(No Model.) 3 Sheets—Sheet 1.

J. F. McELROY.

ELECTRIC SWITCH.

No. 499,363. Patented June 13, 1893.

Fig. 1.

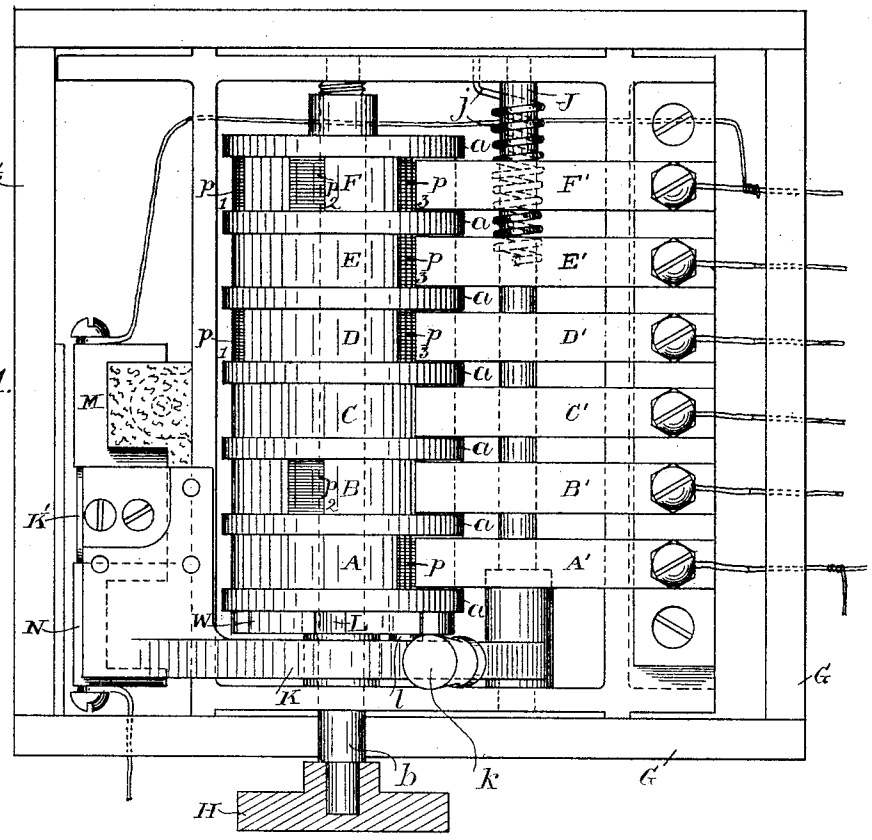
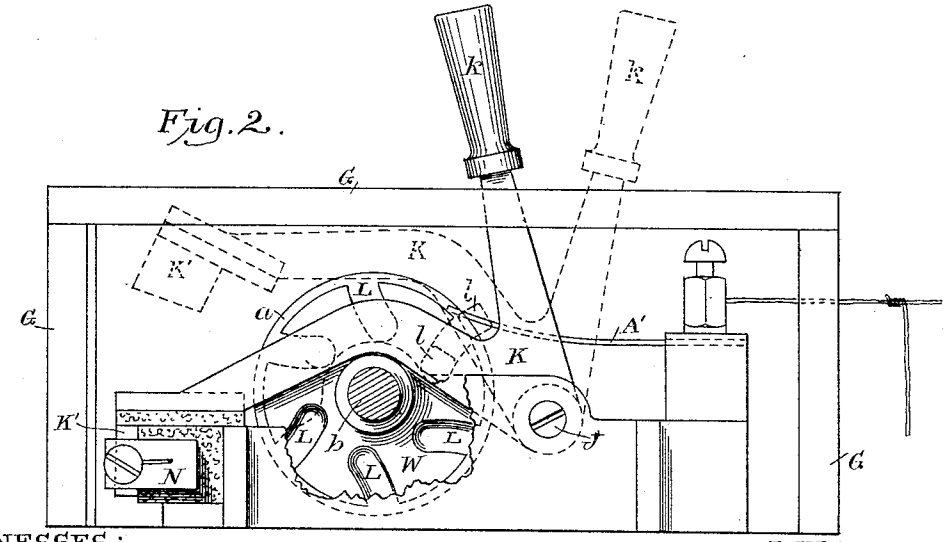


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

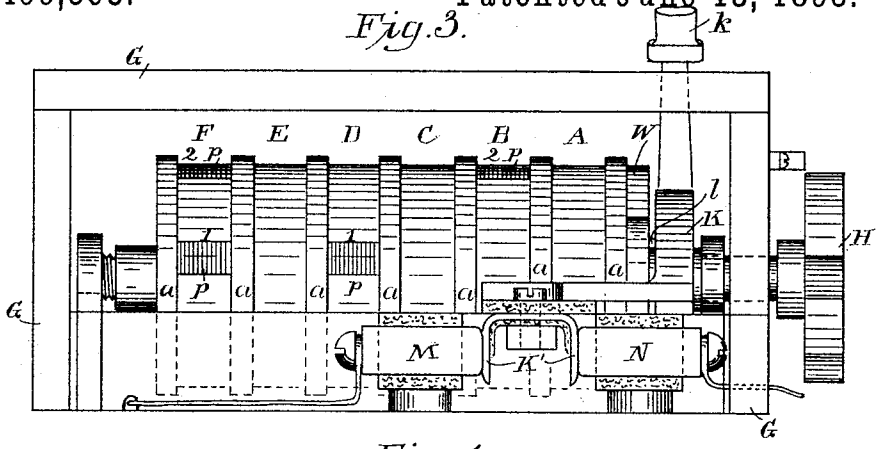


Fig. 4.

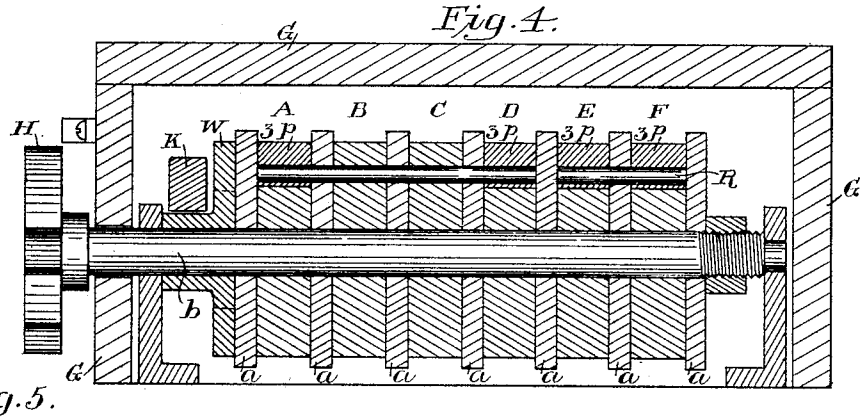
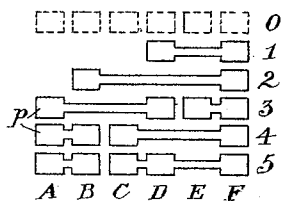


Fig. 5.



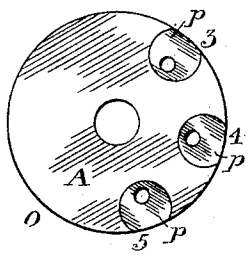
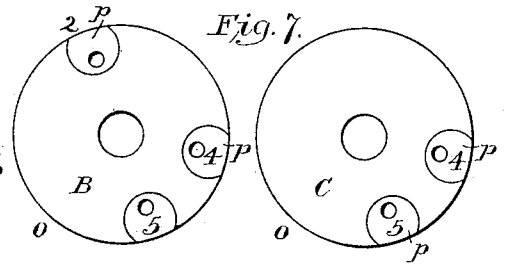
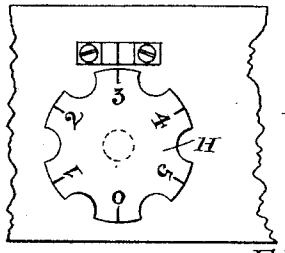


Fig. 7.





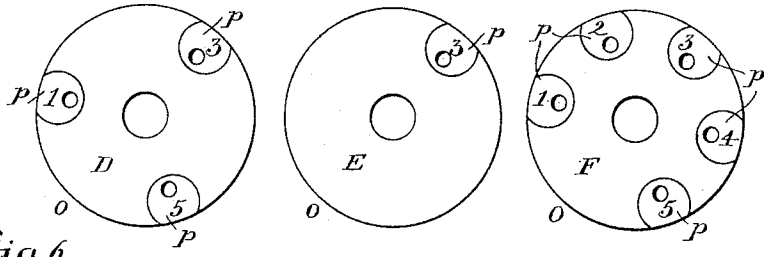


Fig. 6.

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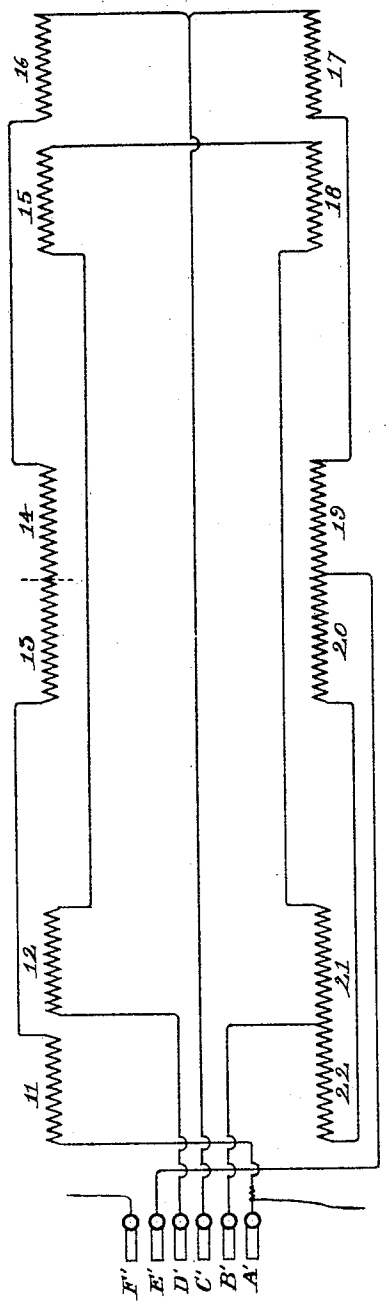
ELECTRIC SWITCH.

No. 499,363. Patented June 13, 1893.

Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK, ASSIGNOR TO THE CONSOLIDATED CAR-HEATING COMPANY, OF WHEELING, WEST VIRGINIA.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 499,363, dated June 13, 1893.

Application filed November 16, 1892. Serial No. 452,137. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing in the city and county of Albany, State of New York, have invented a new and useful Electric Switch, of which the following is a specification.

My invention relates to improvements in mechanism for directing the current of electricity; and the object of my invention is to provide an electric switch particularly adapted for use in mechanism for heating with electricity cars propelled by electricity. I accomplish this object by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan. Fig. 2 is an end elevation. Fig. 3 is a side elevation. Fig. 4 is a longitudinal section. Fig. 5 is a detail view showing the connections between the disks of the cylinder. Fig. 6 is an end elevation of the knob H; Fig. 7 detail views of the disks of the cylinder, and Fig. 8 is a view of the wiring in the car.

Similar letters and numerals refer to similar parts throughout the several views.

I construct a cylinder composed of a series of disks A, B, C, D, E and F made of any suitable non-conducting substance of any suitable nature. These disks are separated from each other by means of narrow partitions *a* extending slightly above the disks, also composed of a suitable insulating material. The cylinder is suitably mounted upon a spindle *b*, which is journaled within the box G and which has at one end keyed to it, the knob H. At one end of the cylinder and secured thereto, I arrange the notched wheel W.

Within the box G, I mount the rocking shaft J carrying a spiral spring *j*, and having pivoted to it, the bell-crank lever K. One end of the lever K is provided with a handle *k*; the opposite end carries the metallic disk K′. One side of the arm of the lever which carries the disk K′, is provided with a stud *l* constructed to engage with the openings L in the wheel W when the disk K′ is between the posts M and N. The disk K′ is constructed to fit snugly between the metallic posts M N; the posts M and N are insulated from the box and cylinder, as is also the disk K′ from the lever K. The post N is connected by wire to one pole of the battery, or where it is used upon an electric car, to the trolley. The post M is connected by a wire to a metallic spring F′; the spring F′ being attached to an insulated bolt in the frame of the box at one end, its other end being in contact with the disk F of the cylinder. In a similar way, the springs E′, D′, C′, B′, and A′ are arranged in contact with the corresponding disks of the cylinder.

Each of the disks of the cylinder is provided with one or more metallic plugs *p*, as shown in Figs. 1, 3, 4 and 7. A metallic rod R is used when it is desired to unite these metallic plugs in various series, as shown in Fig. 4. Thus in disk A, there are three plugs; the disk B contains three plugs; the disk C two; the disk D three; the disk E one; the disk F five. By referring to Fig. 5, the letters at the bottom of the figure refer to the disks and show by the number of squares in the upright column, in full lines, the number of metallic plugs in each disk. The figures at the right of Fig. 5 refer to the various series of metallic plugs in the disks and show how they are connected.

I have indicated on Figs. 1, 3, 4 and 7, the positions of the various plugs and numbered them according to which series they belong. Thus in Fig. 1, at the top of the cylinder, is seen series 1, lower down is series 2, while the springs are in contact with series 3.

Fig. 4 shows the connection of the plugs of the third series, in which the plug in the disk A is connected with the plug in the disk D by means of the rod R; and the plug in the disk E is connected in the same manner with the plug in the disk F. Thus the current passing from the trolley to the post N passes through the disk K′ to the post M and is carried to the spring F′, see Fig. 1, thence to the plug in the disk F; from thence it is conducted by the connecting rod R to the disk E; thence through the spring E′ to the heater in the car, Fig. 8, carried by wires of the heater and returns to spring D′ and plug in disk D and is conducted to plug in the disk A, from whence it passes to the ground.

By the operation of the bell-crank lever K, the circuit is made or broken. When the cir-

cuit is complete, the disk K′ being in position between the posts M and N, the cylinder is locked, the lug *l* within the wheel W preventing the oscillation of the cylinder, and in order to change the position of the cylinder and thereby operate the switch, it is necessary to first break the circuit by operating the lever.

The numbers on the knob H, shown in Fig. 6, indicate the position of the cylinder, and after the lever is drawn back, the cylinder may be revolved by means of the knob to the position indicated by the figures, and then the circuit may be made and the switch will be in operation. By this construction of the switch, I prevent sparking at the spring contact with the cylinder, which would take place if the circuit were made when the cylinder was revolved and I make and break the circuit at a point above the cylinder, which is controlled by the lever.

It will be noticed that the lever performs a double function, first that of breaking the circuit, and second that of locking the rotary cylinder in a position so that it cannot be turned until after the circuit is broken. It moreover makes it impossible to close the circuit through the switch when the cylinder is not in its proper position.

Referring to Fig. 8, the location of the heaters in the car are so arranged that they are symmetrical with regard to their location to each other and to their position in reference to the heating surface of the car.

I describe one adaptation of my switch, that connected with heating by electricity, and which is more particularly described and claimed in an application for a patent filed simultaneously herewith.

The heaters in the car are numbered 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22, all connected together and placed two at each end and two in the center of each side of the car; the spring A′ being connected with heater 11; B′ with heaters 21 and 22; C′ with heaters 16 and 17; D′ with heater 12; E′ with heaters 19 and 20. By this arrangement of the heaters and their connections when the springs D′ and F′ are in contact with the plugs in disks D and F, as shown on series 1, the current passes first to heater 12, then to heaters 15, 18, 21, 22, 20, 19, 17, 16, 14, 13 and 11 and through the ground wire at A′ out, having twelve heaters in the series. When the second series is in connection, the current passes from spring B′ to heaters 22, 20, 19, 17, 16, 14, 13 and 11, having eight heaters in series. When the third series is in connection, the current passes from spring E′ to heaters 19, 17, 16, 14, 13 and 11 and heaters 20, 22, 21, 18, 15 and 12, making two series of six heaters each. When the fourth series is in connection, the current passes from the spring C′ to heaters 16, 14, 13 and 11 and heaters 17, 19, 20 and 22, making two series of four heaters each. When the fifth series is in connection, the current passes from spring D′ to heaters 12, 15, 18 and 21 and from spring C to heaters 16, 14, 13 and 11 and 17, 19, 20 and 22, making three series of four heaters each. In the first position all of the heating surface within the car is placed in series. In the second position 2—3 is placed in series. In the third position, the total heating surface is divided into two equal parts, and these parts are placed in multiple with reference to each other. In the fourth position, 2—3 of the heating surface is divided into two equal parts and these parts are placed in multiple with reference to each other. In the fifth position, the total heating surface is divided into three equal parts and these parts are placed in multiple with reference to each other.

In heating up a car, I preferably place the switch in the fifth position, allowing a large current to flow through the heater; hence I obtain a rapid heating of the car. As the car becomes warm ready to go on the road, I then turn the switch in one of the other positions requiring less current; the position of the switch depending upon the temperature of the outside air. As the flow of current commences, the heating effect may be varied in this manner. Thus I am enabled to set the switch so as to give just the heat required to make a car comfortable in any weather.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electric switch, a cylinder composed of a series of disks constructed of a non-conducting substance, a spindle upon which said cylinder is mounted, a metallic plug placed in one or more of said disks, a means for connecting said metallic plug or plugs with an electric heater together with a means for connecting said metallic plug or plugs with the poles of a battery, substantially as described and for the purpose set forth.

2. In an electric switch, a cylinder composed of a series of disks constructed of a non-conducting substance, each disk containing one or more metallic plugs, said metallic plugs arranged in series, metallic connections between said disks of the cylinder and wires connected with an electric heater, a means for connecting the current of electricity to said metallic connections, with a ground wire extending from one of said metallic connections, substantially as described and for the purpose set forth.

3. In an electric switch, a cylinder composed of a series of non-conducting disks, each disk containing one or more metallic plugs, a spindle upon which said cylinder is mounted, a series of metallic springs in contact with said disks, one of said springs attached to a wire carrying the current of electricity to the switch, one of said springs attached to a wire connected with the ground, substantially as described and for the purpose set forth.

4. An electric switch composed of a series

of non-conducting disks, one or more metallic plugs placed in each disk, said disks arranged in a cylinder in such a manner that the metallic plugs are in series, a series of metallic conductors arranged to come into contact with said metallic plugs in the course of the revolution of the cylinder, in such a manner that all of the metallic plugs in each series will be in contact with their corresponding conductors simultaneously with a means of connecting said metallic plugs to each other, substantially as described and for the purpose set forth.

5. In an electric switch, the combination of a cylinder composed of a series of non-conducting disks, one or more metallic plugs placed in each disk, said disks arranged in such a manner that the metallic plugs are in series, a series of metallic conductors arranged to come into contact with said metallic plugs in the course of the revolution of the cylinder, in such a manner that all of the metallic plugs in each series will be in contact with their corresponding conductors simultaneously, with a means of connecting said metallic plugs to each other, a spindle upon which said cylinder is mounted, said spindle journaled in a suitable frame, with a knob at the end of said spindle by means of which the cylinder may be rotated, substantially as described and for the purpose set forth.

6. An electric switch, consisting of a cylinder composed of a series of non-conducting disks, one or more metallic plugs in each of said disks, said disks arranged in such a manner that the metallic plugs are in series, a series of metallic conductors arranged to come into contact with said metallic plugs in the course of the revolution of the cylinder, in such a manner that all of the metallic plugs in each series will be in contact with their corresponding conductors simultaneously, with a means of connecting said metallic plugs to each other, a spindle upon which said cylinder is mounted, said spindle journaled in a suitable frame, with a knob at the end of said spindle by means of which the cylinder may be rotated, a rocking shaft mounted in said frame, a bell-crank lever secured to said rocking shaft, a metallic disk on one arm of said bell-crank lever adapted to make and break the circuit by entering and leaving the space between the two poles of the switch, substantially as described and for the purpose set forth.

7. In an electric switch, the combination of a cylinder composed of a series of non-conducting disks, one or more metallic plugs placed in each disk, said disks arranged in a cylinder in such a manner that the metallic plugs are in series, a series of metallic conductors arranged to come into contact with said metallic plugs in the course of the revolution of the cylinder, in such a manner that all of the metallic plugs in each series will be in contact with their corresponding conductors simultaneously, with a means of connecting said metallic plugs to each other, one end of said cylinder provided with a wheel with a notched or corrugated periphery, a lever mounted upon a shaft, said shaft suitably journaled in the frame of the switch, one arm of said shaft provided with a lug fitted to engage in the notches or corrugations of said wheel, by means of which said cylinder may be locked, with a disk at the end of said lever-arm adapted to fit between the poles of the switch, substantially as described and for the purpose set forth.

8. In an electric switch, the combination of a suitable frame, a metallic post insulated from said frame connected with the electricity bearing wire, a similar metallic post insulated from said frame and separated from first mentioned post a short distance and connected by wire to a metallic conductor, a rocking shaft mounted in said frame carrying a pivotally connected lever, a metallic disk secured to said lever, but insulated therefrom, capable of fitting snugly between said metallic posts, a cylinder mounted upon a spindle journaled in said frame, a wheel secured to one end of said cylinder having a notched periphery, a lug protruding from said lever capable of engaging with the notches in said wheel, said cylinder composed of a series of disks, each carrying one or more metallic plugs, with a series of metallic conductors resting upon said disks and coming into contact with said metallic plugs as the cylinder is revolved, one of said metallic conductors connected by wire to the ground, or to the negative pole of the battery, substantially as described and for the purpose set forth.

9. In an electric switch, the combination of a cylinder composed of six metallic disks, a metallic conductor in contact with each of said disks—three of said disks containing each three metallic plugs, one of said disks containing two metallic plugs, one containing five metallic plugs and one containing one metallic plug arranged in such a manner that the disks and plugs form five series of circuit connections in the first of which the metallic plugs in the fourth and sixth disks shall be connected together by a metallic rod and be brought simultaneously in contact with their respective metallic conductors, in the second the metallic plugs in the second and sixth connected by a metallic rod and be brought simultaneously in contact with their respective metallic conductors, in the third the metallic plugs in the first and fourth will be connected by a metallic rod and fifth and sixth connected by a metallic rod and be brought simultaneously in contact with their respective metallic conductors, in the fourth the first and second connected by a metallic rod and third and sixth connected by a metallic rod and be brought simultaneously in contact with their respective metallic conductors, in the fifth the first and second connected by a metallic rod, third and fourth connected by a metallic rod and the fourth and sixth connected by a

metallic rod and be brought simultaneously in contact with their respective metallic conductors, the current supply wire connected with one of said metallic conductors, an out wire connected to another of said metallic conductors, a means for making and breaking the circuit between the poles of the switch, substantially as described and for the purpose set forth.

10. In an electric switch, the combination of a rotary cylinder, a lever K suitably mounted, a disk K′ placed at the end of said lever K adapted to fit between the poles M, N, of the switch, a wheel W keyed to the shaft upon which said cylinder is mounted, the current through the switch made and broken by the operation of said lever, so arranged that the cylinder cannot be rotated without operating the lever K, substantially as described and for the purpose set forth.

JAMES F. McELROY.

Witnesses:
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WILLIAM P. EDDY.