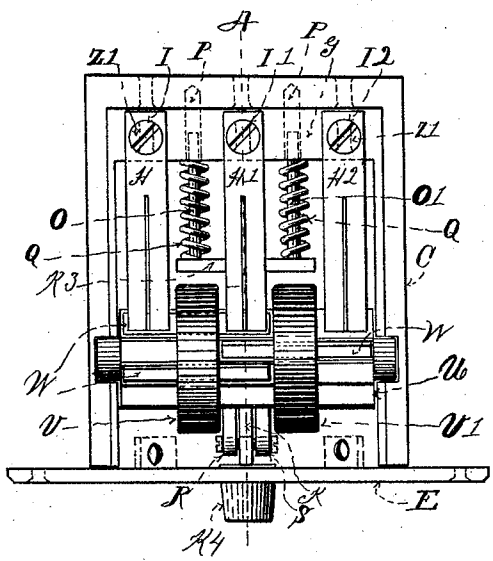
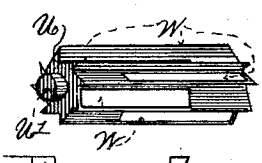
(No Model.)

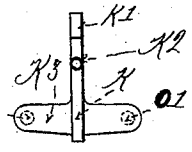
H. W. LAWRENCE.

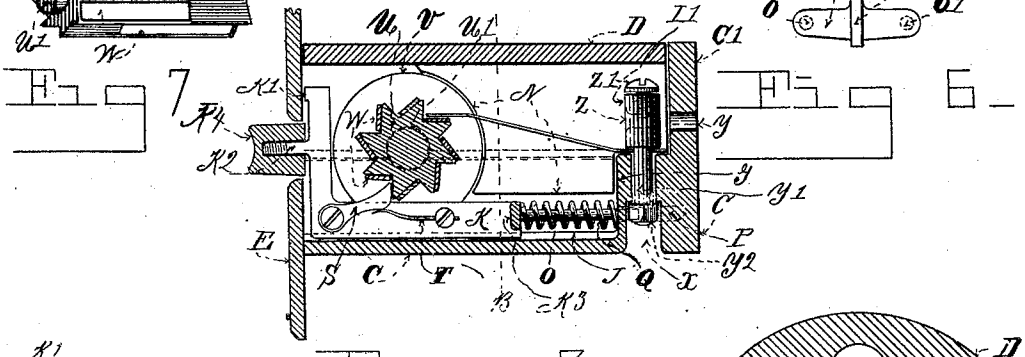
ELECTRIC LIGHT SWITCH.

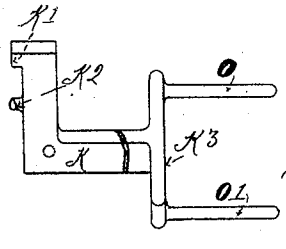
No. 553,857. Patented Feb. 4, 1896.

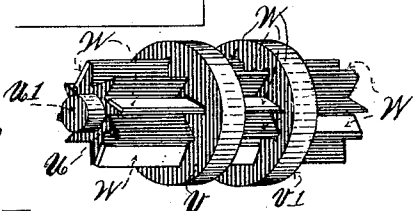


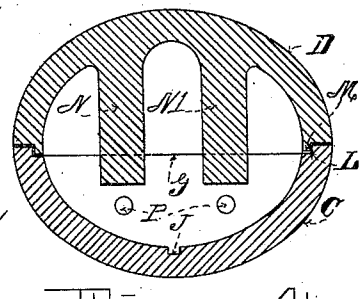












Witnesses

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UNITED STATES PATENT OFFICE.

HARRY WALLACE LAWRENCE, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO WILLIAM A. BLAKENEY, OF SAME PLACE.

ELECTRIC-LIGHT SWITCH.

SPECIFICATION forming part of Letters Patent No. 553,857, dated February 4, 1896.

Application filed April 1, 1895. Serial No. 544,112. (No model.)

To all whom it may concern:

Be it known that I, HARRY WALLACE LAWRENCE, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Electric-Light Switches; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in electric-light switches; and the objects of my invention are, first, to provide a three-way switch by means of which one or more lights in a circuit may be lighted from one switch and extinguished from another located at a distant point; second, to provide a strong, compact and durable switch. I attain these objects by the mechanism illustrated and described in the accompanying drawings and specification, in which—

Figure 1 represents a plan view of my improved switch with a cap removed. Fig. 2 represents a longitudinal section through the center of Fig. 1 on line A with the cap in position. Fig. 3 represents a perspective view of the ratchet-wheel. Fig. 4 represents a cross-section of the base and cap on line B of Fig. 2. Fig. 5 represents a perspective view of the push-button lever. Fig. 6 represents an elevation of the same. Fig. 7 represents a perspective view of a modification of the ratchet-wheel.

Similar letters of reference refer to similar parts throughout the several views.

C designates the base of the switch. It is constructed of non-conductive material, preferably porcelain, and with the cap D forms an oval-shaped shell with a wall C′ at one end and a face-plate E, through which a push-button extends, detachably secured to the opposite end. The wall C′ extends above the body of the base even with the top of the cap. A step formed integral with the wall projects into the body of the base. This step forms a bearing for the terminal contact-brushes H, H′, and H^2 and the terminal posts I, I′, and I^2. The bottom of the base is divided with a groove J, which is adapted to receive the lower edge of the push-button lever K and confines it in reciprocal position. The edges of the shell and cap are provided with a step L and a lip M, the lip of the cap being adapted to fit into the step of the base and hold the cap against lateral movement when in place.

The cap is provided with two depending partitions N and N′, which divide it and part of the base into three compartments. These partitions fit the outline of the wall C′ and step G, but do not extend to the bottom of the base, a space being left below them for the stems O and O′ of the push-button lever K. This lever is of peculiar shape. It consists of a rectangular shank adapted to the groove J, which at one end terminates in a right-angled extension arranged to stand vertically in the base, at the extremity of which is a slight projection K′, which contacts with said face-plate. A projection K^2 is also provided adjacent to this end, to which a push-button K^4 is attached. This push-button extends through an opening E′ in the face-plate. At the opposite end of the rectangular portion the lever branches out at right angles in opposite directions, forming a cross-bar K^3, and from the ends of this cross-piece stems O and O′ extend forward and lodge in holes P, which are drilled in the step G to receive them. These stems support the expansive springs Q, through the medium of which when the push-button is pressed in a reciprocative movement is imparted to the lever.

Two pawls R and S are pivoted one to each side of the lever, and springs T are secured to the lever and are adapted to hold said pawls in operative engagement with the ratchet-teeth of the ratchet-cylinder U. This cylinder, which I illustrate in perspective in Figs. 3 and 7, is preferably cast of porcelain, with trunnions U′ at each end. These are supported in suitable circular bearings formed partially in the base and cap. The ratchet-wheel is made either with or without collars. In Fig. 3 collars are shown; but in Fig. 7 the ratchet-wheel is shown without collars. The collars, when used, divide it into three circular divisions of teeth. The partitions N and N′ of the cap are arranged in line with the collars of the ratchet-wheel and partially surround them to prevent the current cross-cir-

cuiting between the brushes and terminal posts. When collars are not used these partitions can be extended to the teeth and will answer fully as well for insulating the brushes from one another with currents of low tension; but the collars are preferably used with currents of high tension and when a large number of lights are in circuit. Each tooth of each division is in axial alignment with the adjacent teeth of the other divisions. Consequently the teeth would be continuous across the cylinder if they were not intersected by the collars V and V′. Every other tooth of the cylinder in each end division is provided with a conductive pole-piece W, which is embedded in or attached to its respective teeth. The conductor W on one end passes through the collar V adjacent to that end and extends to, or nearly to, the second collar V′ on the same tooth of the central division, leaving the end of the same tooth on the division beyond the second collar insulated, while the conductors on the opposite end of the ratchet are placed on the alternate intermediate teeth of the first-named end, which would be the insulated teeth of that end. These conductors pass through the collars V′ and extend to the collar V, leaving the opposite ends of the teeth beyond this collar insulated. Consequently every tooth of the central division is a conductive tooth, while every other tooth of the end divisions is conductively connected with the central division in successive order. In Fig. 7 these pole-pieces W are clearly shown arranged on opposite ends of the successive teeth. Each pole-piece extends from the end of the tooth past the center and covers about two-thirds of the length of it, extending past the inner end of the one on the next tooth. H, H′, and H² designate the contact terminal brushes. They are made of resilient conductive material, and are split centrally to decrease their tendency to spark. They are secured to the step G by the binding-posts I, I′, and I². These posts are provided with a reduced shank Y′, which passes through the ends of the brushes. This shank is provided with a threaded end and nut Y², by means of which they are secured to the step. Counterbored holes X are made in the base to receive the nut, so that the exterior body of the switch may be free from projections. These terminal posts are provided with wire-receiving holes and binding-screws Z′, and similar holes Y are formed in the wall of the base in line with those in the posts to admit the wires to them.

It will be noticed in Fig. 1 that the brushes H and H′ are in circuit as they bear on the conductive pole-piece W which passes through the collar V, but stops close to the collar V′, and that the brush H² is out of circuit as it bears on the insulated part of the same axially-aligned tooth. Now if the push-button be pressed in the lever K will force the pawls to engage a tooth of the ratchet-wheel, and will give it a partial rotative movement of one tooth, that being the limit of the lever movement before it contacts with the ratchet-wheel with its vertical extension. This causes all the brushes to synchronously drop to the next row of teeth, where the brushes H′ and H² will be in circuit, and brush H is out of circuit as it drops onto the insulated part of the tooth. When the push-button is released, the springs T force the lever and pawls back in normal position and in engagement with the next tooth of the ratchet-wheel.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a three-way switch the non-conductive ratchet-wheel revolubly mounted in a suitable base and provided with three circular divisions of teeth separated by collars, each alternate tooth of each end division intermediate of the teeth of the opposite end provided with a conductive pole-piece passing through the collar adjacent to its end, as specified.

2. In a three-way switch a non-conductive ratchet-wheel revolubly mounted in a suitable base and provided with collars, dividing it into three equal divisions, each alternate tooth of one end division having a conductive pole-piece passing through the collar adjacent to its end and extending across the same tooth of the central division, and each alternate tooth of the opposite end division intermediate of the conductive teeth of the first-named end also having a conductive pole-piece passing through the collar adjacent to its end and across the same tooth of the central division, contact terminal brushes arranged to bear upon the same axially-aligned tooth of each division, and a push-button mechanism adapted to impart a predetermined, partial rotative motion to said ratchet-wheel, as set forth.

3. In a three-way switch, a non-conductive ratchet-cylinder provided with trunnions at each end and divided into three divisions by collars formed integral therewith, poles of conductive material embedded in or attached to each alternate tooth in the end divisions, and upon one end intermediate of the conductive teeth of the opposite end and continuous through the collars nearest each end and across the central division, whereby the teeth of the central divisions are all made conductive poles and every alternate tooth of the end divisions in successive order is conductively connected with the central division, as herein set forth.

4. The combination in a three-way switch of a non-conductive base, a non-conductive cap fitting said base and provided with depending partitions extending into said base and partially dividing it into three compartments; a non-conductive, rotative ratchet-cylinder journaled in said base, and provided with collars dividing the teeth into three equal parts having said partitions arranged contiguous and in line with said collars and adapted to

partially surround them; conductive pole-pieces secured to each alternate tooth of the end divisions of said ratchet-cylinder, the pole-pieces being arranged intermediate of those of the other end, and extending through the nearest collar across the central division; terminal supports and brushes secured to said base and arranged in the spaces between said partitions, and in engagement with the teeth of said ratchet-wheel, and a push-button and spring-pawl mechanism arranged in operative engagement with said ratchet-wheel and adapted to impart a partial rotative movement to it, as herein set forth.

5. In a three-way switch the combination of a non-conductive base and cap, a non-conductive ratchet-wheel journaled in said base divided by collars into three divisions of teeth; conductive pole-pieces arranged alternately on each end division to pass through the adjacent collar and across the central division, and arranged on one end on the teeth intermediate of the conductive teeth of the opposite end, terminal binding-posts and brushes secured to said base and in contact with said ratchet-teeth; a face-plate secured to said base, a push-button extending freely through said plate; a lever supporting said push-button; spring-actuated pawls pivoted to said lever in engagement with said ratchet-wheel, a cross-bar on said lever having two forwardly-extending stems journaled in said base; expansive springs on said stems adapted to reciprocate said lever and push-button whereby a step-by-step partial rotative movement is imparted to said ratchet-wheel, as herein set forth.

6. In an electric switch a non-conductive ratchet-wheel having conductive pole-pieces embedded in each alternate tooth and extending from one end to the central portion of the tooth, and on the opposite end arranged alternately on the intermediate or insulated teeth of the first-named end, likewise to extend past the central portion of the tooth, whereby the central portion of every tooth is conductive, and each alternate tooth at the ends is insulated, and the intermediate teeth are conductively connected with the central portion in successive order, as specified.

7. In an electric switch a non-conductive ratchet-wheel provided with trunnion-bearings; conductive pole-pieces embedded in each tooth and arranged to extend from each alternate tooth of one end to, or slightly past the central portion of the wheel, and on the opposite end on the intermediate insulated teeth of the first-named end to extend also to or past the central portion whereby every alternate tooth of one end is conductively connected to the central portion of the same tooth, and every alternate tooth of the opposite end is also conductively connected with the central portion of its tooth in opposite order, and the ends of each tooth beyond the conductive pole-pieces are insulated; a base supporting said ratchet-wheel, contact terminal brushes arranged in operative engagement with the same axially-aligned tooth of said ratchet-wheel, and a push-button mechanism substantially as herein described for rotating said ratchet-wheel, whereby the end brushes are placed alternately in and out of circuit with the central brush, as set forth.

8. The combination in a three-way switch, of a non-conductive ratchet-wheel, a base supporting said wheel, resilient contact, terminal brushes attached to said base and arranged in operative engagement with said ratchet-wheel, conductive pole-pieces embedded in each tooth of said ratchet-wheel, and arranged on each alternate tooth of one end to extend to the central portion of the same tooth, thereby leaving the remainder of the tooth insulated, and arranged on the opposite end of the ratchet-wheel alternately on the teeth between the conductive teeth of the first-named end to extend also to the central portion of the tooth, and a push-button mechanism substantially as herein described for imparting a step-by-step rotative motion to said ratchet-wheel whereby the middle terminal brush is always in circuit with a conductive pole, and the end brushes are alternately placed in and out of circuit with it, as set forth.

9. The combination with the terminal brushes in a three-way switch, the base supporting said brushes, a non-conductive ratchet-wheel mounted therein in operative engagement with said brushes, having non-conductive pole-pieces embedded in or attached to its teeth, and arranged on each alternate tooth at one end to extend a little beyond the center of the ratchet-wheel on the same tooth, thereby leaving the remainder of said tooth insulated, and arranged on the opposite end of the ratchet-wheel alternately on the insulated teeth of the first-named end and extending also slightly beyond the center, whereby every tooth at the center of the ratchet-wheel in successive order is a conductive tooth and in circuit with the central brush, and the end brushes are alternately in and out of circuit with it as the ratchet-wheel is rotated, and a push-button mechanism substantially as herein shown and described, for imparting a step-by-step, partial rotative motion to said ratchet-wheel, as specified.

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

HARRY WALLACE LAWRENCE.

Witnesses:
ROBERT DAVIS THOMPSON,
CHARLES JAMES BLAKENEY.