

P. H. F. SPIES.  
ELECTRIC SWITCH.

(Application filed Aug. 2, 1900.)

(No Model.)

2 Sheets—Sheet 1.

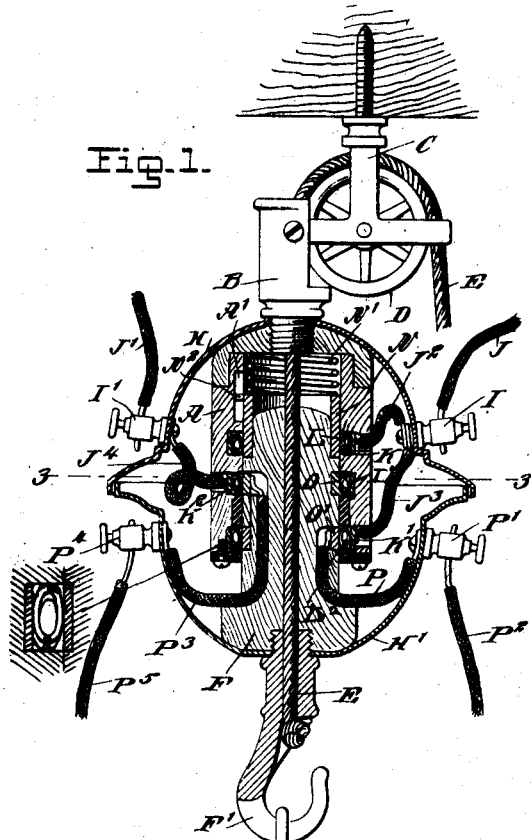


Fig. 1.

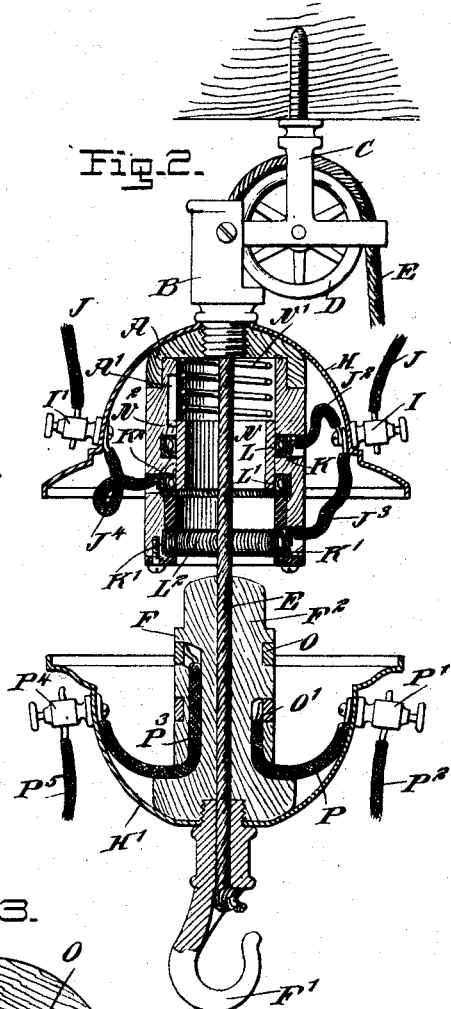


Fig. 2.

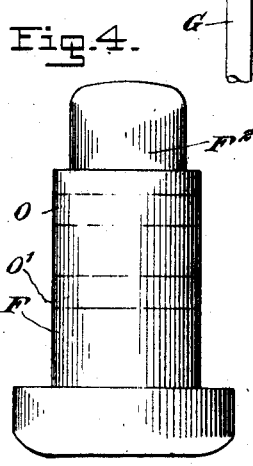


Fig. 4.

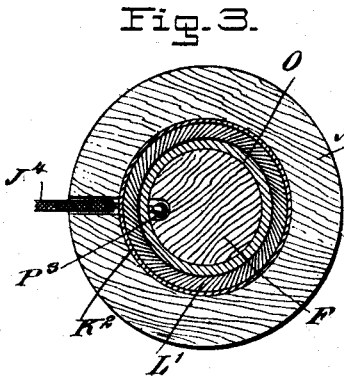


Fig. 5.

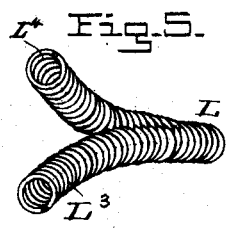
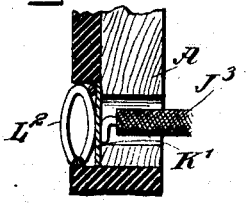


Fig. 6.

Fig. 7.



WITNESSES:  
*James F. Duhamel*  
*Henry Hostet*

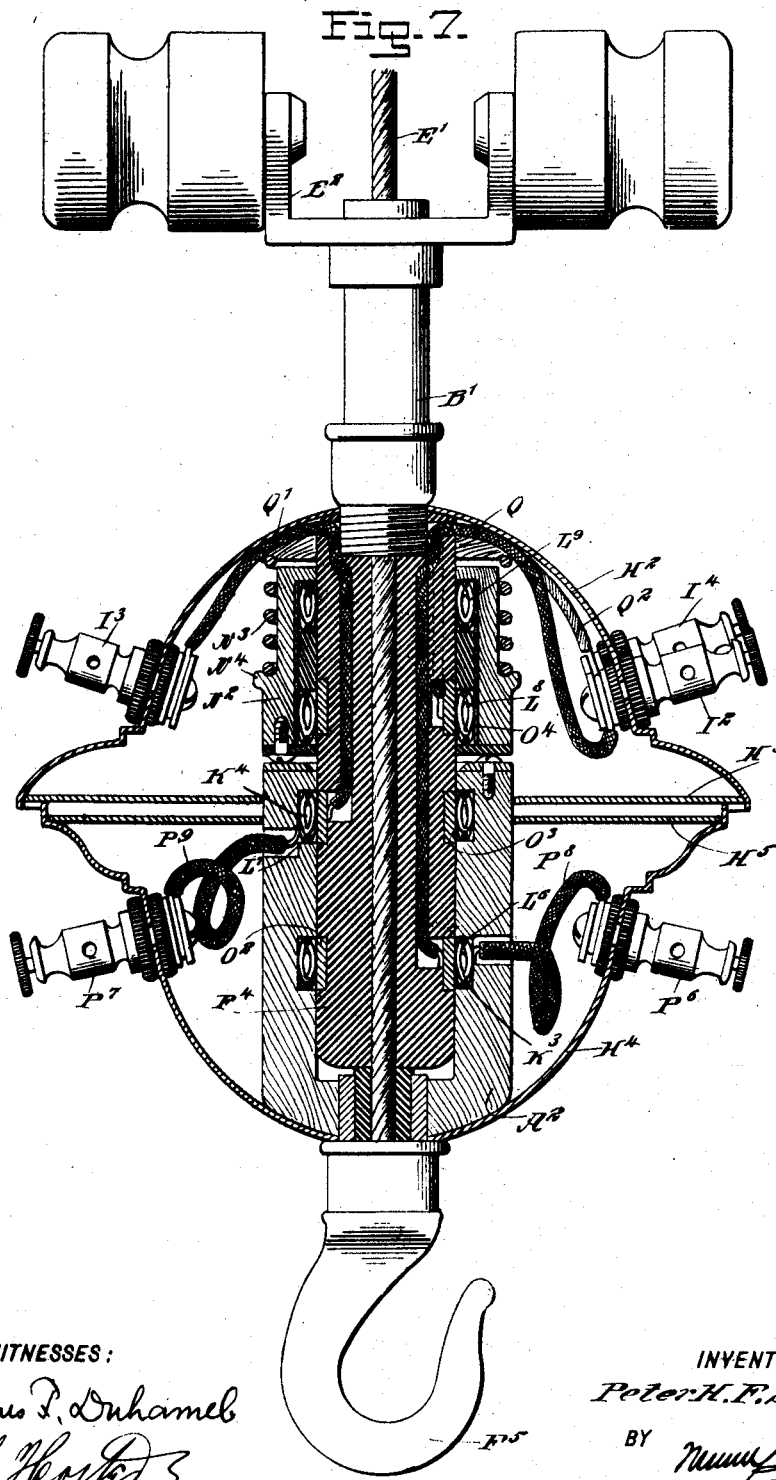
INVENTOR  
*Peter H. F. Spies,*  
 BY *Mumford*  
 ATTORNEYS

P. H. F. SPIES.  
ELECTRIC SWITCH.

(Application filed Aug. 9, 1900.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES:

*James S. Duhamel*  
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# UNITED STATES PATENT OFFICE.

PETER HEINRICH FELIX SPIES, OF MOUNT VERNON, NEW YORK, ASSIGNOR  
OF ONE-HALF TO JACOB NORDEN, OF SAME PLACE.

## ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 668,887, dated February 26, 1901.

Application filed August 2, 1900. Serial No. 25,659. (No model.)

*To all whom it may concern:*

Be it known that I, PETER HEINRICH FELIX SPIES, a subject of the Emperor of Germany, and a resident of Mount Vernon, in the county of Westchester and State of New York, have invented a new and Improved Electric Switch, of which the following is a full, clear, and exact description.

The invention relates to electric switches which are on electric-arc lamps, switchboards, and other electric devices and apparatus; and the object of the invention is to provide a new and improved electric switch arranged to permit of conveniently breaking and positively closing the circuit and in case the switch is applied to an electric-arc lamp to permit of readily lowering the lamp for renewal of electrodes or for repairs without the slightest danger to the operator and without throwing other lamps in the series out of the circuit.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the improvement as applied to an electric-arc lamp and with the switch in a closed position. Fig. 2 is a like view of the same with the switch in an open position. Fig. 3 is a sectional plan view of the same on the line 3 3 in Fig. 1. Fig. 4 is a side elevation of the plunger for opening or closing the circuit of the lamp. Fig. 5 is a perspective view of one of the flexible and compressible contacts with the helices separated at one end. Fig. 6 is an enlarged sectional side elevation of part of the socket, and Fig. 7 is a sectional side elevation of a modified form of the improvement.

The improved electric switch shown in Figs. 1 to 6 is provided with a socket A, of a suitable insulating material and supported on a hollow head B, carrying a bearing C, attached to an overhead support in any suitable manner, a pulley D being journaled in said bearing for carrying a rope E, one run of which extends to the ground and the other passes

through the head B to rigidly connect with a plunger F, adapted to pass into the socket A, as is plainly shown in Fig. 1. The socket A is provided at its lower end with a hook F' for supporting an electric-arc lamp G of any approved construction, the arrangement being such that when the operator takes hold of the rope E and slackens the run extending to the ground then the weight of the lamp G pulls the plunger F out of the socket A and electrically disconnects the lamp G from the circuit, so that new electrodes can be inserted in the lamp or the latter repaired without danger to the operator. When this has been done, the operator pulls on the rope E, and the plunger F, with the lamp G, is raised, the plunger F finally passing into the socket A for again connecting the lamp with the circuit in the manner hereinafter more fully described.

On the socket A is arranged a hood H, carrying binding-posts I I', connected with line-wires J J', and from the binding-post I lead branch wires J<sup>2</sup> J<sup>3</sup>, connecting with metallic rings K K', set in recesses in the socket A, as plainly shown in the drawings, and the binding-post I' is similarly connected by a wire J<sup>4</sup> with a contact-ring K<sup>2</sup>, likewise set in a recess in the socket A between the rings K K', it being understood that the several rings K K' K<sup>2</sup> are spaced apart and insulated one from the other. The contact-rings K K<sup>2</sup> K' are engaged at their inner faces by flexible and compressible contacts L L' L<sup>2</sup>, respectively, set in the recesses containing the rings K K' K<sup>2</sup>, and each formed of two helices L<sup>3</sup> L<sup>4</sup> having their convolutions overlapping each other, as is plainly indicated in Fig. 5. It is evident that to do this one of the helices is right-handed and the other left-handed to interlock with the convolutions overlapping each other. The helices are oval in cross-section, as shown in Fig. 6, and when interlocked form an exceedingly sensitive contact to insure proper transmission of electricity. The contacts L L' are adapted to be connected with each other by a slidable contact-ring N, mounted to slide in the upper portion of the socket A, a spring N' normally pressing the ring N downward to the position shown in Fig. 2 at the time the plunger F is

withdrawn from the socket. (See Fig. 2.) When this takes, place electric connection is made between the binding-posts I I' by way of the wires J<sup>2</sup> J<sup>4</sup>, the rings K K<sup>2</sup>, the contacts L L', and the ring N. The downward movement of the ring N is limited by a pin N<sup>2</sup> engaging a groove A' in the socket A. When the plunger F is, however, pushed into the socket A, then the upper reduced end of the plunger engages the lower end of the ring N, and on a further upward movement of the plunger said ring N is moved upward against the tension of its spring N', whereby the electric connection between the contacts L L' is broken; but at the same time electric connection is made between the binding-posts I I' and the lamp G by contact-plates O O', fitted in annular recesses in the plunger F and adapted to engage the contacts L' L<sup>2</sup>, respectively. The contact-plate O' is connected by a wire P with a binding-post P', connected by a wire P<sup>2</sup> with one electrode of the lamp G, and the other contact-plate O is connected by a wire P<sup>3</sup> with the binding-post P<sup>4</sup>, connected by a wire P<sup>5</sup> with the other electrode of the lamp G. The binding-posts P' and P<sup>4</sup> are carried on a hood H', attached to the plunger F and adapted to engage with its base the base of the hood H, as is plainly shown in Fig. 1, to protect the plunger and socket and their parts against the inclemency of the weather, dust, &c.

It is evident that when the plunger F is moved into the socket A by the operator manipulating the rope E, as previously explained, then the contact-plates O O' move in engagement with the flexible and compressible contacts L' L<sup>2</sup>, so that the binding-posts I I' are electrically connected with each other by way of the wire J<sup>3</sup>, ring K', contact L<sup>2</sup>, plate O', wire P, binding-post P', wire P<sup>2</sup>, electrodes of the lamp G, wire P<sup>5</sup>, binding-post P<sup>4</sup>, wire P<sup>3</sup>, contact-plate O, contact L', ring K<sup>2</sup>, and wire J<sup>4</sup>, leading to the binding-post I'. Thus from the foregoing it is evident that the current is completely cut off from the lamp G when the latter is lowered; but at the same time the circuit for the series line remains closed, so that the other lamps used are in electrical connection with the power-station. As soon, however, as the plunger F is raised and passes into the socket A then the lamp G is thrown into the series line. It is expressly understood that the series circuit is not interrupted when the plunger F is withdrawn from the socket, as the ring N makes contact with the contacts L L' before the local or loop circuit is broken.

By making the contacts L L' L<sup>2</sup> in the manner described they are compressible transversely to insure a positive contact between the plates O O' and the rings K<sup>2</sup> K' as well as between the ring N and the ring K. It is understood that this contact takes place around the rings and plates, especially as the contacts are of such thickness as to slightly project into the bore of the socket A, so that

when the plunger F is moved into the socket the convolutions are compressed transversely to insure a firm annular contact between the rings and plates. The contacts L L' L<sup>2</sup> are sufficiently flexible to be readily formed in circular shape to fit the annular recesses in the socket A.

In the modified form shown in Fig. 7 the plunger F<sup>4</sup> is fixed, and the socket A<sup>2</sup> is hung on the lowering and raising rope E' and carries the hook F<sup>3</sup> for supporting the electric-lamp. A hood H<sup>2</sup>, secured to the plunger F<sup>4</sup>, carries at its base end a centrally-apertured plate H<sup>3</sup>, and a similar plate H<sup>5</sup> is attached to the hood H<sup>4</sup>, carried by the socket A<sup>2</sup>. The hood H<sup>2</sup> carries the binding-posts I<sup>2</sup> I<sup>3</sup> I<sup>4</sup>, and the hood H<sup>4</sup> carries the binding-posts P<sup>6</sup> and P<sup>7</sup>, connected with the electrodes of the lamp and by wires P<sup>8</sup> and P<sup>9</sup> with the contact-rings K<sup>3</sup> K<sup>4</sup>, secured in the socket A<sup>2</sup> and engaged by the compressible contacts L<sup>6</sup> L<sup>7</sup>, adapted to engage the fixed contact-plates O<sup>2</sup> O<sup>3</sup> on the plunger F<sup>4</sup>. The contact-plates O<sup>2</sup> O<sup>3</sup> are connected by wires Q Q' with the binding-posts I<sup>2</sup> I<sup>3</sup> on the hood H<sup>2</sup>, the said binding-posts being connected with the line. The third binding-post I<sup>4</sup> on the hood H<sup>2</sup> connects by the wire Q<sup>2</sup> with a contact-ring O<sup>4</sup> on the fixed plunger and is adapted to be engaged by the compressible contacts L<sup>8</sup> L<sup>9</sup>, electrically connected with each other by a metallic lining in the sliding contact-ring N<sup>2</sup>, pressed by a string N<sup>3</sup> and held to slide on the fixed plunger F<sup>4</sup>. A flange N<sup>4</sup> on the said ring N<sup>2</sup> engages the hood-plate H<sup>3</sup> to limit the downward-sliding movement of the said contact-ring when the socket A<sup>2</sup> is lowered by the rope E'. When this takes place, the compressible contacts L<sup>8</sup> L<sup>9</sup> are in engagement with the contact-plates O<sup>3</sup> O<sup>4</sup> to keep the series lamps supplied with electricity, while the socket A<sup>2</sup> is lowered or out of engagement with the fixed plunger F<sup>4</sup>. When the socket A<sup>2</sup> moves into a final uppermost position, it engages the slidable contact-ring N<sup>2</sup> and moves the same upward against the tension of its spring N<sup>3</sup> to the position shown in Fig. 7 to render the said ring N<sup>2</sup> inactive. The plunger F<sup>4</sup>, as shown, is secured to a pipe B', having a head B<sup>2</sup> for engaging an overhead support.

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

1. An electric switch, comprising a receiving-socket, a contact-plunger for engagement with said socket, a series circuit, a local or loop circuit and a cut-in device so arranged that when the plunger and socket move out of engagement and the local circuit is broken then the said cut-in device maintains the series circuit unbroken or closed, the said circuits having flexible and compressible contacts each formed of a plurality of interlocked helices, as set forth.

2. An electric switch comprising a receiving-socket, a contact-plunger for engagement

with the said socket, a series circuit, a local or loop circuit forming part of the said series circuit and broken when the plunger and socket are disengaged, the said circuits having a plurality of spaced annular contact-plates on the plunger, a plurality of contact-rings in the socket, and flexible and compressible contacts for making contact between the said plates and rings when the plunger and socket are in engagement, each of the said contacts consisting of a plurality of interlocked helices approximately oval in cross-section, as set forth.

3. An electric switch, comprising a receiving-socket of insulating material and formed on its inner face with a plurality of spaced annular recesses, a connecting-ring in each recess and connected with the circuit or line wires, a flexible and compressible contact set in each recess for contact with the ring therein, and a spring-pressed connecting-ring having a limited sliding movement in said socket, for connecting a pair of said spaced flexible and compressible contacts with each other, to keep the series-line circuit closed when the local circuit is broken, as set forth.

4. An electric switch, comprising a receiving-socket of insulating material and formed on its inner face with a plurality of spaced annular recesses, a connecting-ring in each recess and connected with the circuit or line wires, a flexible and compressible contact in each recess for contacting with the ring therein, a spring-pressed connecting-ring having a limited sliding movement in said socket, for connecting a pair of spaced flexible and compressible contacts with each other, to keep the series-line circuit closed when the local circuit is broken and a plunger of insulating material pushed into the said socket and arranged to engage said sliding ring, to move the same out of contact with one of said flexible and compressible contacts and break the

series-line circuit by way of the sliding ring, as set forth.

5. An electric switch, comprising a receiving-socket of insulated material and formed on its inner face with a plurality of spaced annular recesses, a connecting-ring in each recess and connected with the circuit or line wires, a flexible and compressible contact in each recess for contacting with the ring therein, a spring-pressed connecting-ring having a limited sliding movement in said socket, for connecting a pair of spaced flexible and compressible contacts with each other, to keep the series-line circuit closed, and a plunger of insulating material pushed into the said socket and arranged to engage said sliding ring, to move the same out of contact with one of said flexible and compressible contacts and break the series-line circuit by way of the sliding ring, said plunger having spaced annular contact-plates adapted to engage such of the flexible and compressible contacts as are out of engagement at the time with the said slidable ring, as set forth.

6. A contact device for electrical apparatus, consisting of a plurality of helices with convolutions running in opposition and with the convolutions of one helix interlocked with the convolutions of the other helix, as set forth.

7. A contact device for electrical apparatus, consisting of a plurality of helices with convolutions running in opposition and with the convolutions of one helix interlocked with the convolutions of the other helix, the helices being oval in cross-section, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PETER HEINRICH FELIX SPIES.

Witnesses:

JOHN J. O'REILLY,  
B. WOODARD.