

(No Model.)

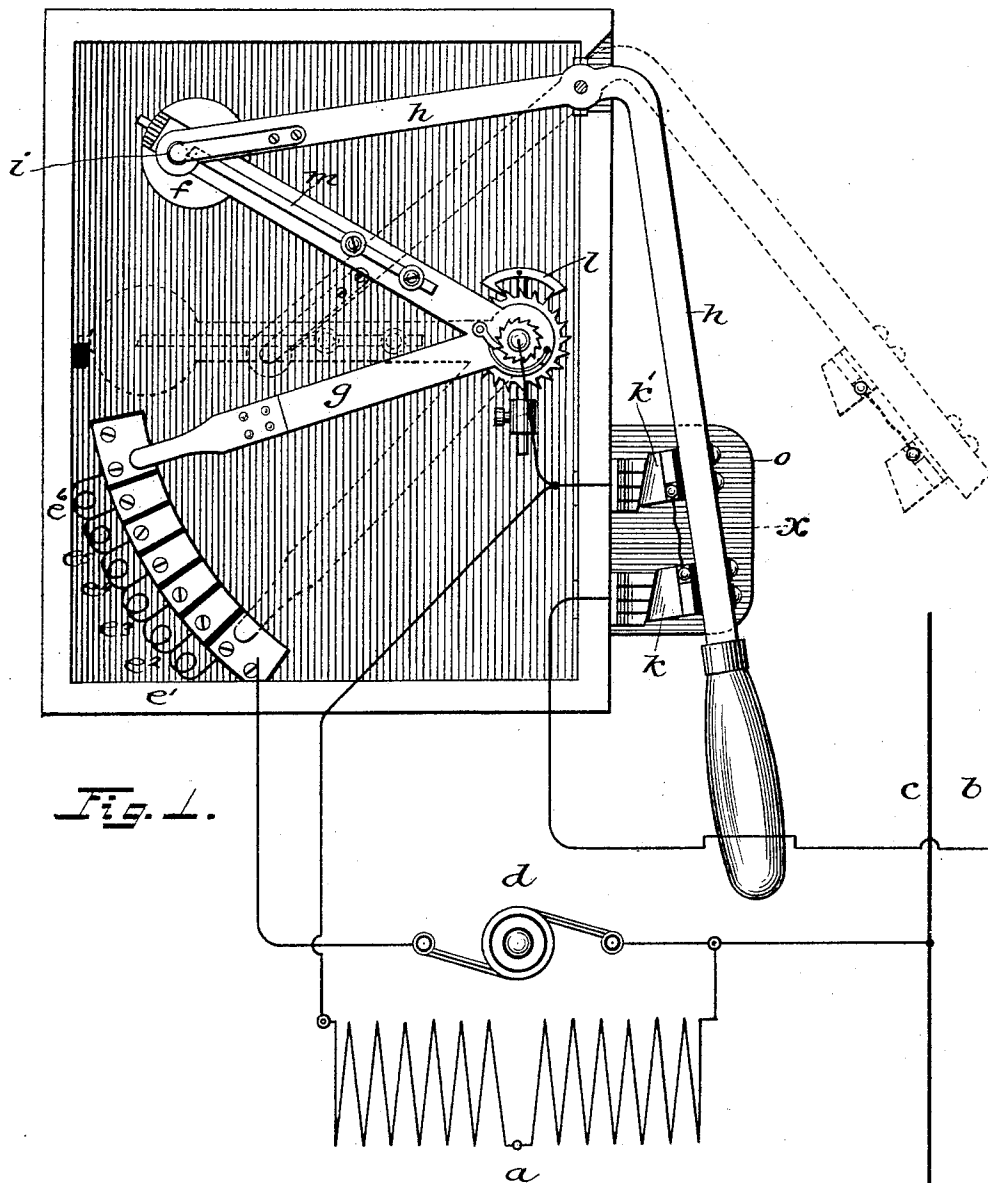
2 Sheets—Sheet 1.

C. B. DOYLE.

AUTOMATIC ELECTRIC SWITCH AND CUT-OFF.

No. 432,988.

Patented July 29, 1890.



Witnesses.
Charles G. Hawley.
Geo. R. Parker.

Inventor.
Charles B. Doyle.
By *George A. Barton*
Attorney.

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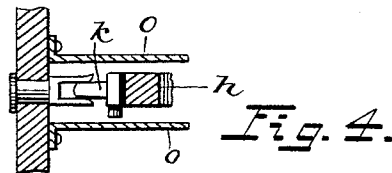
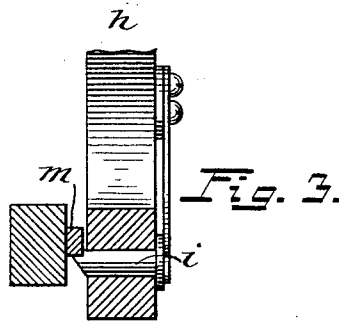
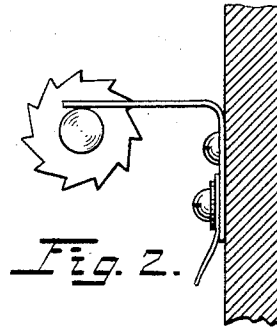
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UNITED STATES PATENT OFFICE.

CHARLES B. DOYLE, OF MAYWOOD, ILLINOIS.

AUTOMATIC ELECTRIC SWITCH AND CUT-OFF.

SPECIFICATION forming part of Letters Patent No. 432,988, dated July 29, 1890.

Application filed November 18, 1889. Serial No. 330,724. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. DOYLE, a citizen of the United States, residing at Maywood, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Automatic Electric Switches and Cut-Outs, (Case 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to switching apparatus for connecting electric motors into circuit. If the circuit be closed upon the armature without interposition of resistance while the armature is at rest, the current will be abnormally great in the armature and liable to cause overheating or even fusing of the conductors, and in addition to this the torsion on the armature may be so excessive as to cause mechanical damage to the armature or machinery connected thereto. Apparatus for including resistance in circuit with the armature at the time the circuit is closed and gradually shunting out this resistance has been heretofore provided.

My invention relates to such apparatus; and it consists, first, in a switch-lever carrying a safety-catch between two contact-points, and a shield which is in position to prevent the user of the apparatus from attempting to repair the safety-catch, except when the lever is lifted so as to disconnect the contacts carried on the switch-lever from the circuit.

My invention consists, secondly, in the combination, with the lever, of a weight adapted to be raised thereby and released when the circuit is closed, said weight, when released, acting by gravity to move a contact-arm across the contacts of the rheostat or resistance-coils included in circuit with the armature to gradually shunt out said resistance.

My invention consists, thirdly, in the lever adapted to be brought into engagement with the weight when lifted to open the circuit, so as to be connected with the weight to raise the same when the lever is brought down to close the circuit, and, fourthly, my invention consists in an escapement controlling the rate of movement of the contact-arm, which is impelled by a weight across the contacts of the

resistance-coils included in the circuit with the armature of an electric motor, whereby the resistance thus included in the circuit is gradually removed therefrom to prevent injury to the motor.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a view illustrative of my apparatus connected with a motor, one side of the shield being removed to show the safety-catch. Fig. 2 is a view showing the frictional electric contact between the pivot of the movable contact-lever or cut-out and the circuit. Fig. 3 is a detailed view showing the engagement between the lever and the weight. Fig. 4 is a view showing the position of the lever, the safety-catch, and the shield as seen from section-line X of Fig. 1.

Like parts are indicated by similar letters of reference throughout the different figures.

The coil *a* may be considered as the field of the motor. This field is shown included in circuit between the two mains *b c*. The armature *d* is shown as just connected into circuit, the resistance-coils *e' e² e³ e⁴* being included in circuit therewith, and the weight *f*, carrying the arm *g*, being shown raised to its highest position and just about to be released from the lever *h*.

The engagement between the weight *f* and the lever *h* will be more readily understood by reference to Fig. 3. A spring-catch *i* is provided upon the end of the lever *h*. When the weight falls to the position indicated by the dotted lines in Fig. 1, the lever *h* will remain down, so as to close contacts *k k'* to maintain the circuit through the motor, and the arm *g* will be moved by the weight to the position indicated by the dotted lines. The movement of the arm *g*, as it sweeps across the contacts of the resistance-coils *e' e², &c.*, will be controlled by the escapement *l*, which may be regulated to permit the arm *g* to move at the desired rate of speed. The lever *h* will remain down, so as to maintain the circuit until it is desired to open the circuit of the motor. The arm *h* will then be lifted to the position indicated by the dotted lines. When the lever is thus lifted, the spring-catch *i* will find the catch-strip *m* upon the arm carrying the weight in its path. The spring-catch will

be thus forced in and the catch will slip over this strip *m* and engage with the same, as indicated in Fig. 3. Thus the engagement between the lever *h* and the weight is effected
 5 when the lever *h* is lifted to disconnect the machine from circuit. When now it is desired to bring the motor again into circuit, the lever *h* is thrown down by the handle to complete the circuit at contacts *k k'*, while
 10 the weight is at the same time raised, and with it the arm *g*, so as to bring the resistance-coils *e' e''*, &c., into circuit with the armature *d* of the motor. As the circuit is closed by the contacts *k k'* as they are forced
 15 between the brushes connected with the mains *b c*, the catch *i* is carried over the end of the strip *m*, thus releasing the weight, as before described. This strip *m* is attached adjustably to the side of the arm carrying the
 20 weight, so that a greater or less number of the coils *e' e''*, &c., may be brought into the circuit before the catch *i* slips over the end of the strip *m*. The "safety-catch," as it is commonly called, consists simply in a fusible
 25 wire *n* between the contacts *k k'*. These contacts *k k'* are insulated from the lever *h*, so that the circuit is through this fusible wire *n*. In case the current is abnormally great this wire will be melted, so as to interrupt
 30 the circuit of the machine and prevent injury. Now in order to repair this safety-catch—that is, in order to substitute a wire or plug in place of one that has been fused—it is necessary to raise the arm *h*, so as to
 35 bring the contacts *k k'* above the shield *o*. Thus there will be no danger to the one making the substitution, as would be the case if the safety-catch were accessible when the lever was down in position to close the cir-
 40 cuit.

The weight *f* may be moved up and down upon the arm carrying the same, and secured at any position thereon desired to adjust the force exerted upon the contact-arm *g*.

45 My invention admits of various modifications which will readily suggest themselves to those skilled in the art, and I therefore do not limit myself to the precise details of construction shown.

50 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the mains supplying a motor, of a switch-lever carrying
 55 contacts insulated from the lever and connected by a fusible wire, the field and armature of the motor, and contacts or brushes with which the contacts upon the lever are

adapted to be closed to bring the motor into circuit, substantially as and for the purpose specified.

2. The combination, with the lever carrying the insulated contacts thereon connected by a fusible wire, of brushes or contacts to correspond thereto connected with a motor and the mains for supplying the same, and a shield over said brushes or contacts, whereby the safety-catch is covered when the lever is down in position to complete the circuit through the motor, substantially as and for the purpose specified.

3. The combination, with a lever carrying contact-pieces connected by a fusible wire, of corresponding contacts or brushes included in an electric circuit, and a shield over said contacts, whereby the fusible wire is covered when the circuit is closed, substantially as and for the purpose specified.

4. The combination, with the circuit through the armature of a motor, of resistance-coils provided with contacts, a gravity-controlled circuit-closer included in said circuit, and a lever for closing the circuit of the machine, said lever being connected with said gravity-controlled arm to raise the weight and bring the resistance into circuit when the circuit is closed, said gravity-controlled arm being disengaged from the lever upon said closing of the circuit to permit the said arm to sweep across the contacts of the resistance to gradually shunt the same out of circuit, substantially as and for the purpose specified.

5. The weighted arm and the contacts of the resistance included in circuit with the armature of a motor, over which contacts the arm is adapted to be rotated, a lever carrying a connecting device adapted to be closed to the brushes or contacts of the circuit to complete the circuit through the medium of said contact-piece, said lever having an engagement with said weighted arm and adapted to bring the same to position to include the resistance in the circuit of the armature when the circuit is closed, and permit said arm, actuated by gravity thereafter, to sweep across said contacts to gradually shunt the said resistance from the circuit, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 12th day of November, A. D. 1889.

CHARLES B. DOYLE.

Witnesses:

GEORGE P. BARTON.

ELLA EDLER.