

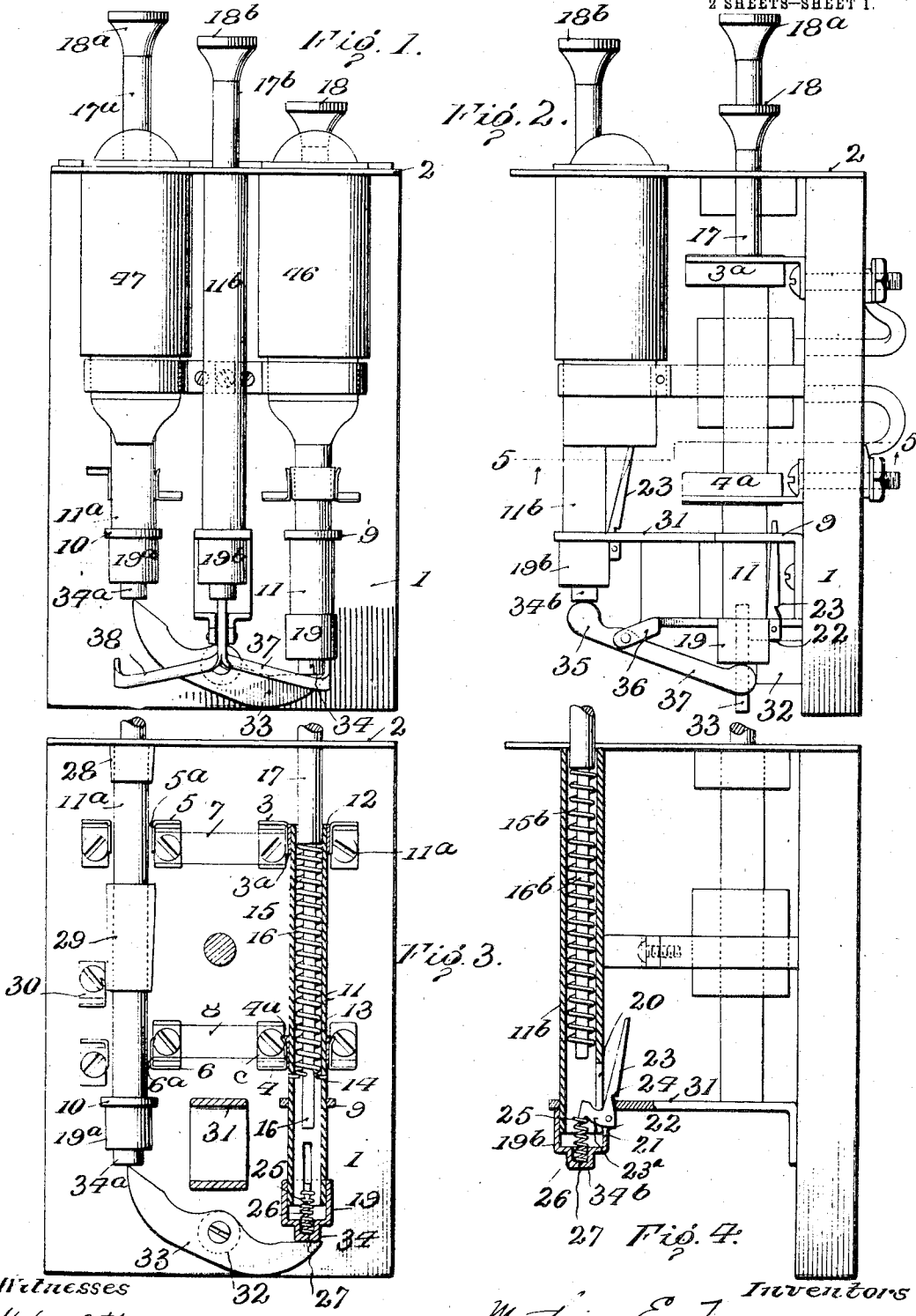
M. E. TURNER & R. A. FULTON.
ELECTRIC SWITCH.

APPLICATION FILED AUG. 6, 1909.

1,053,245.

Patented Feb. 18, 1913.

2 SHEETS—SHEET 1.



Witnesses
Helge H. Murray.
Foy R. Cornwall.

Inventors
Mathias E. Turner
Robert A. Fulton
By Bates, Fento & Hull
attorneys

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2 SHEETS—SHEET 2

Fig. 5.

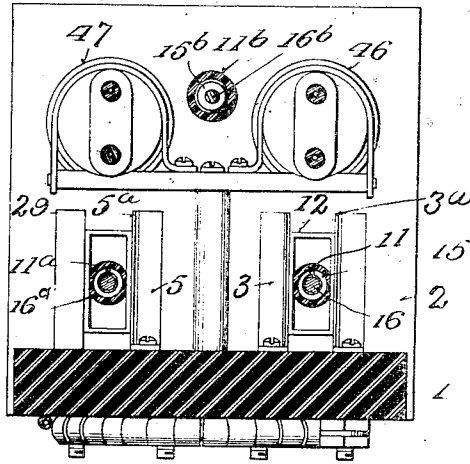
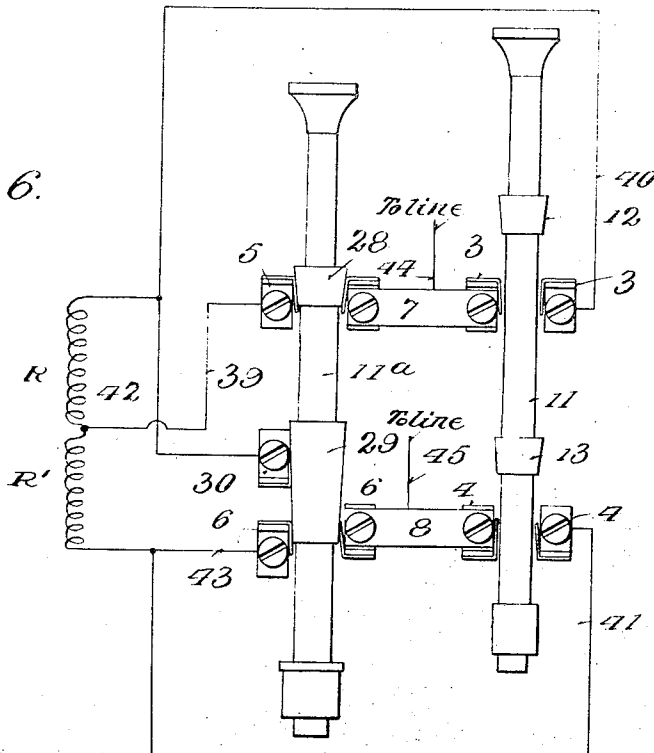


Fig. 6.



Helge & Murray.
Floyd R. Cornwall.

Mathias E. Turner
Robert A. Fulton

By Bates, Fenton & Hall.
Attorneys

UNITED STATES PATENT OFFICE.

MATHIAS E. TURNER, OF EAST CLEVELAND, AND ROBERT A. FULTON, OF CLEVELAND, OHIO.

ELECTRIC SWITCH.

1,053,245.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, MATHIAS E. TURNER and ROBERT A. FULTON, residing, respectively, at East Cleveland and Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Electric Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to electric switches, and more especially to a combination of switches which are adapted to close circuits including a pair of resistances in such manner that when one switch is in operative position, both resistances will be connected in parallel and, when the other switch is in operative position, the resistances will be connected in series, the switches being provided with interlocking means whereby the act of placing one switch in operative relation to its circuit will automatically cause the movement of the other switch member in the reverse direction to open its circuit.

The invention comprises the combinations of parts by means of which the above object may be realized.

A further object of the invention is to combine a pair of switch members, operating in the manner aforesaid, with a third member, with connections so arranged that, by the operation of said third member, either switch member that may be in operative relations to its circuit will be returned to inoperative position.

A further object of the invention is to provide a switch of this character that shall be compact in construction and efficient in operation.

In carrying out our invention, we provide two switch members of the push-button type, each member being provided with a plunger adapted, when pushed inwardly, to close its circuit. We also provide a third push button and plunger and so connect all of the plungers that, when one is pushed inwardly into its operative position, it will automatically cause the outward movement of either of the other two plungers that may have been pushed inwardly.

Generally speaking, the invention may be

defined as consisting of the combinations of elements and parts embodied in the claims hereto annexed and illustrated in the drawings forming part hereof, wherein—

Figure 1 represents a plan view of a switch constructed in accordance with our invention; Fig. 2 is a side elevation of the same; Fig. 3 a view, partly in section and partly in elevation, illustrating the manner in which one of the switch members closes its circuit and at the same time returns either of the other members to inoperative position; Fig. 4 represents a sectional detail through the switch and through one of the aforesaid plungers; Fig. 5 represents a sectional detail on the line 5—5 of Fig. 2, and Fig. 6 a somewhat diagrammatic view of the two switch members, and the circuits cooperating therewith.

Describing the parts by reference characters, 1 denotes a base, which may be of any suitable insulating material. This base is provided at one end with a plate 2, which is preferably of metal. The base is provided with two pairs of contact members, 3 and 4, 5 and 6. These contact members comprise each a pair of jaws 3^a, 4^a, 5^a and 6^a respectively, said jaws extending longitudinally of the base. As will appear by reference to Fig. 6, contact members 3 and 5 are connected to one side of the main line (say the positive side) and contact members 4 and 6 are connected to the opposite side of the line (say the negative side), contacts 3 and 5 being connected by means of a suitable conducting plate 7 and contacts 4 and 6 being connected by a suitable conducting plate 8.

9 and 10 denote brackets carried by the base 1. The bracket 9 is provided with an aperture in line with the jaws 3^a, 4^a and bracket 10 with an aperture in line with the jaws 5^a, 6^a and the plate 2 is provided with correspondingly located apertures for the reception of the plunger rods of the two switch members. These switch members are identical in construction, except that one is provided with a different contact from the other.

The switch member cooperating with the contacts 3 and 4 will now be described. This member comprises a sleeve 11 of non-conducting material, said sleeve being pro-

vided with a pair of contact members 12 and 13 adapted when the sleeve is moved inwardly with reference to the plate 2, to engage the contact jaws 3^a and 4^a. This sleeve is provided internally at a suitable distance from its inner end with pins 14, forming abutments for the spiral spring 15. 16 denotes a rod which is mounted within the sleeve and is of such size as to move freely within the spring. The outer portion of said rod is enlarged, to form a plunger, as shown at 17, and to provide a shoulder which is adapted to engage the spring 15. The plunger 17 projects through the plate 2 and is there provided with a push button 18. 19 denotes a cap which is applied to the inner end of the sleeve 11. The sleeve 11 is provided near its inner end with a slot 20, the inner end of which is covered by the cap 19, said cap being slotted, as shown at 21, and provided with ears 22 on each side of said slot for the pivot of a locking member. This locking member is in the shape of an angle lever comprising two arms 23 and 23^a, the former of which projects outside of the sleeve 11 and the latter of which projects within the same and is provided at its inner end with a projection 25. This projection engages the inner end of a spiral spring 26, the outer end of which may be conveniently carried in a recess 27 in an extension of the cap 19. The arm 23 is provided with a notch 24, said notch having an abrupt shoulder which is adapted, when the rod 16 is in its outermost position, to engage the bracket 9.

From the construction described, it follows that, when the button 18 is pushed inwardly, the spring 15 is compressed until the inner end of the rod 16 has moved the lever arm 25 a sufficient distance to disengage the shoulder on the outer arm from the bracket 9, whereupon the spring 15 drives the sleeve 11 inwardly and causes the contact members thereon to engage the jaws 3^a and 4^a. Further movement of the sleeve will be prevented by the interlocking of one of the other two members therewith, as will be described hereinafter.

The parts of the other switch member are identical in construction with those of the one just described. The push button of the other switch member is shown at 18^a, the plunger connected therewith at 17^a, the sleeve at 11^a, and the cap at 19^a. The contact members carried thereby are somewhat different from those on the first member, in order to adapt the second switch member for coöperation with its particular circuit. These contact members are shown at 28 and 29. The former member is adapted, when the plunger is pressed inwardly, to engage the jaws 5^a. The latter member is of such length as to engage not only the jaws 6^a, but a jaw or bone 30. The purpose of this arrange-

ment will appear in connection with the diagrammatic view, which will be explained hereinafter.

11^b denotes a sleeve, similar in all respects to sleeve 11 and 11^a except that it does not carry any contact members. The inner end of this sleeve is supported in the outer end of a bracket 31 and has therein the rod 16^b and spring 15^b. As the locking member and spring therefor are identical in construction with the similar members in sleeves 11 and 11^a, the same reference numerals are employed for these parts in all three of the movable members. At its outer end, the plunger 17^b is provided with the button 18^b.

32 denotes a stud projecting outwardly from the base 1. A lever 33 is pivoted at its central portion to said stud, and the opposite ends of this lever are adapted to be engaged by the projections 34, 34^a on the ends of the sleeves 19, 19^a when either of the buttons 18 or 18^a is pushed inwardly, as will appear from Fig. 3. The purpose of this construction is to enable either of the switch members to be returned to inoperative position when the other is moved inwardly to its operative position and serve as a stop to cause the contact members on either sleeve to remain in engagement with the contact members of the base. With the parts arranged as shown in Figs. 1 and 3, suppose the button 18^a to be moved inwardly. The first effect of this movement will be to compress the spring 15^a in the sleeve 11^a. Further movement will cause the latch 23 projecting through said sleeve to be disengaged or unlocked from the bracket 10. The spring within the sleeve 11^a will thereupon drive the sleeve 11^a inwardly, bringing the contact members 28 and 29 thereon into engagement with their contact members on the base, and rocking lever 33 to restore sleeve 11, plunger 17 and push button 18 to its "off" or outermost position. When the sleeve moves outwardly, the latch 23 drops down to the position shown in Fig. 4, locking the sleeve against inward movement until such time as the latch shall be disengaged by the action of the plunger rod when the push button is moved inwardly. From this construction it follows that moving the push button 18 inwardly will automatically return the push button 18^a and the associated parts to the position shown in Figs. 1 and 2, and that the inward movement of either of the switch members to close its circuit will cause the outward movement of the other switch member to break its circuit. With these switch members, we employ a third member, to which reference has been made, which operates in substantially the same manner as the switch members and is adapted to move both of said members outwardly and itself to be moved outwardly by both of the switch members. For the pur-

pose of accomplishing this result, we provide a lever which comprises a short arm 35 adapted to be engaged by the projection 34^b on the cap 19^b. This lever is pivoted to any convenient support 36 and is provided below said support with longer arms 37 and 38, the lower ends of said arms being in substantially the same vertical plane and adapted to engage the sleeves 19 and 19^a while the arm 35 is adapted to be engaged by the projection of the cap 19^b. The lower ends of arms 37 and 39 allow the plungers connected with buttons 18 and 18^a to be moved to either extreme inward position. It will be understood that the forked lever carried by 36 will not be operated until the spring in either of the sleeves 11, 11^a or 11^b has been compressed a sufficient distance to allow the plunger rod in such sleeve to unlock the sleeve from the corresponding bracket. When this occurs, the spring drives its sleeve inwardly and in so doing rocks the forked lever and restores to its outer or "off" position any other plunger that may have been moved inwardly. It will be observed that the forked lever is pivoted nearer its upper than its lower end. This is for the purpose of compactness of construction, enabling us to bring the sleeve 11^b and associated parts closer to the switch members.

In Fig. 6 we have shown diagrammatically the action of the switch members in connection with their circuits. In this figure, R and R' represent resistances, which may be used for heating purposes. 39 denotes a conductor connecting adjacent ends of the resistances to contacts 5; 40 and 41 denote conductors connecting the other ends of said resistances to contacts 3 and 4 respectively. 42 denotes a conductor connecting to the contact 30 the same end of the resistance R as is connected to contact 3, while 43 denotes a conductor connecting to contacts 6 the same end of resistance R' as is connected to contacts 4. Contacts 3 and 5 are connected to the same side of the main line (positive or negative) by a conductor 44, while contacts 4 and 6 are connected to the opposite side of the line (negative or positive) by conductor 45. From this construction, it follows that when the sleeve 11 is pushed inwardly, the contact members 12 and 13 thereon will connect the resistances R and R' in series and that the sleeve 11^a when moved inwardly will connect the resistances R and R' in multiple.

For the purpose of indicating which combination of resistances is in operation, the switch may be provided with lamps 46 and 47 each of which is adapted to be illuminated only when the corresponding switch button is pressed inwardly.

The construction described herein provides interlocking means whereby the movement of one switch member will not only

automatically move the other member and break its circuit, but will also enable each circuit to be made and broken quickly to prevent arcing between the contacts. Furthermore, the construction disclosed herein enables the operator to select either circuit directly without passing through any intermediate step.

Having thus described our invention, what we claim is:

1. The combination, with a pair of contact members, of a sleeve, contact members carried thereby and adapted to engage the former members, a plunger mounted in said sleeve, a spring in said sleeve resisting the movement of said plunger therein, a slot in said sleeve and a trigger pivoted in said slot and locking said sleeve against movement, said trigger being adapted to be engaged by the plunger and unlocked when the plunger has been moved a predetermined distance.

2. The combination of a base, two sets of contacts mounted on said base, a sleeve co-operating with each set of contacts and itself provided with contact members, a plunger in each sleeve, a spring resisting the movement of said plunger in said sleeve, means normally locking each sleeve against movement in a direction to bring its contacts into engagement with the base contacts, connections whereby the movement of each sleeve by its spring will be prevented until the corresponding plunger has been moved a predetermined distance, and an interlocking connection between said sleeves whereby the movement of either sleeve in a direction to bring its contact in engagement with the co-operating base contacts will cause a reverse movement of the other sleeve.

3. The combination, with a contact member, of a sleeve, a co-operating contact member carried thereby and adapted to engage the former member, a plunger mounted in said sleeve, a spring in said sleeve resisting the movement of said plunger therein, a lever having a locking member projecting outside of said sleeve and an operating member projecting within the sleeve, a spring co-operating with said lever to normally hold the locking member in engagement with a stop, and a stop for said locking member, the inner end of said lever being adapted to be engaged by the plunger when the latter has been moved a predetermined distance against the resistance of the first-mentioned spring.

4. The combination, with a pair of electric circuits, of a pair of longitudinally movable switch members, one for each circuit, a third longitudinally movable member extending substantially parallel with the first-mentioned members, a lever pivoted intermediate of its ends and adapted to engage the ends of the first-mentioned members when either of said members is in its

"on" position, and a three-armed lever adapted to be engaged by any one of said members when in "on" position and to be operated thereby to restore either of the other members to "off" position.

5 5. The combination with a pair of electric circuits, of a longitudinally movable switch member for each circuit, each switch comprising a longitudinally slidable sleeve, a
10 contact member carried thereby and adapted to engage fixed contact members, a plunger mounted in said sleeve, a spring in said sleeve resisting the movement of said plunger therein in one direction, means locking
15 said sleeve against movement in said direction, said means adapted to be engaged by the plunger and unlocked when the plunger has been moved a predetermined distance, and interlocking connections between said
20 switches whereby the movement of either switch sleeve in a direction to close its circuit will automatically move the other switch sleeve in a direction to abruptly open its circuit.

25 6. The combination, with a pair of contact members, of a sleeve member of insulating material, contact members carried thereby and adapted to engage the former members, a plunger mounted inside said sleeve, a
30 spring inside said sleeve, abutments carried by said sleeve and said plunger between which said spring is compressed, said sleeve also having a slot, and a trigger mounted in said slot, said trigger being adapted to
35 retain said sleeve in inoperative position

against the force of the spring and to be tripped by said plunger to allow actuation of the sleeve by the spring.

7. In a device of the character described, the combination, with a base and a pair of contact members carried thereby, of a switch comprising a pair of longitudinally movable sleeves, a plunger mounted in each sleeve, a spring in each sleeve resisting the movement of the plunger therein in one direction, locking means for securing each of said sleeves against movement in the direction of action of said spring, means operative upon the forward movement of each of said plungers for a predetermined distance against the resistance of its spring for disengaging the corresponding locking means so as to permit the forward movement of its corresponding sleeve under the action of said spring, contact means carried
55 by one of said sleeves and adapted upon the movement of said sleeve in one direction to engage the former members, and connecting means whereby the movement of the other sleeve will cause the shifting of said contact
60 sleeve in the opposite direction.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

MATHIAS E. TURNER.
ROBERT A. FULTON.

Witnesses:

J. B. HULL,
S. E. FOUTS.