(No Model.)

H. H. BLADES.

ELECTRICAL SWITCH.

No. 457,338. Patented Aug. 11, 1891.

Fig-1-

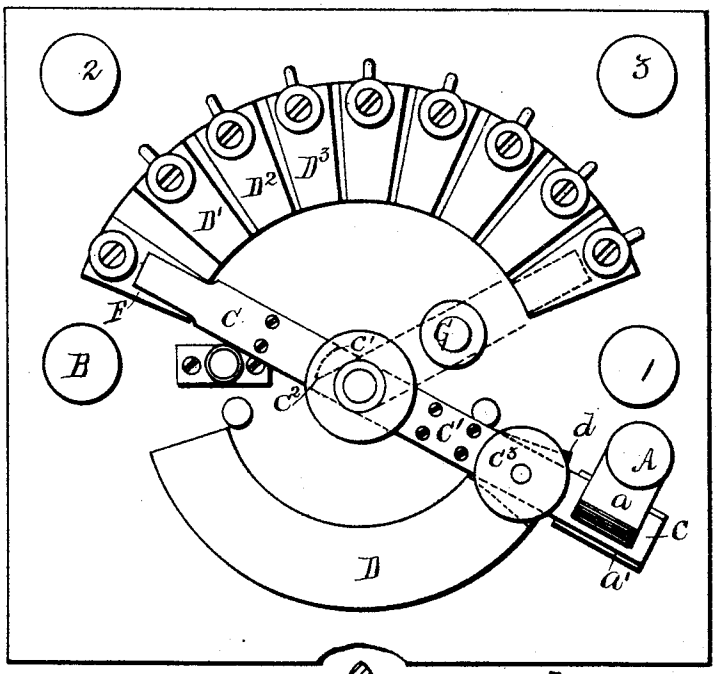


Fig-2-

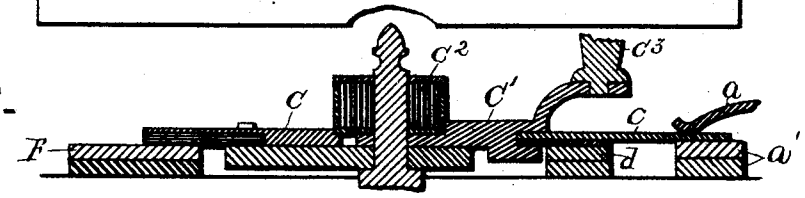
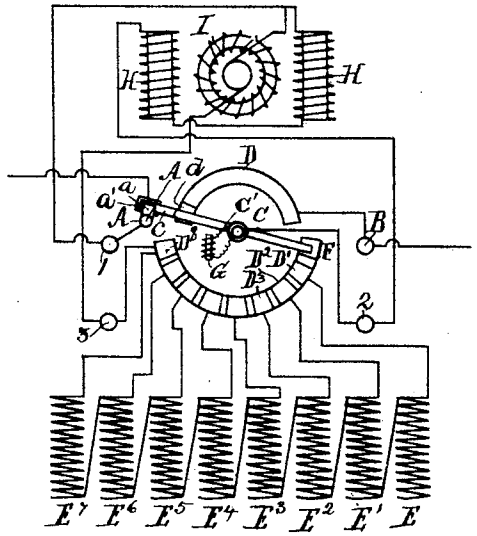


Fig-3-



WITNESSES

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ELECTRICAL SWITCH.

SPECIFICATION forming part of Letters Patent No. 457,338, dated August 11, 1891.

Application filed November 3, 1890. Serial No. 370,171. (No model.)

To all whom it may concern:

Be it known that I, HARRY H. BLADES, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Electrical Switches; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

In the drawings, Figure 1 is a plan view, and Fig. 2 a side elevation, of a switch embodying my invention. Fig. 3 is a diagrammatic view showing how the switch is connected into the circuits.

It is the purpose of my invention to produce a switch for governing the admission of operative current into and cutting the same off from an electric motor or electric machine. Heretofore it has been quite customary to provide a switch which would first admit the current from the main line to the fields, and then another switch which should be turned slightly by the operator to gradually admit the current through the armature-circuits.

My device is designed to do away with the first-mentioned switch and to combine the two into one and the same switch mechanism, and provide at the same time means whereby when the switch is turned to cut off current from the motor the current generated in the motor will operate to prevent the cutting off of this current through the armature-circuits until the motor shall have come substantially to a standstill and the generated current shall have been reduced sufficiently to be harmless.

In carrying out my invention, A and B represent the terminals for the outgoing and the incoming main-line circuit. At A the terminal is separable, the upper portion *a* being in the nature of a spring, and when the switch-lever is in the position shown in Fig. 3 a section of insulation *c* on the switch-lever C is interposed between the portions *a* and *a'* of the terminal, so as to break the circuit at this point. At the same time the switch-lever has ridden past the metallic segment D onto the insulation at *d*, thus likewise breaking the circuit through the terminal B.

D' D^2 D^3, &c., represent a series of terminals corresponding with the series of resistances E E' E^2, &c., F being a dead terminal.

G is an electro-magnet.

The lever C is provided with a handle-section C', pivoted to the portion C at the pivotal point of the switch, the two uniting along the concentric line *c'* and the shoulder c^2, and a spring C^2 exerts its tension to hold the two sections of the lever in line with each other, so that if the handle-section C' is moved around independently of the section C the said latter section will when released instantly fly around into line with the section C. The section C has a soft-iron armature on its under side, designed to rest over the core of the electro-magnet G when in the position shown by dotted lines in Fig. 1.

H represents the fields, and I the armature. The electro-magnet is on the circuit of the motor, as will be hereinafter explained. The operation of the device will now be understood. Before starting the motor the switch is in the position shown by the full lines in Figs. 1 and 3. When it is desired to start the motor, the switch is turned and caused to sweep over the terminals D D' D^2 D^3, &c. As soon as it breaks from the terminal A it rides off from the dead terminal F and makes connection with D and D'. Current entering at B then passes directly through the segment D and lever C. The current then shunts through the electro-magnet G, thence back through the terminal 2, directly through the fields and back through the terminals 1 and A off on the main line. At the same time current from B passes through D and C and C' to the resistance-terminal D' through the armature-circuit. It then meets with the resistances E to E^7 on the armature-circuit. Consequently but low current enters the armature. As the lever sweeps on over the terminals D' D^2, &c., these resistances are successively cut out, thus admitting more and more current to the armature until the lever reaches the terminal D^8, when its full quantum of current will be passing through the armature. It passes thence through the terminals 1 and A off onto the main line. It

is thus apparent that when on the terminal D^8 the arm C of the lever will be held snugly in place by the electro-magnet G beneath it. Now when the operator desires to stop the motor he grasps the switch-handle C^3 and turns it around into its initial position, as shown by the full lines in Figs. 1 and 3. This operates, as before explained, to cut off current at both the main-line terminals A and B; but it leaves the circuit closed through the fields and armature of the motor as respects the current that may be generated by the motion of the motor after it shall have been cut off from the main line. Thus the current so generated by the motor passing through the fields will pass thence through the electro-magnet, thence off over the field-circuit to the starting-point at the fields of the motor, while the corresponding current will be maintained through the armature. The magnetism in the electro-magnet is thus maintained, causing it to hold the arm C of the lever in position, and this it does until the motor has come nearly to a rest and the generated current decreased to a point where it can no longer maintain a sufficient magnetism within the magnet to hold the said lever against the tension of the spring at the pivotal point. As soon as the tension of the spring thus gains the ascendency it operates to quickly bring the arm C around to its initial position in line with the handle-section C′. I have thus accomplished with a single switch-lever the entire manipulation of the current, cutting it off at the two terminals when the motor is at rest, admitting it through the fields and gradually through the armature, and finally cutting off the current from the main line instantly, yet controlling the subsequently-generated current in the fields and armature until it shall have decreased to a harmless degree, and have finally automatically restored the switch to its initial condition. It is also manifest that no matter how quickly and incautiously the operator may turn the switch to stop the motor he cannot thereby imperil his armature-circuits.

This apparatus is designed for constant-potential circuits.

Instead of locating the electro-magnet on the field-circuit, as described, it might be located on the armature-circuit or upon a direct shunt between the main terminals on the motor.

What I claim is—

1. The combination, with the main line of an electric motor, a series of terminals and resistances and an electro-magnet in the circuit of the motor, of a circuit-switch consisting of a pivoted two-part lever joined at the pivotal point and one part having an armature to cooperate with the electro-magnet, and a spring acting to maintain the two parts of the lever in line with each other, said armature part of the lever being held by the electro-magnet after the other part of the lever is moved to cut off the current from the main line until the motor has come nearly to rest, substantially as described.

2. A switch for an electric motor, consisting of the two-part lever C C′ and spring C^2, one part of said lever having an armature, the main-line terminals A and B maintained open or broken by the switch in its initial position, the electro-magnet G, a series of terminals D D′, &c., governing a series of resistances, the switch-section C, adapted to sweep said terminals and to be held in its final position by the electro-magnet, the switch-section C′, adapted to be moved independently to cut off the current from the main line, the switch-section C being adapted to be returned to its initial position by the spring C^2 when released by the weakening of the electro-magnet, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

HARRY H. BLADES.

Witnesses:
C. J. SHIPLEY,
W. H. CHAMBERLIN.