed contacts, a rotary actuating member adapted to be operated by a pull chain or other means for turning said movable contact and a spring for returning said actuating member to initial position.

One of the important features of the invention resides in the method of connecting the fixed contacts in the switch chamber to terminals mounted in recesses formed in the insulating body on opposite sides of said chamber and opening out the side of said body. The fixed contacts are provided with portions projecting into shallow recesses in the bottom face of said body and the terminals have portions extending into said shallow recesses which are connected to said contacts. This conduces to a very efficient and compact construction and by providing suitable terminal openings in the casing, lead wires may be easily connected to the terminals without opening the casing.

Another feature of the invention consists in providing, for the purpose of holding the switch parts in operative relation, means which may be mounted in the insulating body in the assembling process and locked thereto by a mere turning movement without requiring any other fastening means. One form of this means comprises a bridge provided with a pin to serve as a shaft for the movable switch parts, the ends of the bridge being formed to lock into the insulating body when turned through a short arc. For holding the bridge in locked position the spring is so connected to the bridge as to exert a constant locking pressure in addition to its function of returning the actuating member to initial operating position. The provision of means of this character simplifies the switch construction and the assembling of the parts and makes possible a smaller and more compact structure.

Another feature of the invention relates to the provision of a spring which when compressed assumes a flat form thereby permitting full up and down movement of the actuating member as it is rotated to turn the movable contact from one position to another without making it necessary to increase the depth of the insulating body. For this purpose I employ a spiral cone-shaped spring interposed between the bridge and the actuating member which offers no appreciable resistance to the upward movement of the latter since it may be easily compressed into flat form lying in a single plane.

In the accompanying drawing in which is shown for purposes of illustration an electrolier switch made in accordance with the invention, Figure 1 is a view in perspective of the switch mounted in a link of a fixture suspension chain;

Fig. 2 is a plan view on an enlarged scale of the

switch with the cover of the casing in which it is enclosed removed to expose the switch construction;

Fig. 3 is a bottom plan view of the same with the bottom of the casing cut off to expose the bottom face of the insulating body;

Fig. 4 is an exploded view in perspective of all the various parts of the switch;

Fig. 5 is an exploded view in perspective of the insulating body, fixed contacts, terminals, movable contact and actuating member;

Fig. 6 is a vertical cross sectional view on line 6—6 in Fig. 2, and

Fig. 7 is a view in perspective of a switch having a modified form of insulating body and terminals.

Referring to the drawing showing my invention embodied in a link switch, 10 indicates an insulating body of oval form having a top face 11 and a bottom face 12. The top face is provided with a centrally located recess or switch chamber 13 and with a pair of terminal recesses 14 and 15 arranged one on each side of said central recess, but on opposite sides of the longitudinal axis of said body and opening out opposite sides of said insulating body. The insulating body 10 may be made of porcelain or any other suitable moldable insulating material.

In the floor of the recess 13 is formed a central annular boss 16 surrounded by an annular series of ratchet teeth 17 shown as numbering four. On two alternate and opposite teeth are mounted a pair of thin fixed contacts 21 and 22 which correspond in shape to the shape of said ratchet teeth and serve as facings to said teeth. Each of said contacts on its inner edge is provided with a pair of depending prongs or fingers 23 which project downwardly through an opening or slot in the floor of the recess for connection to a terminal. Each of the terminal recesses 14 and 15 opens out the bottom face of the insulating body and mounted in said recesses respectively through said openings are two terminals 24 and 25, each bored and threaded for carrying a binding screw 26. Each terminal is provided with a base 27 arranged on one side and at right angles to it, which base is fitted in a shallow recess formed in the bottom face of the insulating body. On one side the base of each terminal is provided with a small projecting finger 28 which extends in between the fingers 23 of a fixed contact and is connected thereto by solder 29 or in any other suitable manner (Fig. 3). By thus fastening a terminal to each of said fixed contacts, these members are locked in the insulating body in their respective positions.

Within the switch recess 13 are mounted the switch operating parts comprising a rotatable metallic contact member 32 adapted to bridge the fixed contacts for closing the circuit, an actuating member 33 for rotating said member 32 to close and to open the circuit through said fixed contacts and a spring 34 for returning the actuating member to initial position. For holding these parts in operative position a pin bridge is provided comprising a flat bar 35 having a depending pin 36 fixed therein. The lower end of the pin fits within the annular boss 16 and the bar 35 is provided with downturned ends 37 having each a lateral open slot 38 which slots face in opposite directions in the two ends for engaging lugs 39 formed in recesses 40 in opposite side walls of the switch recess 13 adjacent the top face 11 of the insulating body. When the pin bridge is inserted in position with its ends 37 in the recesses 40 and is given a slight turn clockwise the slotted ends engage the lugs 39 which locks the pin bridge in position against vertical movement.

The metallic contact member 32 is provided with a central hole 42, permitting it to be rotatably mounted on the pin 36, and with a pair of inclined radial wings 43 for engaging flatwise the fixed contacts 21 and 22 on the floor of the switch recess 13. The center portion of the contact member 32 normally rides on the annular top of the boss 16 with the depressed wings 43 in engagement with the ratchet teeth 17.

The actuating member 33, which is of insulating material, is in the form of a circular block having on one side an extension 45 and is provided with a central bore permitting it to be rotatably mounted on the pin 36 above the movable contact 32. The bottom face of the actuating member is recessed and provided with an annular series of ratchet teeth 46 adapted to engage a pair of ears 47 formed on the movable contact 32 for turning it in a clockwise direction when the actuating member is rotated (Figs. 4 and 5).

For holding the actuating member in constant engagement with the movable contact yet permitting a limited vertical movement thereof as the contact moves upwardly on the inclined ratchet teeth, the spring 34 is mounted on the pin 36 between the actuating member and the bridge 35 and its two ends are fastened to those members.

The top face of the actuating member is provided with a circular recess 50 within which is seated in a marginal groove 51 the base of the spring 34 and its base end is turned outwardly through a slot 52 in the floor and side of the actuating member and fastened thereto. The apex end of the spring is fastened to the bridge by turning that end around an ear 53 centrally located in one side of the bridge. The spring is under compression at all times and as thus mounted it exerts a pressure upon the bridge in such a direction as to force it into locking engagement with the lugs 39 in the insulating body and a pressure upon the insulating member to return it to initial position. Preferably, I employ a cone-shaped spiral spring for this purpose because it can be compressed into a flat form in the recessed top of the actuating member on the upward movement of that member and therefore, it is not necessary to provide any additional head room in the switch chamber than that required for the vertical movement of the actuating member when rotated. In consequence, the switch can be made of less depth than would ordinarily be required if head room had to be provided for the spring.

For rotating the actuating member to turn the movable contact, the extension 45 of that member is provided with a through and through recess 55 and a slot 56 in one end opening out the bottom edge thereof and in the recess is inserted the end ball 57 of a ball-link pull chain 58 with the link 59 lying in the slot 56. The pull chain extends around the periphery of the actuating member in a guideway 60 partially encircling the switch chamber and actuating member and out through a nipple 61 formed integral with the insulating body 10 on one side face thereof. Adjacent the slot 56, the periphery of the actuating member may be provided with a depression 65 in which is seated the second end ball of the chain to cause it to hug the actuating member closely. Preferably, the bore 62 of the nipple opens out the top thereof so that the chain may

be simply dropped into the nipple when the parts are being assembled. The nipple is provided with an outer thread for receiving a nut 64 to hold the chain therein and the nut is provided with a flaring bell-shaped mouth to facilitate the movement of the chain in the operation of the switch.

For enclosing the insulating body and the parts carried thereby any suitable casing may be provided and one such is shown in the drawing, comprising a casing 70 and a cover 71. The casing corresponds in shape to the insulating body to enclose the same and is provided with a front opening 72 to enclose the base of the nipple and with opposite openings 74 and 75 to expose the terminal recesses 14 and 15 and the terminals therein. Preferably, the insulating body is provided with a projecting lip 76 surrounding each terminal recess except on the top, which lips extend outwardly through said openings 74 and 75 in the casing a distance sufficient to insulate effectively the terminals and binding screws in the recesses. The bottom and top faces of the insulating body are insulated from the casing and cover by disks 78 and 79 respectively made from any suitable sheet insulating material. The disk 79 which covers the top face of the insulating body has portions which extend outwardly over the terminal recesses to insulate the terminals from the cover.

For locking the cover to the casing any suitable means may be used and one such is shown in which the rim 80 of the cover is provided on one side with a pair of inturned lugs 81 adapted to enter openings 82 in the nipple side of the casing and with a single inturned lug 83 on the other side to engage an opening 84 on the opposite side of the casing. The cover may be removed when desired by exerting inward pressure on that side of the casing to disengage the lug 83 from the hole 84. The rim 80 of the cover is cut away at 85 to accommodate the nipple 61 and at 86 and 87 where the lips of the terminal recesses 14 and 15 project from the insulating body and the top of the cover is extended partially over said recesses but not to the edge of the insulating disk 79.

For securing the switch in a link of a fixture suspension chain, the cover and the bottom face of the casing may be provided each with a pair of parallel ridges 90 which, when the casing and cover are made of metal, may be formed by stamping, each pair of ridges being separated a sufficient distance to embrace one side of a link 91 of the suspension chain. The switch may be mounted therein by inserting one end of it into the link and then swivelling the switch around that end and it may be removed in the same manner.

In Figure 7 is shown an insulating body 92 having modified end portions and terminals permitting the use of different means for insulating the terminals. The two ends of the insulating body instead of being rounded are formed with transverse straight faces 98 thereby creating a space between each end of the body and the rounded end of the casing. The two terminals 93 are provided each with a base similar in form to the base 27 of terminals 24 and 25 which is connected to a fixed contact in the same manner but the terminals themselves are arranged perpendicular to the longitudinal axis of the insulating body and are set in shallow recesses formed in the ends 98 of the insulating body, the upper end of each terminal being turned over and countersunk in the top face of said body. Each terminal carries a binding screw 99 for the attachment of lead wires 94 thereto.

For insulating the terminals from the casing 70, the insulating disk 78 mounted between the bottoms of the insulating body and casing is provided with upright end portions 95 of sufficient width to enclose entirely the ends of the insulating body, terminals and binding screws and to insulate them from the casing. Each of the upright portions 95 is provided with a small opening 96 through which an insulated lead wire 94 extends outwardly from said casing. In Figure 7, the lead wires 94 are, for the sake of clearness, shown erect but in practice they are, after being connected to the binding screws 99 carried by the terminals, turned laterally out through the openings 96. In all respects other than the foregoing, the switch illustrated in Figure 7 is of the same construction as that shown in the remaining figures of the drawing.

In assembling the switch, the fixed contacts are first mounted on alternate ratchet teeth in the switch chamber and the terminals are then adjusted in the terminal recesses and their bases 27 soldered to the fingers 23 of the contacts which locks these parts in the insulating body. The movable contact may then be placed in position on the annular boss 16 in the switch chamber and after the spring 34 has been connected to the actuating member 33 and bridge 35 and the end of the pull chain 58 locked in the extension 45, these parts are mounted in the switch chamber and the bridge is locked to the lugs 39. In this operation, the bridge is first given one or more turns to tighten up the spring so that the spring is under tension when the bridge is adjusted in the insulating body in order to exert a constant pressure on the bridge to hold its ends in locking engagement with the lugs 39. When the switch parts are placed in the switch chamber the pull chain is laid in the guideway 60 and in the nipple 61 after which the nut 64 is threaded on the nipple.

In mounting the insulating body and assembled parts in the casing, the insulating disk 78 is placed in the bottom of the casing, then the insulating body and the disk 79 on the top face thereof and finally the cover is adjusted in position and locked to the casing. The nut 64 is then screwed up on the nipple into tight engagement with the casing and the assembling operation is completed.

It will be observed that this assembling operation is comparatively simple and requires no fastening means such as screws and the like with the exception of soldering the terminals to the fixed contacts. The switch parts are all held in operative position by the pin bridge which is held locked by the spiral spring.

The operation of my switch is very simple. The recess 13 is in plan approximately in the form of a quadrant of a circle and the spring 34 under tension holds the actuating member 33 in such position that its extension 45 normally engages an end wall of the recess 13 (Fig. 2) which serves as a stop for the initial position of said member. When a pull is exerted upon the pull chain, it rotates the actuating member through an arc of approximately ninety degrees and in this operation the ratchet teeth on the bottom face of the actuating member engage the opposite upstanding lugs on the movable contact and turn it through an arc of approximately ninety degrees, that is, from one

ratchet tooth to the next succeeding one. In this movement the spring is tightened thereby reducing the width of the various coils and permitting the spring to be compressed into a single plane as the actuating member is forced upwardly on its supporting pin by the upward movement of the movable contact in sliding engagement with the inclined ratchet teeth on the floor of the switch chamber. The movable contact is thus moved up the inclined faces either of the two opposite teeth or of opposite contacts as the case may be until it slides off and drops into the next succeeding pair of ratchet teeth. If the wings of the rotatable contact are in engagement with the fixed contacts when that member is rotated, the wings drop off the fixed contacts on two sides simultaneously and in this movement break the circuit by a movement transversly of the fixed contacts which reduces the arcing to a minimum because the arcs, instead of being lengthened as they would be by a separation in a longitudinal direction, are smothered by the insulating material underlying the fixed contacts. After this rotation has been accomplished and the chain has been released, the spring which has been tightened by the turning causes the actuating member to be returned to its initial position, the ratchet teeth formed on the bottom face of the actuating member then slide over the lugs on the rotatable contact without causing a reverse movement thereof since the wings are locked against the vertical portions of the teeth on the floor of the switch chamber into which they have just dropped.

After the switch has been assembled in the casing, the lead wires may be attached to the terminals without opening the casing by merely unscrewing the binding screws carried by the terminals, winding the lead wires around the shanks of said screws and then tightening up the screws to hold the lead wires. This is an important advantage because it eliminates opening the casing in order to connect the lead wires to the terminals.

The assembling of the modified form shown in Figure 7 is essentially the same as the foregoing. To obviate the necessity of opening the casing to attach lead wires to the terminals when the switch is being installed in a lighting system, short length lead wires **94** may be attached to the binding screws in the assembling of the switch and the ends of these projecting out the casing may be fastened to the circuit wires.

In mounting the switch in a link of a fixture suspension chain, one end of the switch is inserted in the link and then by a slight turning movement the remaining portion of the switch is pushed into place to bring the sides of the link in between the parallel ridges **90** on opposite faces of the casing and cover, the edges of these ridges being slightly rounded to facilitate this operation. By a similar movement, the switch may be removed from the link. The ridges are sufficiently deep to hold the switch in the link against pulls exerted upon the pull chain.

Although I have shown the insulating body and switch parts as mounted in a metallic casing, it is to be understood that the casing may be made of any suitable material such as molded insulating material and when made of this material the use of the insulating disk **78** may be eliminated.

It is to be understood that my invention is not to be limited to the particular form of switch herein shown and described since it may be embodied in various other forms all within the purview of the following claims.

What I claim is:

1. In an electric switch, an insulating body having a recess in one face to afford a switch chamber, a pair of fixed contacts mounted in said recess in spaced relation, a bridge having its ends locked in opposite portions of the side wall of said recess, a pin carried by said bridge and having its lower end seated in the floor of said recess, a movable contact rotatably mounted on said pin, an actuating member for moving said movable contact into and out of bridging engagement with said fixed contacts to close and to open a circuit therethrough, a spring for holding said actuating member normally in a retracted position and a pull chain for operating said actuating member against the tension of said spring.

2. In an electric switch, an insulating body having a recess in one face to afford a switch chamber, a pair of fixed contacts mounted in spaced relation in said chamber, a bridge having its ends locked in opposite portions of the side wall of said recess, a pin carried by said bridge and having its lower end seated in the floor of said recess, a movable contact member rotatably mounted on said pin, an actuating member for moving said movable contact into and out of bridging relation with said fixed contacts, said actuating member being made of insulating material and rotatably mounted on said pin, a spring for holding said actuating member normally in a retracted position and a pull chain for operating said actuating member against the tension of said spring.

3. In an electric switch, the combination of an insulating body having a recess in one face to form a switch chamber, a pair of fixed contacts mounted in said chamber in spaced relation, a bridge having its ends locked in opposite portions of the side wall of said recess, a pin carried by said bridge and having its lower end seated in the floor of said recess, a movable contact rotatably mounted in said chamber, an actuating member for rotating said movable contact into and out of bridging engagement with said fixed contacts to close and to open a circuit therethrough, a spring for holding said actuating member normally in a retracted position and a pull chain for operating said actuating member against the tension of said spring to rotate said movable contact.

4. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts in said chamber, a bridge having its ends locked in opposite portions of the side wall of said recess, a pin carried by said bridge and having its lower end seated in the floor of said recess, a rotatable contact, a rotatable actuating member having ratchet teeth for rotating said rotatable contact into and out of bridging engagement with said fixed contacts, said rotatable contact and said actuating member being both mounted on said pin, a pull chain for rotating said actuating member and a cone-shaped spiral spring for returning said actuating member to initial position.

5. In an electric switch, the combination of an insulating body recessed in one face to form a switch chamber, a bridge mounted transversely of said chamber and having its ends locked in opposite side walls of said chamber when turned in one direction, said bridge unlocking when turned in the opposite direction, a pin carried by said bridge and having its lower end seated in the

floor of said chamber, a pair of fixed contacts mounted in said chamber, a movable contact and a contact actuating member rotatably mounted on and movable longitudinally said pin, means for operating said actuating member and a spring for returning said actuating member to initial position when said operating means is released.

6. In an electric switch, the combination of an insulating body recessed in one face to form a switch chamber, a bridge mounted transversely of said chamber and having its ends locked in opposite side walls of said chamber when turned in one direction, said bridge unlocking when turned in the opposite direction, a pin carried by said bridge and having its lower end seated in the floor of said chamber, a pair of fixed contacts mounted in said chamber, a movable contact and a contact actuating member rotatably mounted on and movable longitudinally said pin, means for operating said actuating member and a spring for returning said actuating member to initial position when said operating means is released, said spring having one end connected to said bridge and being under compression at all times to hold said bridge in locked position in said chamber.

7. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts mounted in said chamber, a bridge mounted transversely of said chamber and having its ends locked in opposite side walls of said chamber when turned in one direction, said bridge unlocking when turned in the opposite direction, a pin carried by said bridge and having its lower end seated in the floor of said chamber, a pair of fixed contacts mounted in said chamber, a rotatable contact, a rotatable actuating member of insulating material for rotating said rotatable contact into and out of bridging engagement with said fixed contacts, both said rotatable contact and actuating member being rotatably mounted on and movable longitudinally of said pin, means for rotating said actuating member through a predetermined arc to turn said rotatable contact from one position to another and a spring to return said actuating member to initial position and for holding said bridge in locked position.

8. In an electric switch, the combination of an insulating body, a pull-chain switch structure mounted therein and a casing enclosing said insulating body, said casing being provided on opposite faces with pairs of parallel ridges for detachably fastening said device in a link of a fixture suspension chain, the ridges of each of said pairs being adapted for receiving and holding between them in close engagement one side portion of said link.

9. In an electric switch, the combination of an insulating body, a pair of fixed contacts mounted therein, a pull-chain switch for opening and closing a circuit through said contacts, an open top casing for enclosing said insulating body and a cover for closing said casing, the opposite outside faces of said casing and said cover being provided with means for detachably securing said switch in a link of a fixture suspension chain, said means comprising a pair of parallel ridges formed at the bottom of said casing and in said cover, each of said pairs being adapted for receiving and holding between them in close engagement one side portion of said link.

10. In an electric switch, an insulating body having a recess in one face to form a switch chamber, a pair of fixed contacts mounted in said recess in spaced relation, a pin bridge mounted in said recess, a contact rotatably mounted in said recess, an actuating member for moving said contact into and out of bridging engagement with said fixed contacts to close and to open a circuit therethrough, said contact and said actuating member being loosely mounted on the pin portion of said pin bridge, a spring for holding said actuating member normally in a retracted position, a pull chain for operating said actuating member against the tension of said spring and a casing enclosing said insulating body, said casing being provided with means for detachably fastening it within a link of a fixture suspension chain.

11. In an electric switch, an insulating body having a recess in one face to form a switch chamber, a pair of fixed contacts mounted in said recess, a pin bridge mounted in said recess, a contact rotatably mounted in said recess, an actuating member for moving said contact into and out of bridging engagement with said fixed contacts to close and to open a circuit therethrough, said contact member and said actuating member being loosely mounted on the pin portion of said pin bridge, a spring for holding said actuating member normally in a retracted position, a pull chain for operating said actuating member against the tension of said spring and a casing enclosing said insulating body, said casing having two opposite faces each provided with a pair of spaced parallel ridges for detachably fastening said casing within a link of a fixture suspension chain.

12. In an electric switch, the combination of an insulating body recessed in one face to form a switch chamber, the walls of said chamber having a pair of opposite recessed lugs adjacent the top face of said body, a bridge mounted transversely of said chamber and having notched ends interlocking with said lugs, a pin carried by said bridge and having its lower end seated in the floor of said chamber, a pair of fixed contacts mounted in said chamber, a movable contact and a contact actuating member rotatably mounted on said pin, means for operating said actuating member and a spring for returning said actuating member to initial position.

13. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts mounted in said chamber, a pin bridge mounted in said recess, a rotatable contact, a rotatable actuating member of insulating material for rotating said rotatable contact into and out of bridging engagement with said fixed contacts, said rotatable contact and said actuating member being mounted on the pin portion of said pin bridge, means for rotating said actuating member through a predetermined arc to turn said rotatable contact from one position to another and a spring to return said actuating member to initial position and to hold said pin bridge locked in said recess.

14. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts mounted in said chamber, a rotatable contact, a rotatable actuating member of insulating material for rotating said rotatable contact into and out of bridging engagement with said fixed contacts, said actuating member having a recess in one face, means for rotating said actuating member through a predetermined arc to turn said rotatable contact from one position to another and a cone-shaped spiral spring to return said actuating member to initial position, said spring

having one end connected to said actuating member within the recess in its face and being adapted to be compressed within said recess when said actuating member is rotated to turn said rotatable contact.

15. In an electric switch, an insulating body having a recess in one face to form a switch chamber and a threaded nipple projecting from one side thereof and provided with an open pull chain passage leading from said switch chamber out through said nipple, a pair of fixed contacts mounted in said recess in spaced relation, a movable contact mounted in said recess, an actuating member for moving said movable contact into and out of bridging engagement with said fixed contacts to close and to open a circuit therethrough, a spring for holding said actuating member normally in a retracted position, a pull chain laid in said passage for operating said actuating member against the tension of said spring and a nut threaded on said nipple for closing the said open passage to retain the pull chain therein.

16. In an electric switch, an actuating member of insulating material having top and bottom parallel faces and being of circular form having a circumferential extension on one side, said member being recessed in its top and bottom faces and said extension having a recess opening out one end of said extension through a slot for holding the end of a pull-chain locked therein, the ceiling of the recess in said bottom face of said member being provided with an annular series of ratchet teeth for rotating a movable contact and the recess in said top face being provided for housing a spiral spring when compressed.

17. In an electric switch, an insulating body recessed in its top face, a pin bridge mounted in said recess, the wall of said recess at opposite points adjacent said top face and the ends of said bridge interlocking when said bridge is turned in one direction, a movable contact and an actuating member loosely mounted on the pin portion of said pin bridge, a pull-chain for rotating said actuating member through a limited arc to turn said movable contact, and a cone-shaped spiral spring for returning said actuating member to initial position when said pull-chain is released, said spring being under tension at all times to hold said bridge in locked position.

18. In an electric switch, an insulating body recessed in its top face, a pin bridge mounted in said recess, the wall of said recess at opposite points adjacent said top face and the ends of said bridge interlocking when said bridge is turned in one direction, a movable contact and an actuating member loosely mounted on the pin portion of said pin bridge and freely movable longitudinally said pin portion, a pull-chain for rotating said actuating member through a limited arc to turn said movable contact, and a cone-shaped spiral spring, fastened at one end to said actuating member and at its other end to said pin bridge, for returning said actuating member to initial position when said pull-chain is released and for holding said pin bridge in locked position.

19. In an electric switch, an insulating body recessed in its top face, a pin bridge mounted in said recess, the wall of said recess at opposite points adjacent said top face and the ends of said bridge interlocking when said bridge is turned in one direction, a movable contact and an actuating member loosely mounted on the pin portion of said pin bridge, a pull-chain for rotating said actuating member through a limited arc to turn said movable contact, and a cone-shaped spiral spring for returning said actuating member to initial position when said pull-chain is released and for holding said pin bridge in locked position, said actuating member being recessed in its top face for housing said spring to permit free movement of said member longitudinally said pin portion.

20. In an electric switch, a one-piece insulating body having a recess in one face forming a switch chamber and a threaded projecting nipple provided with an open pull chain passage leading from said switch chamber out said nipple, a switch mounted in said chamber, a pull chain laid in said passage for operating said switch and a nut threaded on said nipple for closing said passage in said nipple to retain the said pull chain therein.

21. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts in said chamber, a pin shaft mounted in said chamber, a movable contact, an actuating member for rotating said contact into and out of bridging engagement with said fixed contacts, said contact and said actuating member being loosely mounted on said pin shaft and movable longitudinally said shaft and said actuating member being recessed in its top face, a spiral spring for holding said actuating member in a normally retracted position and in engagement with said contact, said spring being cone-shaped permitting it to be compressed into flat form within the recess in said actuating member to allow free upward movement of said actuating member longitudinally said pin when it is turned to operate said movable contact and a pull chain for operating said actuating member to turn said contact.

22. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts in said chamber, a pin shaft fixed in said chamber, a rotatable contact, an actuating member for rotating said contact into and out of bridging engagement with said fixed contacts, said contact and said actuating member being loosely mounted on said pin shaft and movable longitudinally said shaft and said actuating member being recessed in one face, a spiral spring for holding said actuating member in a normally retracted position and in engagement with said contact, said spring being cone-shaped permitting it when under extreme tension to be compressed into flat form within the recess in said actuating member to allow free upward movement of said actuating member longitudinally said pin when it is turned to operate said movable contact and a pull chain for operating said actuating member to turn said contact in a step-by-step manner.

23. In an electric switch, the combination of an insulating body recessed to form a switch chamber, a pair of fixed contacts in said chamber, a pin shaft mounted in said chamber, a rotatable contact, an actuating member for rotating said contact into and out of bridging engagement with said fixed contacts, said contact and said actuating member being loosely mounted on said pin shaft and movable longitudinally said shaft and said actuating member being recessed in its top face, a spiral spring for holding said actuating member in a normally retracted position and in engagement with said contact, said spring being cone-shaped permitting it to be compressed into flat form within the recess in said actuating member to allow free upward movement of said actu-

ating member longitudinally said pin when it is turned to operate said movable contact and means for operating said actuating member to turn said contact.

24. In an electric switch, the combination of an insulating body provided with a recess in one face approximating a quadrant of a circle in plan and opening out one side of said body through a passage, a pair of fixed contacts in said chamber, a pin shaft mounted in said chamber, a rotatable contact, an actuating member for rotating said rotatable contact into and out of bridging engagement with said fixed contacts, said actuating member comprising a main circular body portion having a side extension and said rotatable contact and said actuating member being rotatably mounted on said pin shaft and movable longitudinally thereof, a pull chain fastened at one end to said extension and laid around and between the circular portion of said actuating member and the circular wall of said recess and leading out said passage, and a helical spring for holding said actuating member normally in retracted position with said extension in engagement with an end wall of said recess and for returning it to initial position after rotation by said pull chain.

25. In an electric switch, the combination of an insulating body provided with a recess opening out one side of said body through a passage, a pair of fixed contacts in said chamber, a pin shaft mounted in said chamber, a movable contact and an actuating member for rotating said movable contact in a step-by-step manner into and out of bridging engagement with said fixed contacts, said movable contact and said actuating member both being rotatably mounted on said pin shaft, said actuating member having a main portion of circular form with a side extension, a pull chain fastened at one end to said extension and extending around and between the circular portion of said actuating member and a wall of said recess and leading out of said passage, said recess being formed to limit the rotation of said actuating member to an arc of approximately ninety degrees, and a helical spring for holding said actuating member in retracted position with said extension in engagement with an end wall of said recess and for returning it to initial position after rotation by said pull chain.

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