No. 697,163. Patented Apr. 8, 1902.

G. B. PAINTER.

ELECTRIC SWITCH.

(Application filed May 31, 1901.)

(No Model.)

Fig. 2.

Fig. 3.

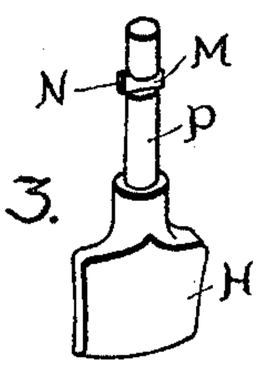


Fig. 5.

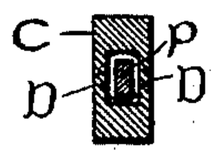


Fig. 4.

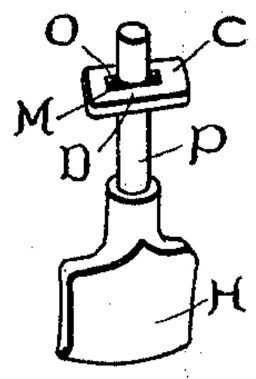


Fig. 6.

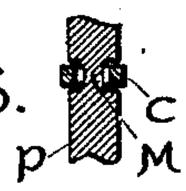
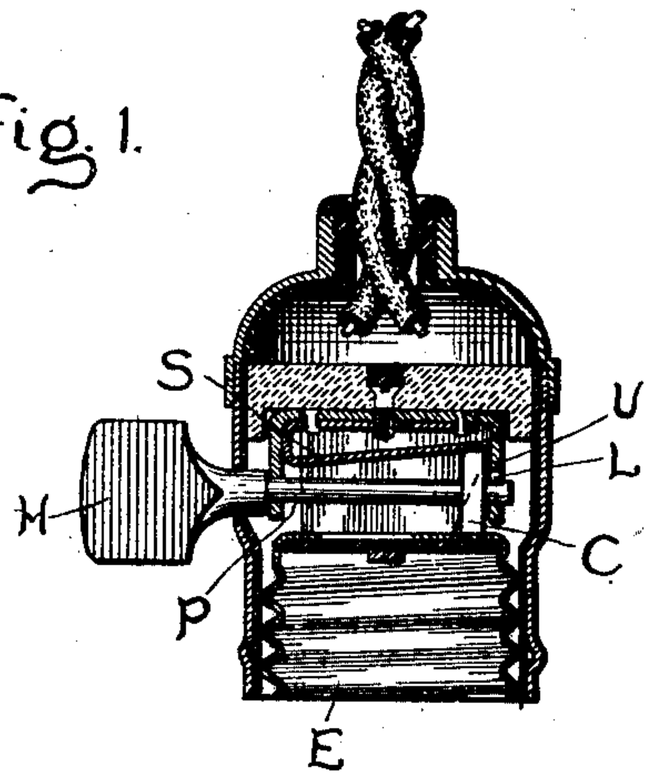


Fig. 1.



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UNITED STATES PATENT OFFICE.

GEORGE B. PAINTER, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 697,163, dated April 8, 1902.

Application filed May 31, 1901. Serial No. 62,581. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. PAINTER, a citizen of the United States, residing at Schenectady, county of Schenectady and State of New York, have invented certain new and useful Improvements in Electric Switches, (Case No. 1,844,) of which the following is a specification.

This invention relates to the construction of movable switch-pieces of electric switches, and has its most important application in connection with the standard Edison key-type incandescent-lamp sockets, which are provided with a switch for making and breaking the circuit of the lamp. This kind of electric switch comprises a rotatable spindle, to which is attached by a lost-motion connection an oblong switch contact or "cam," which cam in the closed position of the switch electrically connects a screw-threaded contact-sleeve, which retains the threaded contact-base of a lamp with a spring which forms the other circuit-terminal. It is obvious that with such a construction the loosely-mounted oblong contact-piece when rotated by the spindle from its closed position will be impelled by the spring-terminal to break the circuit with a snap action to prevent the formation of arcs, which would otherwise burn and seriously injure the switch-contacts. The end of the spindle on which the contact-piece is loosely mounted is itself so mounted that the spindle can have free vertical movement in order that when the contact-piece is first moved so that its upper angular edge abuts against the threaded sleeve the spindle can be pressed downwardly to permit the upper end of the contact-piece to assume its final position squarely against the sleeve, the lower end of the contact-piece bearing continuously against the spring-terminal.

The device in which the present invention is preferably embodied is substantially the same as that just described, and the invention herein relates to the mode of construction of the contact-piece and spindle. In the device just described the contact-piece has a circular perforation for the passage of the end of the spindle, and is also formed with a transverse groove or slot on one side, the walls of which slot are engaged by a pin carried with lost motion by the spindle, so that the contact-piece is rotated when the spindle is manipulated. In some cases the spindle has been formed with an integral projection, which was struck up near its ends and which took the place of the pin above described. Ever since the invention of the standard Edison socket, however, although other changes have been made, the above-described construction of the contact-piece itself has been adhered to and many millions of lamp-sockets have been made in accordance with that invention, notwithstanding that serious disadvantages have always attended the use of a switch-cam of this construction. These defects will now be explained.

Practical conditions require that the threaded metal sleeve adapted for the reception of the lamp-base shall be constructed of brass, and hitherto it has been believed to be necessary to construct the contact-piece of brass as well. The contact-piece must be a good conductor of electricity, and yet it cannot be made of copper, of which metal contact-pieces of other switches are generally composed, because this contact piece or cam is subjected to an unusual amount of wear and copper is too soft for the purpose. In fact, the chief difficulties encountered in this art are due to the fact that the various parts of the switch are liable to be worn out by the thousands of operations to which they are subjected in practice, so that some switches may become entirely inoperative. As stated, the contact-piece cannot be made of copper, because copper is too soft, and yet, on the other hand, it must be made of a metal which is soft enough to be drawn through dies. The cost of casting such small parts of any metal whatsoever is prohibitive of such method. It has been the invariable custom hitherto to construct these contact-pieces by drawing a long bar of brass through dies adapted to form a groove throughout the length of the bar, and the bar as thus drawn was then chopped off into sections, each section constituting a contact-piece provided with its groove or slot, which was then perforated for the reception of the end of the spindle. No metal harder than brass could be thus drawn without seriously injuring or destroying the dies, and

hence it is that brass has been the only material known to be possible of employment for the purpose of making these contact-pieces; but brass was not entirely satisfactory. It was found that the rubbing contact between the like metals of which the contact-piece and the sleeve were composed resulted in wearing away the sleeve, and thus rendering the switch inefficient and sometimes inoperative. It was known that the difficulty could be overcome by making the contact-piece and sleeve of different metals; but owing to the limitation to the use of brass, as pointed out above, it was not considered possible to do so. The prior art discloses one solution of this problem, which consisted in interposing a strip of different metal than brass, such as phosphor-bronze, between the brass contact-piece and the brass sleeve. In this case either the contact-piece or the sleeve could be made entirely of phosphor-bronze, but that would cost more. This greater cost is due not only to the great cost of phosphor-bronze, but also to the fact that bronze, steel, or similar metals are too hard to be drawn in dies without injuring or destroying the dies, which, of course, takes that method of manufacture out of consideration.

This invention aims at the root of the difficulty, which has existed ever since the beginning of the manufacture of modern lamp-sockets. It obviates the necessity of the use of an intermediate strip of different metal in accordance with the method just referred to and renders possible the employment of a contact-piece which is itself constructed of different metal from that of which the sleeve is composed, such different metal being preferably steel on account of its relatively low cost. In accordance with this invention the necessity of drawing the metal for the contact-pieces through dies is obviated, and the cams are constructed of a metal other than brass in such manner that they can be mounted on the spindle so as to have lost motion and to fully carry out the functions of the standard Edison key-type lamp-socket.

Of the drawings, Figure 1 is a vertical section of a lamp-socket constructed in substantial accordance with the original patent for the socket and which is almost universally used. Fig. 2 is a perspective view of a contact-piece as struck up or punched from sheet metal. Fig. 3 is a perspective of the switch-spindle provided with a thumb-piece. Fig. 4 is a perspective view of the assembly of the contact-piece and spindle. Fig. 5 is a transverse section through the contact-piece and spindle, showing their lost-motion connection; and Fig. 6 is a longitudinal section through the spindle and contact-piece, also showing their lost-motion connection.

The device shown in Fig. 1 is so familiar to those skilled in the art that it is considered unnecessary to particularly describe any features of it other than those to which the invention has especial reference. These features comprise the spindle P, which is suitably supported in a U-shaped frame U, its right-hand end engaging in an oblong slot L in the frame U, whereby the spindle P can be freely depressed when the end of the contact-piece engages the contact-sleeve. The spindle has a contact-piece C mounted upon it, and this contact-piece is adapted to be rotated by the spindle when the thumb-piece H is manipulated in order to make and break the circuit of a lamp retained by the threaded brass sleeve E by bridging across from the upper part of the sleeve to the spring-terminal S. The spindle P and cam are constructed in accordance with this invention, as shown in Figs. 2 to 6, inclusive.

Fig. 2 clearly indicates the shape of the contact-piece, which is punched by suitable dies well known in the art from a sheet of suitable metal, such as steel. As shown, the contact-piece is formed with a non-circular perforation O, which may be punched out simultaneously with the punching of any contact-piece, or, if desired, may be punched out before or afterward. The blank contact-piece is oblong or substantially rectangular in outline, except the longitudinal walls D of the perforation or slot O, which are slightly curved and are relatively thin.

In Fig. 3 is shown the switch-spindle P, provided, as hitherto, with a thumb-piece H, of suitable insulating material, such as hard rubber. The material feature of this spindle is the portion M, which is relatively small with respect to the rest of the spindle.

The operations of producing the contact-piece (shown in Fig. 2) and the spindle (shown in Fig. 3) may be conducted independently of each other, and when they are completed the contact-piece C is slipped over the end of the spindle, the perforation O of the contact-piece being of such size and shape that the spindle can readily pass through it. When the contact-piece is located at the portion M of the spindle, the members are placed under suitable dies, and the side walls D of the slot O are compressed together or swaged, so that the contact-piece cannot be withdrawn thereafter from the spindle, but is held at the reduced portion of the spindle by the relatively large portions of the spindle on opposite sides of the reduced portion. The two members as thus assembled are shown in perspective in Fig. 4 as ready to be embodied in the lamp-socket, (shown in Fig. 1,) except that in practice the thumb-piece or handle H will be placed over the end of the spindle as a last operation. It will be observed that after the walls D of the contact-piece have been bent inwardly the entire long sides of the contact-piece are straight.

As shown in Figs. 5 and 6, the contact-piece C does not fit the reduced portion of the spindle, but the side walls D are compressed only sufficiently to hold the contact-piece in place. The slot O, even when the side walls are compressed, is so much larger than the reduced

portion M of the spindle that the contact-piece has sufficient lost motion with respect to the spindle to enable it to be thrown by the spring S, Fig. 1, in breaking the circuit in advance of the movement of the spindle in order to produce a snap action. When the relatively small portion M is formed intermediate the ends of the spindle, as shown, the contact-piece is held at that portion by the adjacent parts of the spindle of greater size, so that the contact-piece is prevented from longitudinal movement on the spindle.

As shown in Fig. 3, when the reduced portion M of the spindle is formed projections N are also thereby formed, which serve the function of the pin of the original patent for the socket. While this device possesses also this advantage, it is to be understood that it is not limited to this specific method, as, in fact, the pin of the original socket patent could be employed in place of the projections N in connection with applicant's invention. Neither is it necessary that the reduced portion M should be formed intermediate the ends of the spindle, as it is within the limits of the invention to form the reduced portion at one extremity of the spindle, the latter being combined with the contact-piece (shown in Fig. 2) and mounted by lost motion on the reduced portion of the spindle. What I have invented is a solution of the hitherto baffling problem of making a contact-piece of different metal from that of which the brass sleeve is composed, and the claims are intended to cover all substantially similar means for accomplishing this result.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An electric switch, which comprises a spindle having a relatively small non-circular portion, combined with a contact-piece having a non-circular perforation and mounted over the relatively small portion of the spindle, the perforation in said contact-piece being smaller than the larger portions of the spindle on opposite sides of its small portion, whereby the contact-piece is held on the spindle, and said perforation in the contact-piece being larger than said smaller portion of the spindle, whereby the contact-piece can have lost motion with respect to the spindle; said non-circular portion of the spindle and non-circular perforation in the contact-piece cooperating to enable the contact-piece to be rotated by the spindle.

2. An electric switch, which comprises a spindle having a portion of relatively small size, combined with a contact-piece mounted over such relatively small portion and having a perforation which is larger than such small portion, so that the contact-piece can have lost motion with respect to the spindle; said spindle being adapted to rotate said contact-piece.

3. An electric switch, which comprises a spindle having a portion of relatively small size intermediate its ends, combined with a contact-piece mounted at such relatively small portion, said contact-piece having a perforation which is larger than such small portion of the spindle and smaller than the adjacent opposite larger portions of the spindle, so that the contact-piece is retained at the small portion of the spindle and prevented from longitudinal movement; said spindle being adapted to rotate said contact-piece.

4. An electric switch, which comprises a spindle having a portion of relatively small size, and projections extending therefrom beyond the larger portions of the spindle, combined with a contact-piece mounted on said small portion of the spindle, and having a perforation which is larger than the smaller portion of the spindle, said projections serving to rotate the contact-piece when the spindle is rotated.

5. The combination with the rotatable spindle of an electric switch, said spindle having a relatively small portion intermediate its ends, of a contact-piece having a perforation, said contact-piece being held upon the small portion of the spindle by the larger parts of the spindle on opposite sides of the smaller portion, said parts being constructed and arranged so that said contact-piece is rotated by the spindle.

6. The combination with the rotatable spindle of an electric switch, said spindle having a relatively small portion, of a sheet-metal contact-piece having a perforation and held on the small portion of said spindle by the larger opposite adjacent portions, said parts being constructed and arranged so that said contact-piece is rotated by the spindle.

7. The method of manufacturing an electric switch, which consists in operating upon the rotatable switch-spindle to form a portion thereof of reduced size; placing a perforated contact-piece over such reduced portion; and finally swaging the contact-piece, so that it is held with lost motion on the spindle at the reduced portion thereof.

8. The method of manufacturing an electric switch, which consists in operating upon the rotatable switch-spindle to form a portion of reduced size; producing by punching, a sheet-metal contact-piece having a non-circular perforation which is larger than the reduced portion of the switch-spindle, and swaging the contact-piece upon the reduced portion of the spindle so that the parts will have a lost-motion connection.

9. The combination with the rotatable spindle of an electric switch, said spindle having a relatively small portion, of a contact-piece having a perforation held on the small portion of said spindle by the larger opposite adjacent portions.

In witness whereof I have hereunto set my hand this 27th day of May, 1901.

GEORGE B. PAINTER.

Witnesses:
BENJAMIN B. HULL,
MARGARET E. WOOLLEY.