(No Model.) 2 Sheets—Sheet 1.

J. B. SMITH.

ELECTRIC SWITCH.

No. 518,471. Patented Apr. 17, 1894.

Fig. 2.

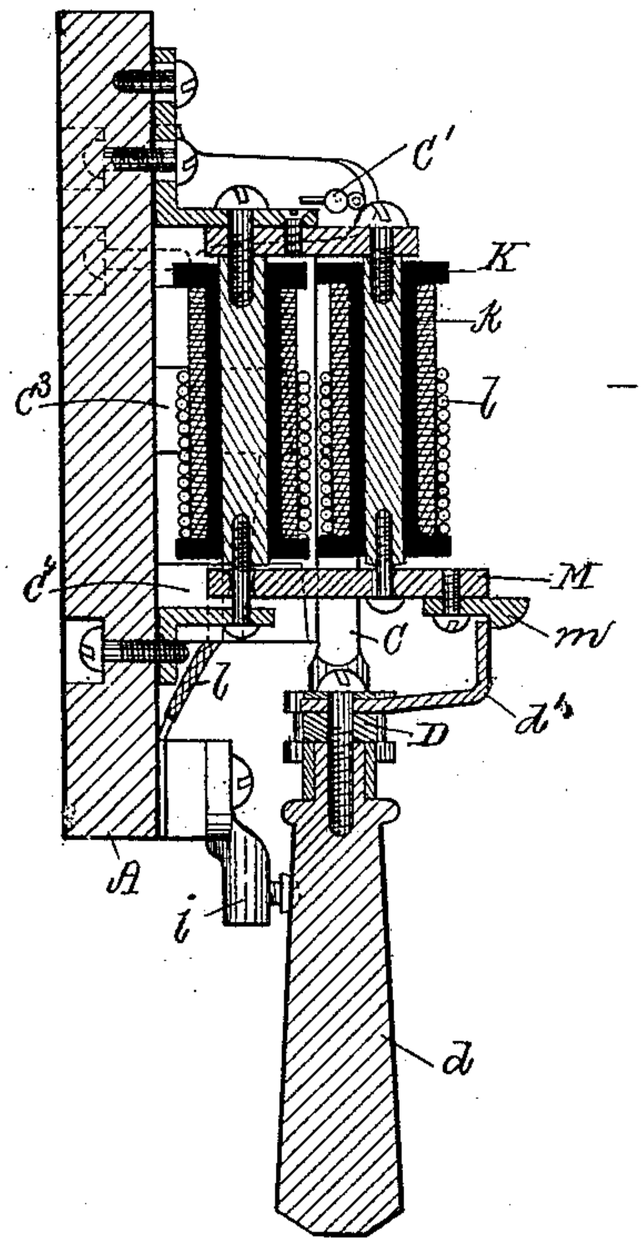


Fig. 5.

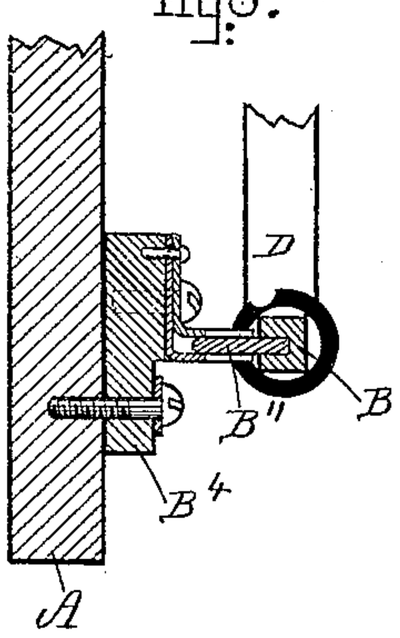
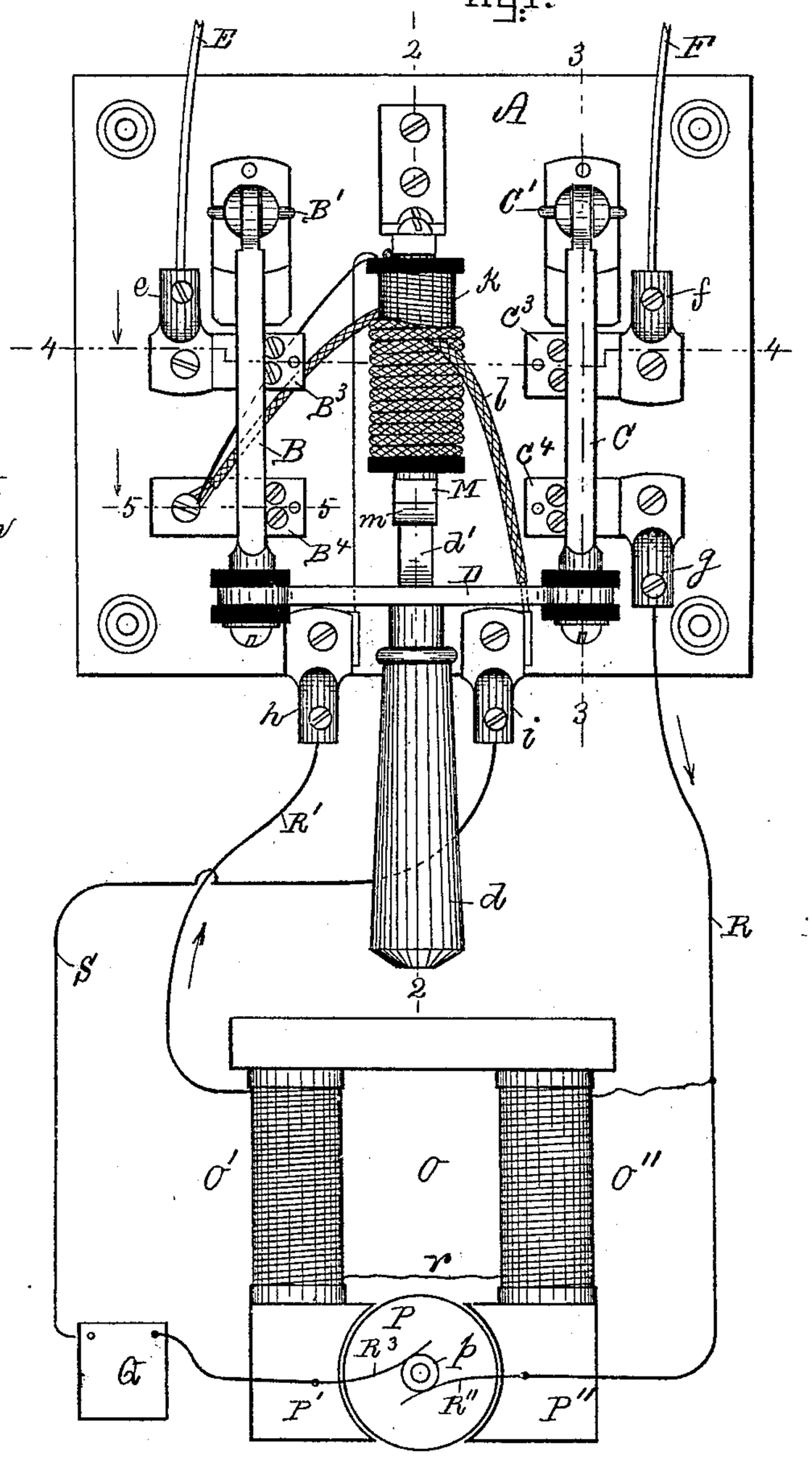


Fig. 1.



Witnesses.

Lauritz N. Möller.

Kittie M. Hanson.

Inventor.

Joseph Brodie Smith

by Albert G. Davis

his atty

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

2 Sheets—Sheet 2.

J. B. SMITH.

ELECTRIC SWITCH.

No. 518,471. Patented Apr. 17, 1894.

Fig. 4.

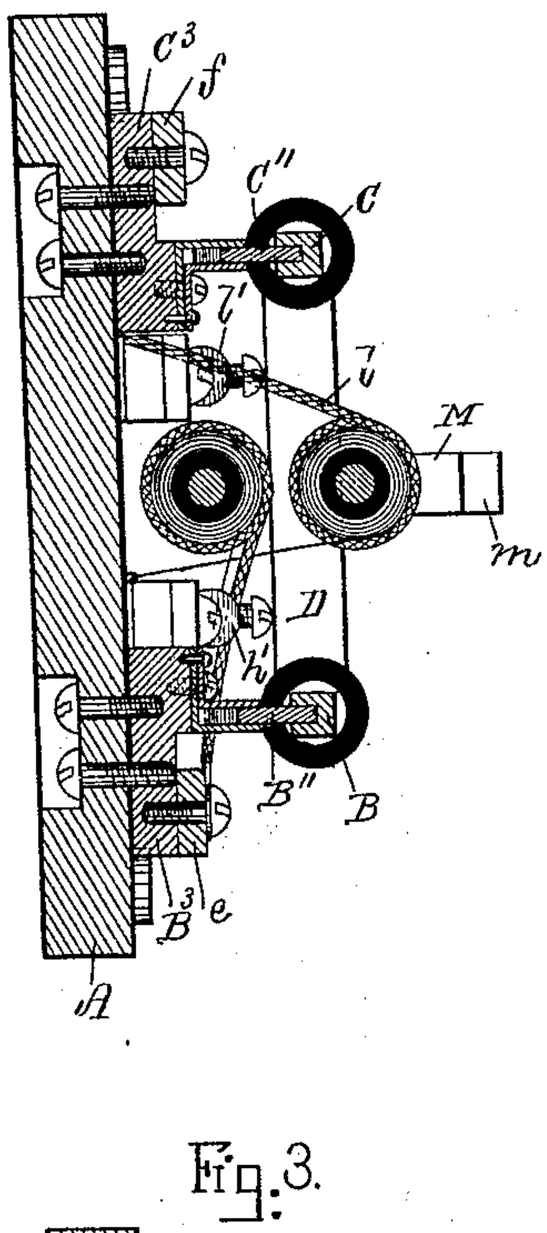
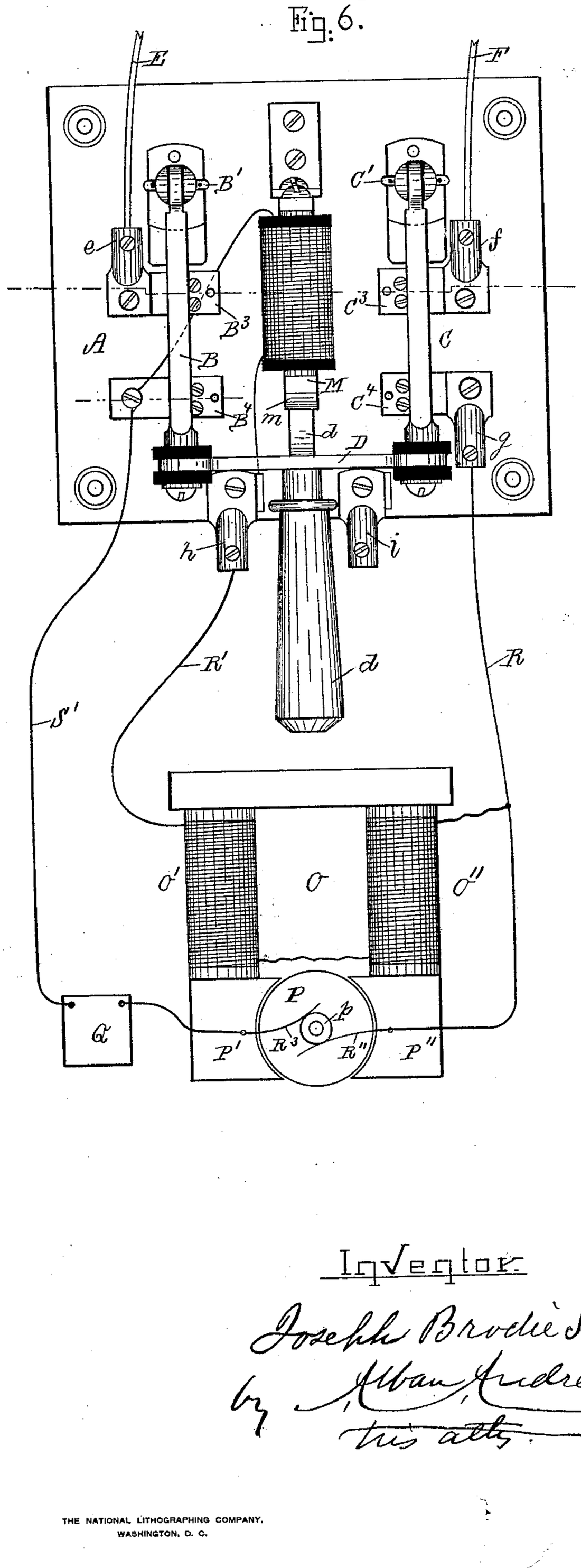


Fig. 3.

Fig. 6.



Witnesses.

Lauritz N. Möller.

Kittie M. Hanson.

Inventor.

Joseph Brodie Smith

by Albert Andrews

his atty.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH BRODIE SMITH, OF MANCHESTER, NEW HAMPSHIRE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 518,471, dated April 17, 1894.

Application filed October 10, 1893. Serial No. 487,763. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BRODIE SMITH, a citizen of the United States, and a resident of Manchester, in the county of Hillsborough and State of New Hampshire, have invented new and useful Improvements in Electric Switches, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in electric switches and it has for its object to prevent the burning out of the armatures of electric motors caused by overloading the latter as well as to protect the same, in case the current is cut off at the station from excessive current when the current is again thrown on at the station, and it is carried out as follows, reference being had to the accompanying drawings, wherein—

Figure 1, represents a front elevation of the improved switch. Fig. 2, represents a central longitudinal section on the line 2—2 shown in Fig. 1. Fig. 3, represents a section on the line 3—3 shown in Fig. 1. Fig. 4, represents a cross section on the line 4—4 shown in Fig. 1. Fig. 5, represents a detail cross section on the line 5—5 shown in Fig. 1; and Fig. 6, represents a modification of the improved switch showing its electromagnet spool wound with a single wire as will hereinafter be more fully shown and described.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

In the drawings A, represents a base of suitable insulating material adapted to be secured to a wall or other convenient position.

B, and C, are metal switch levers pivoted respectively at B′, C′, on the plate A, and having their free ends connected to an insulated cross bar D, provided with a hard rubber or other suitable handle *d*, as shown.

To the respective levers B, and C, are secured the metal switch plates B″, C″, and below the latter are secured to the base A, respectively the preferably forked metal contact pieces B^3 B^4 C^3 C^4 as shown in the drawings.

E, and F, represent the line wires connected respectively to cups or binder posts *e*, and *f*, which are metallically in contact with the respective contact pieces B^3 and C^3.

To the contact piece C^4 is metallically connected the cups or binder posts *g*.

h, and *i*, are cups or binder posts secured to the plate A, and connected by means of wires leading from the switch to the motor as will hereinafter be described.

To the plate A, is secured a pair of spools K, K, on which is spirally wound a fine insulated wire *k*, one end of which is connected to the contact plate B^4 and the other end to the cup *h*, as shown.

In addition to the fine wire *k*, the spools are wound with a coarse insulated wire *l*, which is wound in an opposite direction to that of the wire *k*; one end of said coarse wire being connected to the contact plate B^4 and the other end to the cup *i*, as shown in Fig. 1.

Below the spools K, K, is loosely pivoted an armature M, having a hooked projection *m*, in its forward end as shown in Fig. 2, which is adapted to engage with a projection *d′* on the handle *d* when the latter is depressed and the armature M, attracted toward the spools by the current passing through the latter. The moment the current is cut out from the said spools the rear end of the armature M, drops, causing the handle *d*, to be released from the armature hook *m*, thus liberating said handle and its switch levers B, C, and causing their switch plates B″, C″, to be disengaged from the respective contact pieces B^3, B^4, and C^3, C^4; the said levers B, C, when liberated are automatically forced outward by the influence of springs N, N, arranged below them as shown in Fig. 3.

O, in Figs. 1 and 6 represents an electric motor of the usual kind having field coils O′, O″, pole pieces P′, P″, rotary armature P, and commutator *p*, in the ordinary way.

Q, represents the rheostat or resistance box used in starting the electric motor as usual.

R″ and R^3 are the brushes having their free ends bearing against the commutator as is common in electric motors.

From the cup *g*, leads a wire R, to the field coil O″ and armature commutator *p*, from the cup *h*, leads the wire R′ to the field coil O′, the wire of which is connected to the wire of the coil O″ by means of the wire *r*, as shown in Figs. 1 and 6.

In Fig. 1, S, is a wire leading from the

coarse wire *l*, and its binder post *i*, through the rheostat Q, to the commutator on the armature P, as shown, and as the coarse spiral wire *l*, is thus in circuit with the motor armature an increase of current in the latter from over load will neutralize the switch electromagnet, release its armature lever and cause the spring pressed switch levers to be thrown open the moment such over loading of the motor armature occurs, thus preventing the burning out of the motor armature wires. The switch is also automatically thrown open as soon as the current from the line wire is cut off from any cause and this takes place by the release of the switch armature lever as soon as the electromagnets on the switch are no longer magnetized thus automatically cutting the motor out of the line circuit when the latter is broken thus preventing the motor from being started when the line circuit is again closed until the man in charge of the motor closes the switch, after first switching in the resistance in the starting box Q.

In motors not liable to being overloaded I dispense with the opposed wound coarse wire *l*, and use only a single wire electromagnet as shown in Fig. 6, one end of which is connected to the field coils O′, O″, and armature as in Fig. 1, and the other end connected by means of a wire S′ through the rheostat to the commutator of the armature P. by which arrangement the switch is automatically thrown open by the demagnetizing of the electromagnet at the time the line circuit is broken. Thus it will be seen that by employing a switch having an electromagnet with two sets of wires wound in opposite directions and connected to the field coils and armature of the motor as described the motor is automatically prevented from being overloaded, and by the employment of a single wire electromagnet, the motor is automatically stopped as soon as the line circuit is broken thus preventing the armature wire from being burned out as well as preventing starting of the motor after the line circuit the has been closed unless the person in charge closes the switch.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. In an electric switch or current controlling device a pair of switch levers adapted when closed to be metallically connected to the line wires, field coils and armature of the motor combined with an electro-magnet having one winding in the field circuit and having an opposedly wound wire in circuit with the motor armature and having a movable armature and means for holding said switch closed when the field current is flowing and automatically opening it when the field current ceases as well as opening it when the armature current reaches a certain predetermined value, substantially as and for the purpose set forth.

2. In a circuit for electrical distribution, the combination of one or a pair of switch levers located in the circuit, a magnetic field energized by said circuit and having two opposed windings, one arranged as a shunt to said circuit and the other in series with it, a movable armature acting to hold said switch closed when the electrical pressure in the circuit equals a predetermined amount and to open said switch and break the circuit in each wire of the main line when the electrical pressure falls below a certain amount, or when the current in said circuit increases above a certain amount, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 7th day of September, A. D. 1893.

JOSEPH BRODIE SMITH.

Witnesses:

ALBAN ANDRÉN,

F. W. SHONTELL.