

(No Model.)

2 Sheets—Sheet 1.

W. H. POWELL.
ELECTRIC SWITCH.

No. 569,300.

Patented Oct. 13, 1896.

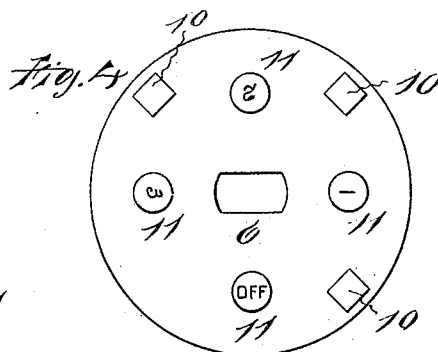
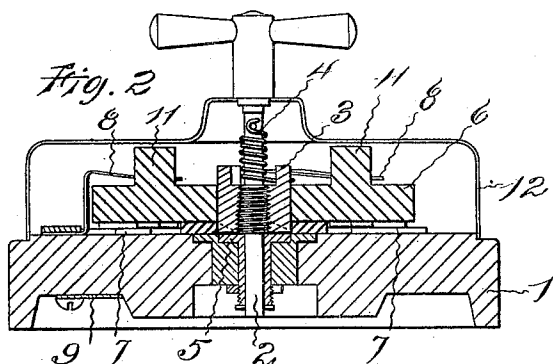
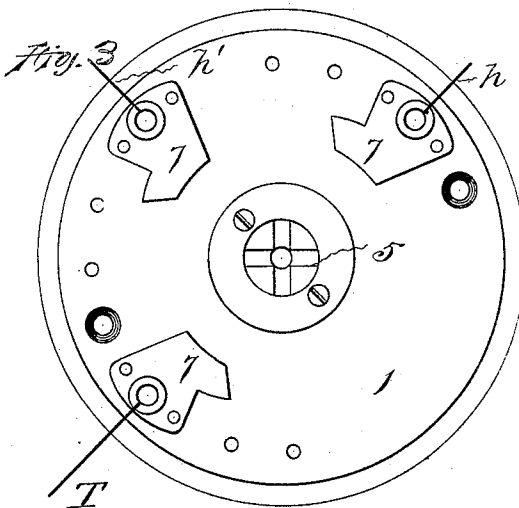
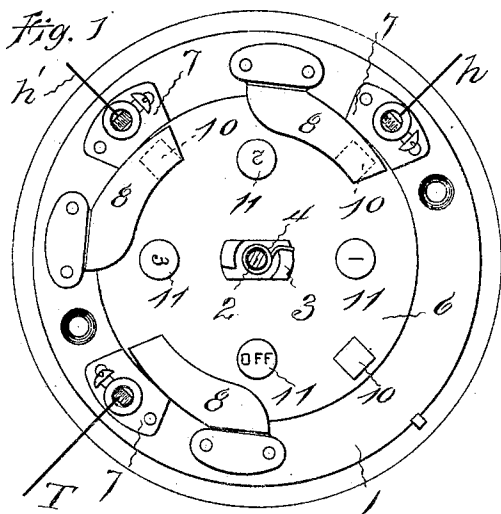
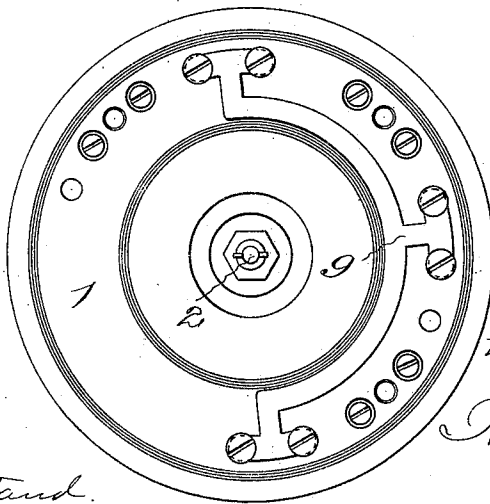


Fig. 5



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C. E. Buckland.

Inventor:

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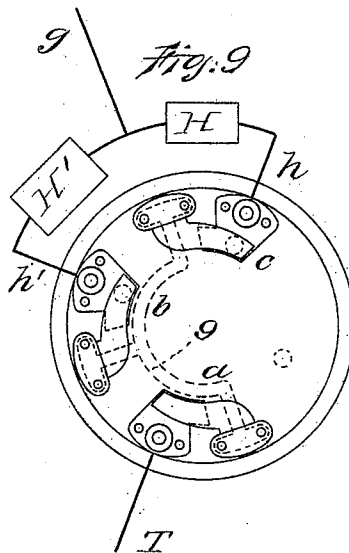
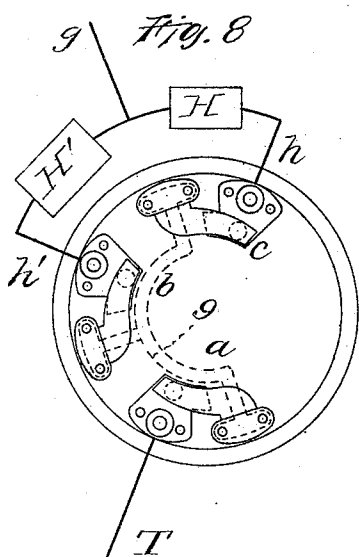
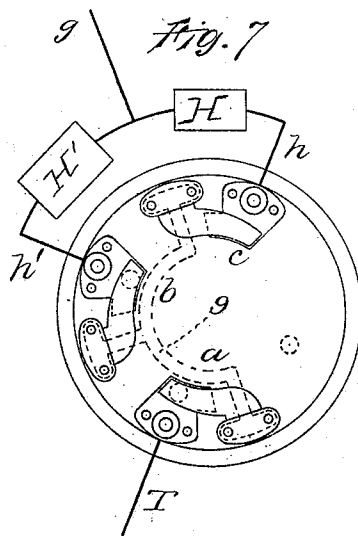
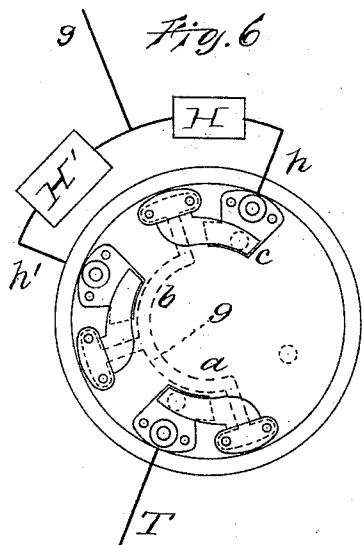
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UNITED STATES PATENT OFFICE.

WILLIAM H. POWELL, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE PERKINS ELECTRIC SWITCH MANUFACTURING COMPANY, OF SAME PLACE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 569,300, dated October 13, 1896.

Application filed February 8, 1896. Serial No. 578,514. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. POWELL, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

The invention relates to the class of electric switches that are more particularly provided for cutting off current from and directing current to electric-heater circuits such as are used in electric-railway cars; and the object is to produce a simple and cheap switch which can be so constructed and connected with the heater-circuit wires that successive movements of the handle will direct current through different heaters and combinations of heaters, whereby a number of different degrees of heat can readily be obtained by operating the single switch.

The invention resides in a switch having a base with a plural number of pairs of stationary contacts and a plural number of insulated posts located and arranged to travel a portion of a revolution around the axis of the switch each time the handle is moved and connect different combinations of the pairs of stationary contacts at the different successive positions that they occupy during a revolution, and thus closing different circuits and directing the current through different heaters or cutting off the heat entirely.

The invention is practicable for circuits provided for other purposes than heating, as for turning in different numbers of lamps in a lighting system; but it is particularly adapted for directing currents of considerable quantity and pressure, and is thus especially applicable and valuable for heater-circuits such as are used in railway-cars, and therefore the embodiment herein is illustrated and described with special reference to car heater-circuits.

In the accompanying drawings, Figure 1 is a plan of the switch with the cover and handle removed. Fig. 2 is a central vertical section of the switch. Fig. 3 is a plan of the base with the commutator-block and one set of the stationary contacts removed. Fig. 4 is a plan of the commutator-block. Fig. 5 is a

view of the under side of the base. Fig. 6 is a diagram illustrating the position of the connecting-posts when the commutator is in the first position and connecting the circuits so as to give one degree of heat. Fig. 7 is a diagram illustrating the position of the connecting-posts when the commutator is in the second position and giving an additional degree of heat. Fig. 8 is a diagram illustrating the position of the connecting-posts with the commutator in the third position and so connecting the circuits as to give a still greater degree of heat. Fig. 9 is a diagram illustrating the position of the connecting-posts when the commutator is in the fourth or "off" position, as when all the circuits are open.

In the views, 1 indicates the base, which may be made of any desired size and shape of suitable insulating material, as wood or porcelain. Supported centrally of this base is a rotary handle-spindle 2, which has a thread for a portion of its length, and upon the threaded part bears a threaded nut 3. Upon the spindle and with one end attached thereto is a spring 4, the other end of the spring being connected with the nut 3. The base beneath the nut is provided with a plate 5, that is held in place by any suitable means and that has its upper face cut in the form of segmental inclined planes, so as to form ratchet-teeth, and with indentations between them. The spring pressing between the spindle and the nut tends to rotate the nut in such manner that the nut travels down the thread and is made to engage the teeth of the plate 5 until the spindle is rotated so that the threads raise the nut out of the teeth of the plate 5 and allow the nut to move forward under the impulse of the spring until it has again run down the thread sufficiently to engage the next teeth. Supported by the nut so as to rotate with it is a block 6 of insulating material. When the handle is turned, the spring is made tense until the nut has been raised by the threads sufficiently to clear the tooth which holds it, and then the nut, under the influence of the spring, with the block, is suddenly thrown around a given distance.

The construction and operation of the

above-mentioned parts are fully shown and described in United States Letters Patent No. 517,100, dated March 27, 1894.

On the base of the switch are any desired number of stationary contacts 7, and corresponding with these contacts are other stationary contacts 8, the latter being preferably made in the form of brushes that project above the first-mentioned contacts. In the form shown there are three of the lower stationary contacts 7, all of which are provided with binding-posts for the attachment of the circuit-wires, and there are three brushes which are connected together by conducting wires or plates 9 on the under side of the base. If the binding-posts are connected with the lower contacts, as in this form of switch, the brushes should be connected together, but if the binding-posts are connected with the brushes the lower contacts should be metallically connected with each other.

Loosely held by the revoluble insulating commutator-block 6 are conducting connecting-posts 10. These posts extend through the block from top to bottom and are located and arranged so as to electrically connect the different pairs of brushes and contacts in different combinations as the block is revolved. In the form shown there are three of the connecting-posts held by the block, and these are arranged so that when in one position they connect one combination of two pairs of brushes and contacts, at another position they connect a still different pair of brushes and contacts, and at the other position they connect all three of the pairs of brushes and contacts, these different positions resulting from the successive movements of the posts as the commutator-block is intermittently revolved by the turning of the handle.

To one of the binding-posts is secured the wire T, that may lead from the trolley, if the switch is used in a car heater system, or may lead from any other source of electrical supply, and the other binding-posts have attached to them the ends of the wires *h* *h'*, that lead to the heaters II II' and then to the ground *g*. In each of the circuits *h* *h'* there may be any desired number of heaters, and the heaters of the different circuits are preferably of different capacity. In the views a single heater II is shown connected with the wire *h*, and a single heater II' of a larger size is shown connected with the wire *h'*, but of course this may represent combinations of heaters rather than single heaters.

When the handle of the switch is turned so as to revolve the insulated connecting-posts to the first position, these posts stand as shown by the dotted circles in Fig. 6, connecting the pairs of contacts and brushes *a* and *c* only, one of the posts being idle. Then the current coming from the trolley-wire or other source of supply passes through the binding-post, contact, connecting-post, and

brush at *a* and through the brush-connecting plate 9 on the under side of the base to the brush, connecting-post, and contact at *c* and out through the wire *h* to the heater II and the ground. The contact and brush at *b* being disconnected, no current can pass at this time to the heater II'. When the handle is turned to revolve the insulated connecting-posts to the next position, (that shown in Fig. 7,) the contacts and brushes at *a* and *b* are connected by the connecting-posts, the contact and brush at *c* being disconnected, and then the current passes from the wire T through the contact, connecting-post, and brush at *a* into the plate 9 and out through the brush, connecting-post, and contact at *b* to the wire *h'*, heater II', and ground-wire *g*. As the brush and contact at *c* are not connected, no current can pass when the posts are in this position to the heater II. This heater II' being larger than the heater II a greater degree of heat can be obtained when the switch is turned to this position than when it was in the first position above described. When the handle is turned to the next position, the brushes and contacts at *a*, *b*, and *c* are all joined by the connecting-posts, as indicated in Fig. 8. In this position the current entering at *a* can pass through the plate 9 and out at both *b* and *c*, for both the brushes and contacts at those points are connected by the posts, so that both or all of the heaters II II' are in use, they then being in parallel. This, of course, gives a still greater degree of heat than when the larger heater was used alone. When the handle is turned to the fourth position, as indicated in Fig. 9, the contact and brush at *a* are disconnected, so that no current will pass through the switch.

Upon the top of the block that bears the connecting-posts it is preferred to locate hubs 11, upon which may be placed the designations "1," "2," "3," and "Off," as shown in Fig. 1, and in the cover 12 there is left a small opening through which the proper designation indicating the position of the switch will show. If desired, however, the indications can be put upon a card and the card supported by the handle-spindle, so that the proper indication would show through the opening in the cover in a similar manner.

The switch is simple, cheap, and efficient. It has a very quick opening and closing movement and a large number of places of disruption of the current for a single-pole switch. At the movement from the first and second positions to the succeeding positions there are four different places of break, one at each end of both of the connecting-posts, so as to divide up and prevent any possible arc, while at the movement from the third position to "off," at which time the greatest amount of current will be passing through the switch, there are six places of break. This permits the switch to be used without danger for currents such as are in common use for operat-

ing railway systems, and with this safe construction different degrees of heat may be obtained by simply turning the handle of the switch so as to throw in the different heaters.

5 I claim as my invention—

1. A single-pole switch having a base with a plural number of pairs of contacts which are unequally spaced about the axis of the base, a handle-spindle held by the base and adapted to be given an intermittent rotation, and a plural number of insulated conducting-posts connected with and moved by the spindle and adapted to connect the pairs of contacts, said posts being equal in number to the pairs of contacts and also unequally spaced about the axis of the spindle so that different combinations of pairs of contacts are joined by the successive movements of the posts during the rotation of the handle-spindle, substantially as specified.

2. A single-pole switch having a base with a plural number of pairs of contacts, one of each of the pairs of contacts being adapted to be connected with the circuit-wires and the other of each of the pairs of contacts being electrically connected together, a handle-spindle held by the base and adapted to be given an intermittent rotation, and a plural number of insulated conducting-posts connected with and moved by the spindle and adapted to connect the pairs of contacts, said posts being located so that different combinations of pairs of contacts are joined by the successive movements of the posts during the rotation of the handle, substantially as specified.

3. A single-pole switch having a base with a plural number of pairs of contacts, a handle-spindle held by the base and adapted to be given an intermittent rotation, and a plural number of insulated conducting-posts connected with and moved by the spindle and adapted to connect the pairs of contacts, said posts being unequally placed about the axis of the spindle so that different combinations of sets of contacts are joined by the successive movements of the posts during the rotation of the handle, substantially as specified.

4. A single-pole switch having a base with a plural number of pairs of contacts, one of each of the pairs of contacts being adapted to be connected with the circuit-wires and the other of each of the pairs being electrically connected together, a rotary handle-spindle held by the base and adapted to be given an intermittent rotation, and a plural number of insulated conducting-posts connected with and moved by the spindle and adapted to connect the pairs of contacts, said posts being unequally placed about the axis of the spindle so that different combinations of pairs of contacts are joined by the successive movements of the posts during the rotation of the spindle, substantially as specified.

5. A single-pole switch having a base with a plural number of pairs of contacts, a handle-spindle held by the base and adapted to

be given an intermittent rotation, the number of movements of the handle during one revolution being greater than the number of pairs of contacts, and a plural number of insulated conducting-posts unequally spaced about the axis of the spindle with which they are connected so as to be moved by the spindle and adapted to join the pairs of contacts, said posts having a greater number of movements during one rotation of the handle than there are pairs of contacts so as to join different combinations of pairs of contacts at the successive movements of the spindle, substantially as specified.

6. A single-pole switch having a base with a plural number of pairs of contacts, a handle-spindle held by the base and adapted to be given an intermittent rotation, a plural number of insulated conducting-posts connected with and moved by the spindle and adapted to join the pairs of contacts, said posts being equal in number to the pairs of contacts but being unequally spaced about the axis of the spindle so as to join different combinations of pairs of contacts at the successive movements of the spindle, substantially as specified.

7. A single-pole switch having a base with a plural number of lower stationary contacts and a corresponding number of upper stationary contacts, a rotary handle-spindle held by the base, and an insulating-block connected with and moved by the spindle, said block bearing a plural number of conducting-posts adapted to connect the upper and lower stationary contacts, which posts are unequally spaced about the block so that different combinations of upper and lower contacts are joined by the successive movements of the posts during the rotation of the block, substantially as specified.

8. A single-pole switch having a base with a plural number of lower stationary contacts and a corresponding number of upper stationary contacts, one set of contacts bearing binding-posts for the attachment of the circuit-wires and the other set being electrically connected, a handle-spindle held by the base and being adapted to be given an intermittent rotation, and an insulating-block connected with and moved by the handle-spindle, said block bearing a plural number of conducting-posts arranged to connect different combinations of pairs of upper and lower stationary contacts as the block is intermittently moved, substantially as specified.

9. A single-pole switch having a base with a plural number of lower stationary contacts and a corresponding number of upper stationary contacts, one set of contacts bearing binding-posts for the attachment of the circuit-wires and the other set being electrically connected together, a handle-spindle held by the base and adapted to be given an intermittent rotation, and an insulating-block connected with and adapted to be moved by the spindle, the block having a greater number

of movements during one revolution around the spindle than there are sets of upper and lower contacts, said block bearing connecting-posts equal in number to the number of sets of contacts, substantially as specified.

10 10. A single-pole switch having a base with a plural number of lower stationary contacts connected with binding-posts for the attachment of circuit-wires and a corresponding
15 number of conducting-brushes that are electrically connected together, a handle-spindle held by the base and adapted to be given an intermittent rotation, and an insulating-block connected with and moved by the spindle,
15 said block bearing conducting-posts equal in number to the brushes and arranged to join different combinations of brushes and contacts as the block is intermittently moved, substantially as specified.

20 11. A single-pole switch having a base with a plural number of stationary contacts connected with binding-posts for the attachment of circuit-wires and a corresponding number of conducting-brushes that are electrically
25 connected together, a handle-spindle held by the base and adapted to be given an intermittent rotation, an insulating-block connected with and moved by the spindle, said block bearing conducting-posts equal in num-

ber to the brushes and arranged to join different combinations of the contacts and brushes as the block is intermittently moved, the block also bearing hubs with lettered indications to denote the position of the connecting-posts, substantially as specified.

35 12. A single-pole switch having an insulated circular base with three stationary contacts on its upper face connected with binding-posts for the attachment of the circuit-wires and three conducting-brushes that are electrically connected on the bottom of the base, a handle-spindle having a rotation divided into four periods, an insulating-block loosely connected with the spindle and adapted to have a four-period intermittent rotation
45 around the axis of the spindle, said block bearing three conducting-posts arranged about the block so as to join first, diametrically opposite contacts and brushes, next contiguous contacts and brushes, next three pairs of
50 contacts and brushes, and finally the other contiguous pairs of contacts and brushes, as the handle is given a revolution, substantially as specified.

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Witnesses:

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E. J. HYDE.