

(No Model.)

2 Sheets—Sheet 1.

W. H. POWELL.
ELECTRIC SWITCH.

No. 569,301.

Patented Oct. 13, 1896.

Fig. 1

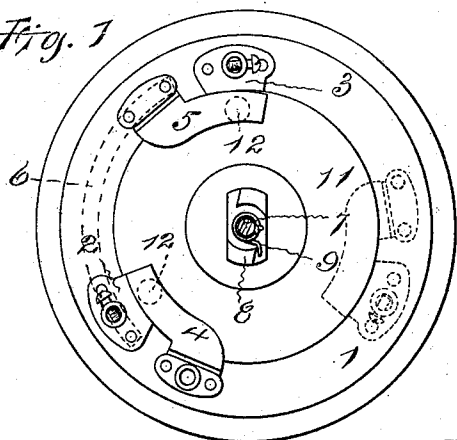


Fig. 2

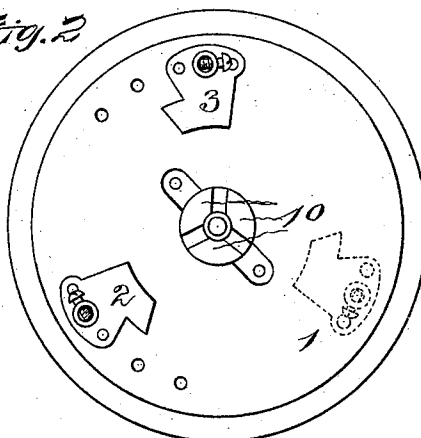


Fig. 3

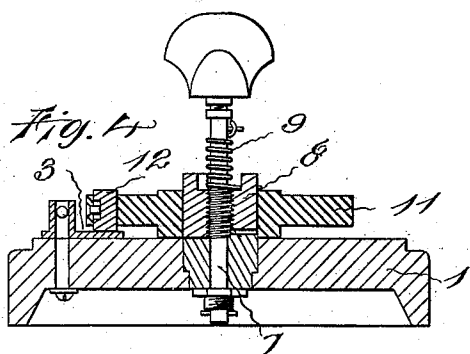
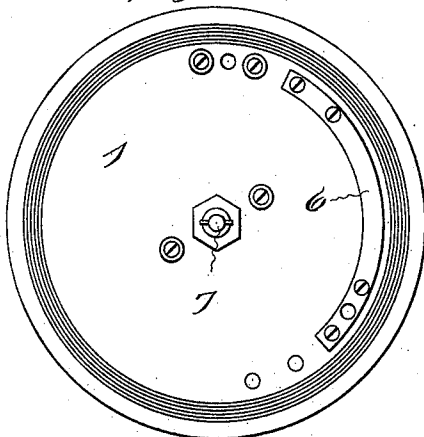
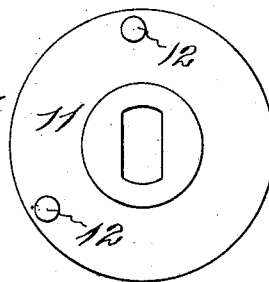


Fig. 5



Inventor:

Witnesses:

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C. E. Buckland.

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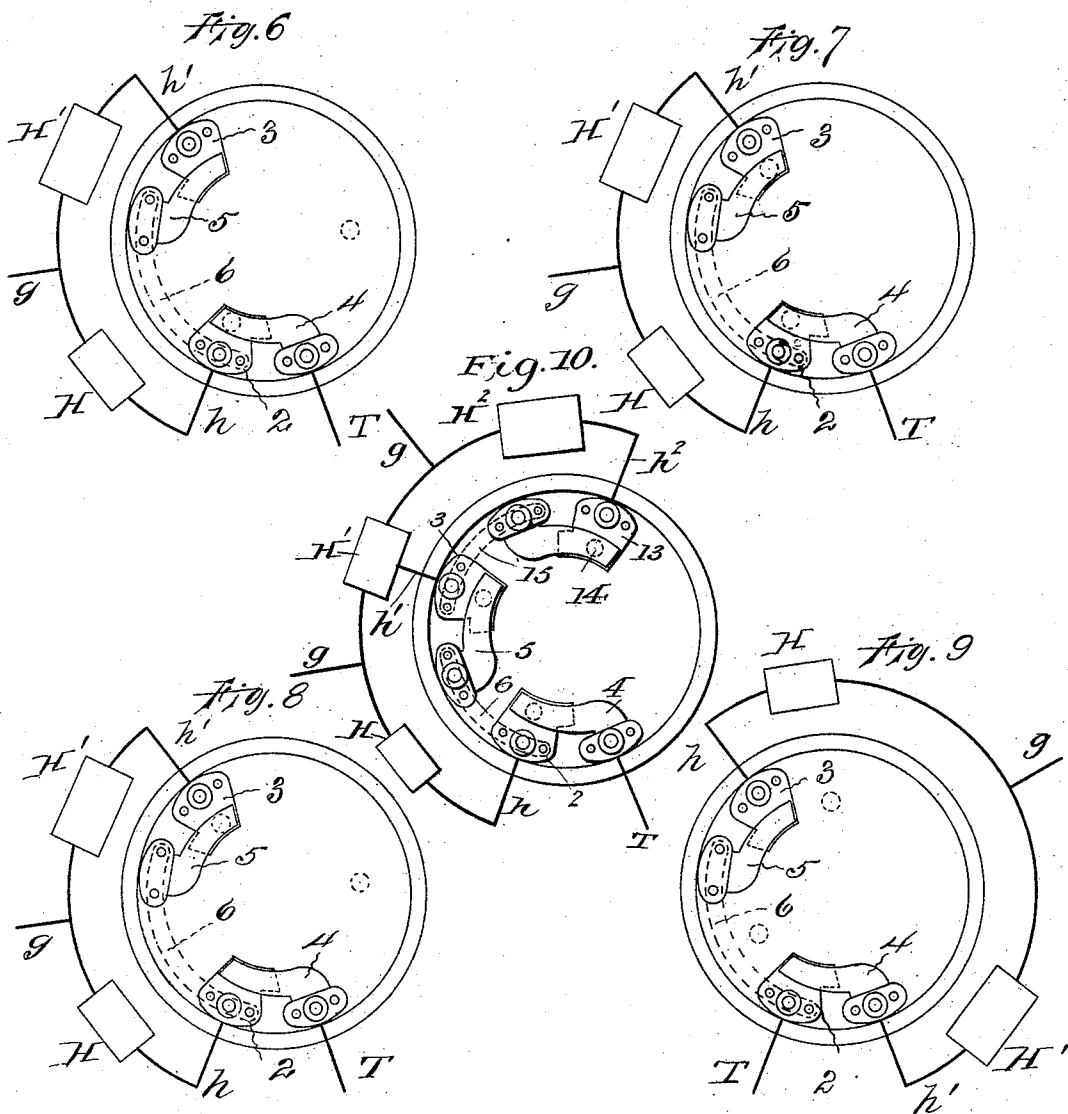
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2 Sheets—Sheet 2.

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E. J. Hyde.

C. E. Buckland

Inventor:

William H. Powell,
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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. 569,301, dated October 13, 1896.

Application filed February 8, 1896. Serial No. 578,515. (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 adapted and intended for use in connection with heating-circuits, such as are used in railway-cars, where it is desirable to be able to turn in different numbers of and different combinations of heaters to effect different degrees of heat; but of course the invention is equally applicable to other systems, such as lighting-circuits, where it is desirable to turn in different combinations of lamps.

The object of the invention is to provide a simple and cheap switch of this class that can be utilized to turn in or off different combinations of heaters or other electrical apparatus by the successive movements of the single ordinary handle, and which will have such a very quick, strong, and peculiar make and break as to insure the absence of arcing, thus enabling the switch to be effectively used without danger in circuits having electricity in considerable quantity under high pressures, such as are employed in railway systems.

To this end the invention resides in a switch having an insulating-base with a plural number of stationary contacts, some of which are electrically connected together, with a rotary handle-spindle connected with and adapted to intermittently move a number of insulated conducting-posts arranged to connect different combinations of contacts as they intermittently move with the block around the spindle, as more particularly hereinafter described, and pointed out in the claims.

Referring to the accompanying drawings, where the switch is illustrated as designed for car-heating service, Figure 1 is a plan of the switch with the cover and handle removed. Fig. 2 is a plan of the base with the commutator-block and brushes removed. Fig. 3 is a view of the under side of the base.

Fig. 4 is a vertical section of the switch. Fig. 5 is a plan of the commutator-block with the connecting-posts. Fig. 6 is a diagram illustrating the switch with the connecting-posts in one position. Fig. 7 is a diagram illustrating the switch with the connecting-posts in another position. Fig. 8 is a diagram illustrating the switch with the connecting-posts in still another position, these views showing the different circuits with different heaters that are thrown in according to the position of the connecting-posts. Fig. 9 is a diagram of the switch arranged to be worked a little differently from the other form shown in these views. Fig. 10 is a diagrammatic view of the switch arranged for three heaters, that is, one more heater than is shown in the other views.

In the views, 1 indicates the base of the switch, which may be made of wood, porcelain, or any other insulating material of any desired size and shape, but it is preferably made of porcelain of circular outline. On this base are secured pairs of stationary contacts, of which there may be any desired number. The members 2 and 3 of these pairs of contacts (shown in full lines) are flat plates provided with binding-posts for the attachment of the circuit-wires, while the members 4 and 5 of these pairs of contacts (shown in full lines) are preferably made in the form of brushes, the ends of which extend above the other contacts. The brush 4 is provided with or connected with a binding-post for the attachment of one of the circuit-wires, and the brush 5 is electrically connected with the plate 2 by a conducting plate or wire 6 on the bottom of the base, but of course this conducting-plate may, if desired, be located on the top of the base.

The contacts and brushes which are shown in dotted outline in Figs. 1 and 2 may be placed on the base to cause the switch to appear symmetrical, also to more evenly distribute the pressure of the brushes on the revolving block which carries the posts that connect the brushes and contacts.

Supported by a perforation in the center of the base is a handle-spindle 7. This spindle is shown as provided with a threaded portion

upon which is fitted a threaded nut 8. Upon the spindle and with one end connected thereto and the other end connected with the nut is a spring 9. This spring is placed under tension, so as to tend to revolve the nut on the threaded part of the spindle in such manner that the nut will run down the thread toward the base. Secured to the base about the center is a plate with a number of inclined segmental surfaces, so as to form teeth 10, which, when the nut runs down the spindle, so engage the nut as to keep it from further movement. When the spindle is turned, however, to make tense the spring, the thread draws the nut from these teeth and allows it to move forward until it runs down the thread sufficiently to engage the next tooth. Connected with this nut is an insulating-block 11, so supported as to revolve around the axis of the spindle with the nut. The construction of this locking and operating mechanism above described is more fully shown and set forth in Patent No. 517,100, dated March 27, 1894.

The block 11 bears conducting connecting-posts 12. There are preferably a less number of these connecting-posts than there are intermittent movements of the spindle and block during one revolution, but an equal number of posts to the number of pairs of active stationary contacts and brushes, and these posts are so located and arranged that when the block is revolved by the turning of the handle they connect first one pair of contacts, then another pair of contacts, and finally both pairs of contacts during one revolution, in order to throw in the different circuits for accomplishing the object desired.

When the posts are in one position, as illustrated in Fig. 6 by the dotted circles, the current will enter from the wire T, leading from the trolley or other source of electrical supply, and pass through the brush 4, one of the posts and the contact 2 to the circuit-wire *h*, and thence to the heater II and the ground *g*. As there is no connection at this time between the brush 5 and the contact 3, no current can pass through them to the heater II'. This gives one degree of heat. When the handle is turned and the block is moved from this position to the next position, the posts stand as illustrated in Fig. 7. When the posts are in this position, they join the brushes 4 and 5 with the contacts 2 and 3, so that current entering from the wire T can pass through the brush 4, connecting-post, and contact 2, and out through the wire *h* to the heater II, and at the same time it can pass through the plate 6 to the brush 5, through the connecting-post and contact 3 to the wire *h'* and heater II'. Thus the two heaters II and II' will be in parallel, giving, of course, much more heat than when but one of the heaters was used, as when the posts were in the first position. When the handle is again turned, the block moves the connecting-posts so that

they stand in the positions indicated in Fig. 8. When the posts are in this position, there is no connection whatever between the brush 4 and the contact 2. Therefore the circuit will be open and no current can pass to the heaters. This position is of course the "off" position of the switch. With this arrangement and connection of the wires the switch has three positions or snaps, two degrees of heat being obtained, first when one heater is being used, then when two heaters are used in parallel, the final snap being that which cuts off the current from both the heaters.

If the plate 10 with the ratchet-teeth is divided into six parts instead of three, as above described, the rest of the construction of the switch being the same, there will be six snaps or positions for the switch during one revolution, that between each movement above described being an off position, for with every half-movement the connecting-posts will stop between the brushes, for they would make but one-half of the movement of the construction previously described. If with this arrangement the heaters and wires are connected as shown in Fig. 9, three degrees of heat can be obtained.

As can clearly be seen, if the trolley or supply wire T is connected with the contact 2 and the heater-wires are connected with the binding-posts at 3 and 4, when the posts are in what has been called the "third" position, the heater II will be thrown in. With this arrangement the current will pass through the contact 2, the plate 6, brush 5, connecting-post and contact 3, wire *h*, and heater II to the ground *g*. When this switch is moved from this position, the block, taking only a half-movement, disconnects all of the brushes and contacts. Then the next movement will bring the connecting-posts so as to join the brush 4 and the contact 2. Then the current will pass through the contact 2, connecting-post, brush 4, wire *h'*, and heater II' to the ground *g*. As there is no connection between the brush 5 and contact 3 no current will pass through the heater II. The next turn of the handle throws the block so the posts disconnect all of the brushes and contacts. Then the next turn of the handle throws the block so that the posts connect both contacts 2 and 3 with brushes 4 and 5. With these connected the current will pass both ways from the contact 2 through the heater II and the heater II', putting them in parallel. The final movement, then, of course will again disconnect all of the brushes and contacts. With the switch wired in this manner and having six periods of intermittent movement during one revolution instead of three allows of three degrees of heat being obtained. The heater II' can be larger than the heater II, so that the first degree of heat will be obtained by the use of the heater or group of heaters II, the second degree by the use of the heater or group of heaters II', and the third degree of

heat will be obtained by the use of both H and H' in parallel, the off positions resulting from the stop of the block with the posts out of connection with any of the brushes and contacts.

In Fig. 10 an arrangement of the switch is shown in which three heaters can be utilized. The addition of heaters only requires the addition of more contacts and brushes. For each additional heater one set of contact and brush can be added, the added brush being connected with the adjacent contact. In this Fig. 10 the arrangement is exactly similar to that shown in Fig. 6, with the addition of the contact 13, brush 14, and connection 15 between the brush 14 and contact 3. The additional heater H² is connected by the wire h² with the contact 13, and the ground-wire may lead to any ground. For each additional heater add to the base a set of contact and brush and to the block a connecting-post connecting the brush to the preceding contact. Any number of heaters can be added in this manner within the capacity of the base to receive the contacts and brushes necessary and block to hold the connecting-posts.

A switch constructed in this manner is simple, cheap, readily located and connected with heater-circuits, and obviously operated by any one so that a simple turn of the handle will throw in such circuits that the desired degree of heat in a system may be obtained. There are a number of points of break between the ends of the connecting-posts and the different contacts, and the movement is very sudden, so that the switch is particularly adapted to heavy currents, such as are used in railway systems and are desirable for heating-circuits.

I claim as my invention—

1. In a single-pole switch, in combination, a base bearing a plural number of contacts and brushes, one of said contacts being permanently electrically connected with one of said brushes, a handle-spindle supported by the base and adapted to be given an intermittent rotation, and insulated connecting-posts connected with and intermittently moved by the spindle, said connecting-posts being arranged at different intervals about the axis of the spindle so as to join first one set, then more than one set of contacts and brushes as they revolve around the spindle, substantially as specified.

2. In a single-pole switch, in combination, a base with sets of stationary contacts and brushes unequally spaced about the axis of the base and a handle-spindle adapted to be given an intermittent rotation of more periods during one revolution than there are sets of stationary contacts and brushes, and connecting-posts connected with and moved intermittently by the handle, there being the same number of connecting-posts as there are sets of contacts and brushes and said

posts being spaced in the same unequal manner as the sets of contacts and brushes, substantially as specified.

3. In a single-pole switch, in combination, a base bearing stationary contacts and brushes and a handle-spindle adapted to be given an intermittent rotation, and two connecting-posts connected to and intermittently movable with the spindle, the sets of contacts and brushes being arranged unequally about the base and the connecting-posts being arranged unequally about the axis of the spindle which has more intermittent movements during one revolution than there are connecting-posts, substantially as specified.

4. In a single-pole switch, in combination, a base with a plural number of lower stationary contacts and a plural number of upper stationary brushes, one of the brushes being electrically connected with one of the contacts, a handle-spindle supported by the base and adapted to be given an intermittent rotation, insulated connecting-posts having an intermittent movement around the axis when the spindle is turned, said posts being arranged at unequal intervals about the spindle so as first to connect certain sets of contacts and brushes then other sets of contacts and brushes and finally all of the sets of contacts and brushes during one revolution around the spindle, substantially as specified.

5. In a single-pole switch, in combination, a base bearing a pair of lower stationary contacts and a pair of upper stationary brushes, one of said contacts being permanently connected with one of said brushes, a handle-spindle adapted to be given an intermittent rotation, an insulating-block connected with and rotated by the spindle, two connecting-posts arranged near the periphery of the block and adapted to connect the pairs of contacts and brushes, each successive movement given to the connecting-posts being less than the distance between the two points of contact between the contacts and brushes whereby during one revolution of the block the posts between the cutting in of each different circuit cut off the circuits altogether, substantially as specified.

6. In a single-pole switch, in combination, a base bearing a plural number of contacts and a plural number of brushes, one of said contacts being permanently electrically connected with one of said brushes, a handle-spindle supported by the base and adapted to be given an intermittent rotation, and an insulated connecting-post connected with and intermittently moved by the spindle, said connecting-post being arranged so as to join different contacts and brushes during a revolution around the spindle, substantially as specified.

7. In a single-pole switch, in combination, a base bearing a plural number of contacts and brushes, some of said contacts being per-

manently electrically connected with some of
said brushes, a handle-spindle supported by
the base and adapted to be given an intermit-
tent rotation, and insulated connecting-posts
5 connected with and intermittently moved by
the spindle so as to first join one set then the
other sets in addition as the connecting-posts

revolve around the spindle, substantially as
specified.

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Witnesses:

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E. J. HYDE.