

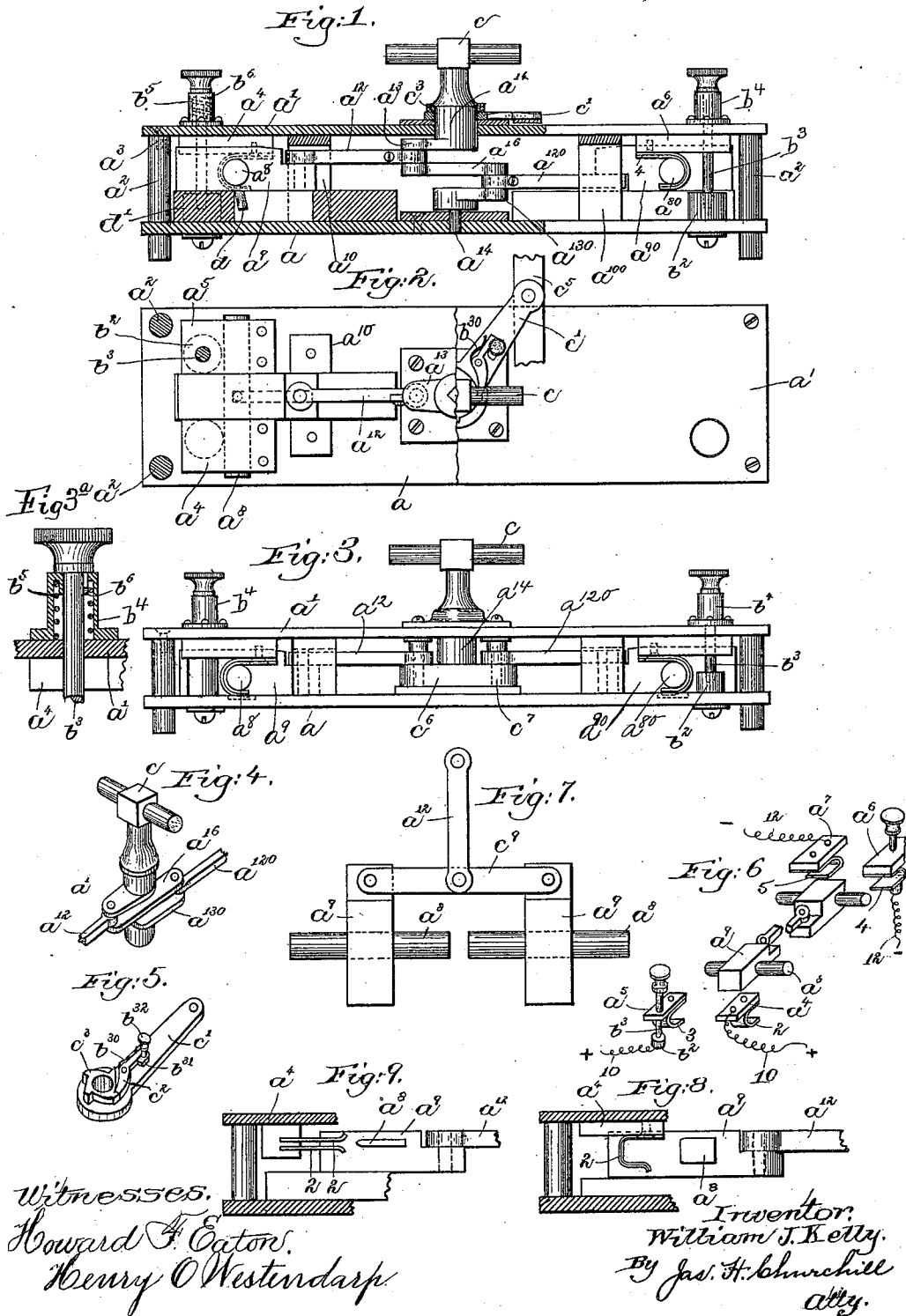
(No Model.)

2 Sheets—Sheet 1.

W. J. KELLY.
ELECTRIC SWITCH.

No. 466,244.

Patented Dec. 29, 1891.



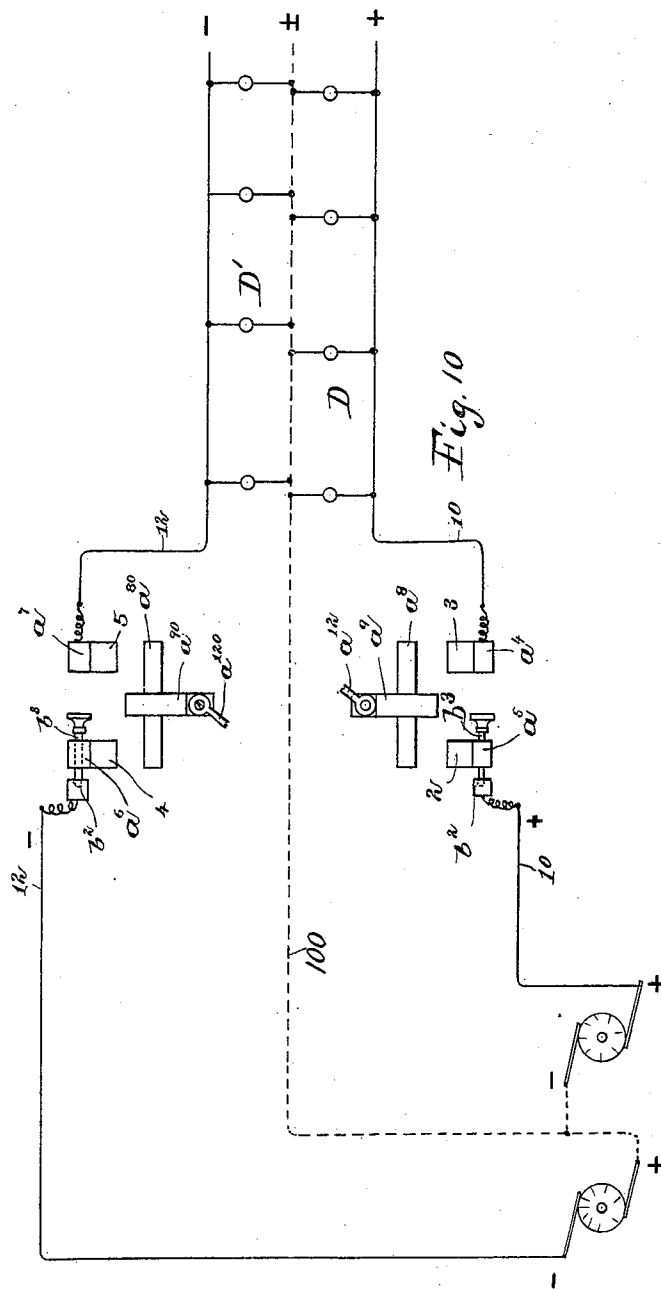
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Witnesses,

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UNITED STATES PATENT OFFICE.

WILLIAM J. KELLY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO JOHN P. CUSHING, OF SAME PLACE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 466,244, dated December 29, 1891.

Application filed June 29, 1891. Serial No. 397,796. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. KELLY, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to a circuit-controlling device or switch for electric circuits, and has for its object to provide a simple, cheap, and efficient switch.

My improved form of circuit-controlling device or switch is especially adapted, among other things, to be used in connection with the well-known three-wire system of electric lighting. In accordance with my invention two contact-plates or circuit-terminals have co-operating with them a circuit-terminal or contact member secured to a straight-line reciprocating or sliding contact-carrier, preferably made as a bar, the said contact-carrier being joined by a connecting-rod to a crank on a disk or shaft, as will be described, the said shaft or disk being operated to produce reciprocations of the contact-carrying bar to close and open the circuit. The contact-carrying bar will preferably be connected to a crank on a shaft capable of a complete revolution, as will be described, whereby a series or plurality of switches may be operated simultaneously by the movement of a single actuating device, as will be described. One of the circuit-terminals or contact members referred to, and with which the contact-carrying bar co-operates, is preferably composed of a stationary member and a movable member, the movable member being adapted to be withdrawn from its co-operating stationary member, so that the line-circuit may be opened positively by hand irrespective of the position of the contact member on the reciprocating bar. This feature is especially advantageous when my improved form of switch or circuit-controlling apparatus is used in connection with the well-known three-wire system of electric lighting, whereby any desired number of lamps may be cut out of circuit without interfering with the operativeness of the switch.

The other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a partial section and side elevation of a circuit-controlling device or switch embodying my invention. Fig. 2 is a top or plan view, partially broken out, of the switch shown in Fig. 1; Fig. 3, a side elevation of the modified form of switch; Fig. 3^a, a detail to be referred to; Figs. 4 and 5, details to be referred to; Fig. 6, a diagrammatic view in perspective of parts of the switch shown in Fig. 1; Fig. 7, a modification to be referred to; Figs. 8 and 9, details of modified forms of circuit-terminals, and Fig. 10 a diagram of circuits to more clearly illustrate my invention.

Referring to Fig. 1, the main parts of my improved circuit-controlling device or switch are shown as located between and secured to a bottom plate *a* and a top plate *a'*, of insulating material, separated from each other by suitable posts *a²*, firmly secured to the bottom plate *a*, and to which posts the top plate *a'* is secured, as by screws *a³*. (See dotted lines, Fig. 1.) The top plate *a'* has secured to it near its opposite ends two sets of circuit-terminals *a⁴ a⁵ a⁶ a⁷*, (shown best in Fig. 6,) the said circuit-terminals, as represented in the said figure, being provided with curved contact-arms 2 3 4 5. The circuit-terminals *a⁴ a⁵* have co-operating with them a contact member, (shown in Figs. 1 and 2,) as a circular rod *a⁸*, extended through an insulating-bar *a⁹*, movable in suitable guides *a¹⁰*, secured to or forming part of the bottom plate *a*, and the circuit-terminals *a⁶ a⁷* have co-operating with them a like contact member or rod *a⁸⁰* on an insulating-bar *a⁹⁰*, movable in suitable guides *a¹⁰⁰* on the bottom plate *a*. The switch is herein shown as a double-pole switch, in which the contact-bars *a⁸ a⁸⁰* and their carriers *a⁹ a⁹⁰* form the movable members of the switch.

The contact-carrying bars *a⁹ a⁹⁰* in accordance with my invention have imparted to them a straight-line reciprocating or sliding motion, which may be accomplished by joining the said contact-carrying bars by means of links or connecting-rods *a¹² a¹²⁰* to cranks *a¹³ a¹³⁰* on a shaft *a¹⁴*, the shaft *a¹⁴* having bearings in the top plate *a'* and in the bottom

plate a , the crank a^{130} being joined by a rod or link a^{16} to the crank a^{13} . One circuit-terminal of each set of circuit-terminals is made in two parts, one of which is capable of being disengaged from the other, so that the circuit may be opened when the contact members a^8 a^{80} are in contact with their respective circuit-terminals.

As herein represented, the circuit-terminals a^5 a^6 are composed of two parts or members, one part or member b^2 of each terminal being herein shown as a hub secured to the bottom plate a , and to which one half or part of the line-wire is connected. The other member of each circuit-terminal a^5 a^6 is shown as a rod b^3 , extended up through the top plate a' . The member b^2 of each circuit-terminal a^5 a^6 is preferably made hollow or cup-shaped to receive the end of the rod or bar b^3 , forming the other part or member of the circuit-terminal. The bar or rod b^3 is preferably extended up through a suitable sleeve b^4 , secured to the top plate a' , and the said bar or rod within the sleeve b^4 is preferably encircled by a spring b^5 , (see Figs. 1 and 3^a,) the said spring normally acting to force the member or rod b^3 down into contact with the member b^2 of the circuit-terminal. The rod or bar b^3 has secured to or forming part of it a pin b^6 , adapted to enter a longitudinal slot in the sleeve b^4 , so that the rod b^3 , when drawn out of its sleeve, may be locked by rotating it to place the pin b^6 out of line with the slot in the sleeve, and thus hold the member or rod b^3 out of contact with its co-operating member b^2 , and thereby open the line-circuit at that terminal.

As shown in Fig. 1, the cranks a^{13} a^{130} are placed at substantially one hundred and eighty degrees, so that both contact-carrying bars may be reciprocated in the same direction at a single movement of the crank-shaft a^{14} . The crank-shaft a^{14} may be revolved by means of a suitable handle c , or it may be revolved through the instrumentality of an arm c' , loose on the shaft a^{14} and provided with a pawl c^2 , adapted to engage a ratchet-wheel c^3 , fast on the shaft a^{14} , the said pawl being adapted to be locked in engagement with the ratchet-wheel by a locking device shown as a spring b^{30} , the said pawl being removed from engagement with the ratchet-wheel by a disengaging device, shown as a cam or projection b^{31} on a pin b^{32} , pivoted to the arm c' . This construction is especially advantageous when a series of the switches are adapted to be operated simultaneously by movement of a single actuating device, such as a bar c^5 , to which the arms c' are connected.

When a series of the switches are connected to the actuating-bar c^5 , the construction shown in Fig. 1, in which the crank-shaft is employed, is preferred; but when it is desired to operate each switch by hand a crank-disk c^6 —such as shown in Fig. 3—may be employed, the connecting-rods a^{12} a^{120} being joined to crank-pins c^7 , set quartering on the said disk.

The switch shown in Figs. 1 to 3, inclusive, is especially adapted to be used in connection with the well-known three-wire system of electric lighting, and when thus used one wire, as the positive wire 10, may be connected to the circuit-terminals a^4 a^5 , as shown in Figs. 6 and 10, and the negative wire 12 may be connected to the other set of terminals a^6 a^7 , while the third or neutral wire 100 may run direct to the lamps. This form of switch is especially advantageous in connection with the three-wire system of electric lighting when it is desired to control any number or series of lamps—as, for instance, when the lamps are arranged in independent groups D D', as represented in Fig. 10, for it will be seen that when the movable members or rods b^3 of the circuit-terminals a^5 a^6 are in engagement with their co-operating members b^2 the circuits of the positive and negative wires will be completed when the contact-bars a^8 a^{80} are in engagement with the contact-arms of the circuit-terminals. If now it should be desired to complete the circuit through only one series or group of lamps—as, for instance, through the group D—and not through the other group, as D', the rod or member b^3 of one circuit-terminal—as, for instance, the terminal a^5 —may be withdrawn from engagement with its co-operating member b^2 , and the circuit of the group of lamps D connected to the positive wire is thus opened even when the contact-bar a^8 is in engagement with the terminals a^4 a^5 , and consequently the switch may be operated to reciprocate the bar a^{100} to open and close the circuit of the group of lamps D' connected to the negative wire without affecting the circuit of the positive wire.

As shown in Figs. 1 and 2, each connecting-rod a^{12} a^{120} is joined to a single contact-carrying bar; but, if desired, the said connecting-rods may be joined to a series of such contact-carrying bars by means of cross bars or links c^9 , (shown in Fig. 7,) and in this way a number of switches may be operated by means of one shaft a^{14} or crank-disk c^6 .

As shown in Figs. 1 and 2, the contact-bar a^8 is a cylindrical rod; but I do not desire to limit myself in this respect, as the said contact-bar may be made in any desired shape—as, for instance, it may be substantially square, as shown in Fig. 8, or it may be made oblong, as shown in Fig. 9. So, also, the form of the circuit-terminal contact-arm may be varied as desired. In Fig. 8 it is shown substantially rectangular in cross-section, and in Fig. 9 it is shown as two jaws or contact members.

I have herein shown my invention as embodied in a double-pole switch, and while I prefer this construction, as it is especially adapted to be used in connection with the three-wire system, I do not desire to limit my invention in this respect, as a single-pole switch may be made upon the same plan. When the contact member a^8 is made as a circular rod, it may be loosely held in its carrier a^9 and be provided with an arm d , adapted

ed to strike a stop or block d' , as shown at the left in Fig. 1, to give to the circular rod a^8 a partial revolution to thereby effect a rubbing contact between the terminal arm and the rod a^8 .

I claim—

1. In a circuit-controlling device or switch, the combination, with circuit-terminals a^4 a^5 , separated from each other, of a horizontally-sliding contact-carrier provided with a contact member extended from the opposite sides of the said carrier and co-operating with the terminals a^4 a^5 , guides in which said carrier slides, a vertical shaft, and a connecting-rod joining the said sliding carrier and shaft to produce straight-line reciprocations of the said carrier, substantially as described.

2. In a circuit-controlling device or switch, the combination, with two sets of circuit-terminals, one of said circuit-terminals being composed of a movable member and a stationary member, of reciprocating contact-carriers co-operating with the said circuit-terminals, and a mechanism to produce reciprocations of the contact-carriers, the said movable member being capable of being disconnected from its co-operating fixed member, to operate substantially as described.

3. In a circuit-controlling device or switch, the combination, with circuit-terminals, of a sliding contact-carrier, guides for said carrier, a crank, a connecting-rod joining said carrier to the said crank, a shaft to which said crank is connected, an arm c' , loose on said shaft, a ratchet fast on said shaft, a pawl to engage said ratchet, and a locking device for said pawl, substantially as described.

4. In a circuit-controlling device or switch,

the combination, with circuit-terminals, one of which is composed of a movable member and a stationary member, of a sliding contact-carrier co-operating with the said circuit-terminals, guides for said carrier, a shaft, and a connecting-rod joined to the said carrier and shaft to slide the said carrier in its guides, substantially as described.

5. In a circuit-controlling device or switch, the combination, with circuit-terminals, of a reciprocating contact-carrier, a crank, a connecting-rod joining said carrier to said crank, a shaft to which said crank is connected, an arm c' , loose on said shaft, an actuating device c^5 , to which said arm is connected, a ratchet fast on said shaft, a pawl to engage said ratchet, a locking device to keep said pawl in engagement with the ratchet, and a cam b^{31} to act on the said pawl against the action of the said locking device to disengage the pawl from the ratchet, substantially as described.

6. In a circuit-controlling device or switch, the combination, with circuit-terminals, of a co-operating contact-carrier, a shaft, a crank on said shaft, a connecting-rod joining the said crank to the said contact-carrier, an arm c' , loose on said shaft, a ratchet fast on the shaft, a pawl normally in engagement with the said ratchet, and a cam b^{31} to act on the said pawl to disengage it from the said ratchet, substantially as described.

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

WILLIAM J. KELLY.

Witnesses:

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