(No Model.)

W. A. DREWETT.

ELECTRIC SWITCH.

No. 591,331. Patented Oct. 5, 1897.

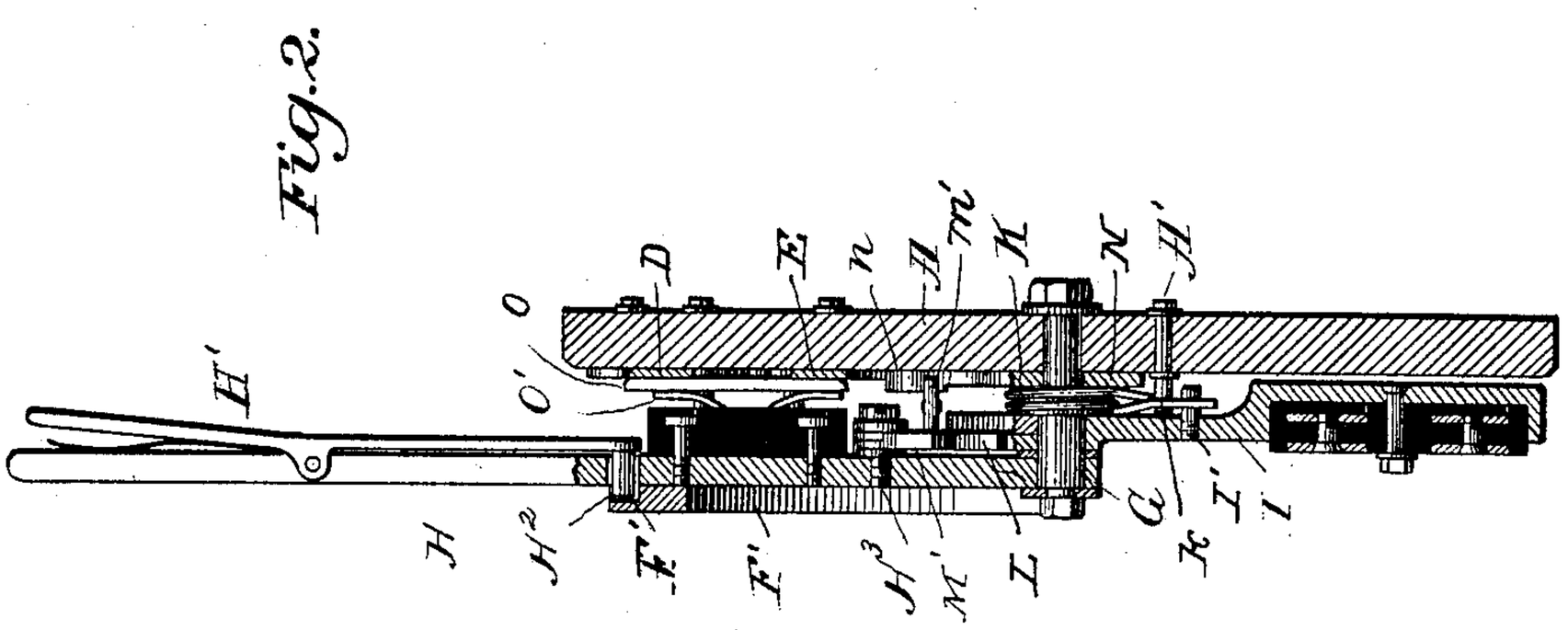

Fig. 2.

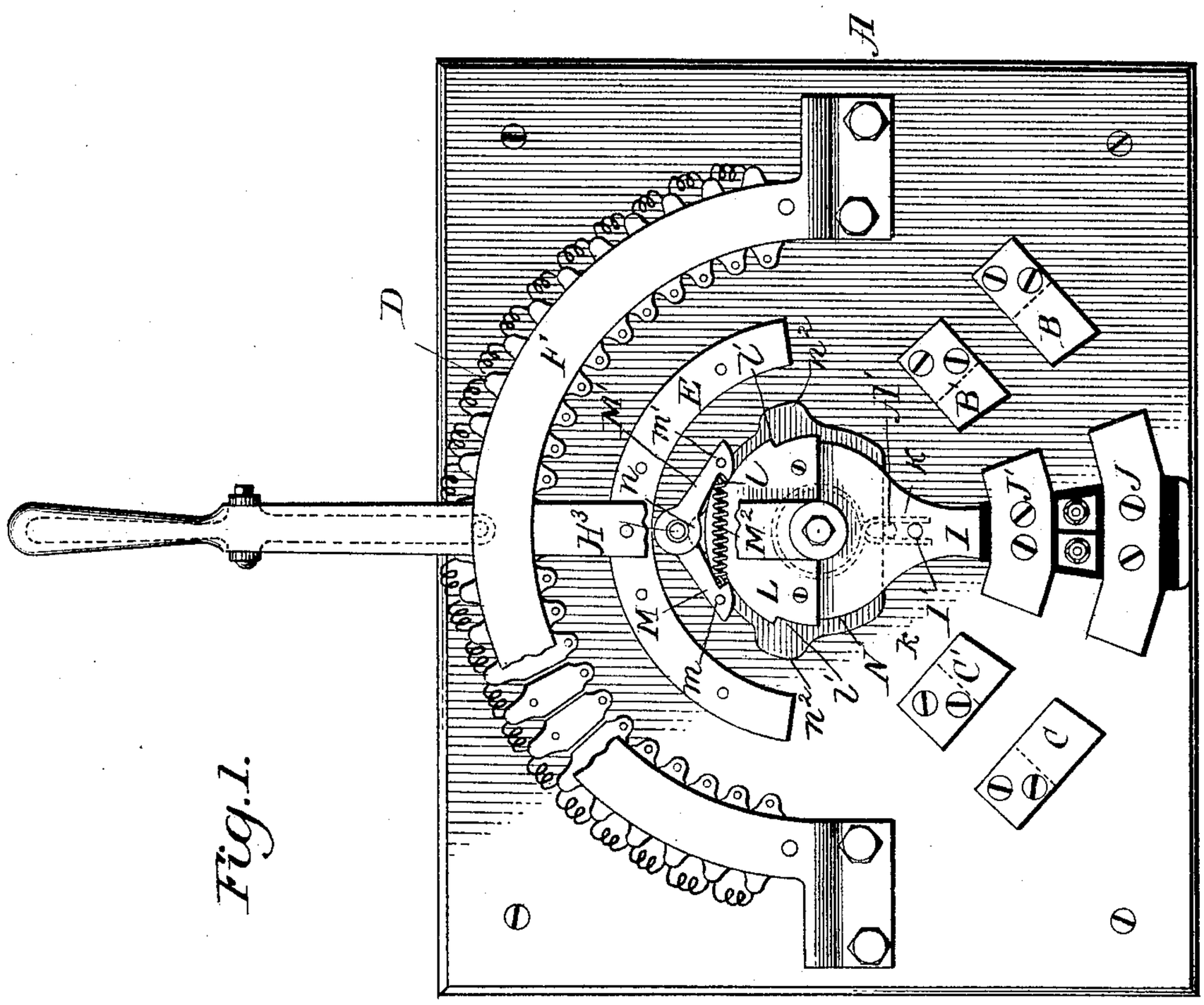

Fig. 1.

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 591,331, dated October 5, 1897.

Application filed March 15, 1897. Serial No. 627,657. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALFRED DREWETT, a citizen of the United States, residing at Brooklyn, Kings county, State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches, and has for its object to improve and simplify the construction of such switches and adapt them for use in connection with various translating devices, and more especially in connection with electric motors, in connection with which it is desirable not only to open and close the circuit, so as to reverse the motion of the armature of the motor, but to regulate the amount of current flowing through the armature by means of variable resistances; and to these ends my invention consists in a switch embodying the features of construction and arrangement, substantially as hereinafter more particularly set forth.

Referring to the accompanying drawings, Figure 1 is a plan view of the switch, parts being broken away for convenience of illustration; and Fig. 2 is a vertical transverse section of the same.

While the general principles of my invention may be embodied in various details of mechanism without departing from the spirit thereof, according to the purposes and uses to be made of the switch, I have shown in the accompanying drawings one convenient and satisfactory embodiment, and in connection with this I will now proceed to describe the general construction and arrangement of the parts, so as to enable those skilled in the art to make use of my invention.

In the drawings, A represents a base supporting the operative parts of the switch, and this base is preferably of some non-conducting and non-inflammable material—as, for instance, slate and the like. Mounted on the base A are two sets of terminals B B′, C C′, which are connected to the circuits in any proper and usual manner, which need not be specifically described, and these are shown arranged in their corresponding positions on each side of a vertical line passing through the plate. Also mounted on the plate are a series of contacts D, which are connected together in the usual manner to form resistance-contacts, and these are shown arranged in a semicircle, and their terminals are connected to the armature or other circuit in the usual way. Concentric with this row of resistance-contacts is a segmental plate E. Arranged over the resistance-contacts D is a segmental plate F, which serves as a guide for the operating-handle and has means of locking the same, in the manner hereinafter set forth.

Arranged, as shown, in a central position on the plate is a pivot-pin or standard G, and mounted on this standard is an operating-handle H, having a stop device H′, provided with a pin H^2, adapted to enter a slot or slots F′ in the plate F. Also mounted on the pin or standard G is an arm I, carrying the double contacts J J′, these being insulated from each other and arranged in a well-known manner and being adapted to coöperate with the contacts B B′ or C C′, according to the position in which the arm I is placed. This arm I is loosely mounted on the pin G, but is under the stress of a suitable spring or other device tending to hold it in its central position, as shown in Fig. 1, and I have illustrated a spring K coiled around the pin G and having its bent ends *k* embracing a pin or extension I′ on the arm I in such a manner that there will be an equal tendency from both ends of the spring to hold the arm I in its normal position, but that the ends of the spring will yield to permit the arm I to be swung to the right or the left to engage the contacts B B′ or C C′ in the manner hereinafter set forth, while when these contacts are released the spring will tend to quickly restore the arm I to its normal position, breaking the circuits and preventing arcing. Further, to prevent the arm being swung beyond its normal position under these circumstances I preferably provide a pin or projection A′, passing through the plate A and extending between the free ends of the spring. Some means must be provided for moving the arm I to close the circuit, and I have shown a ratchet L, mounted upon the enlarged head or upper portion of the arm, which ratchet has a number of teeth *l l′*. Connected to the handle H are the pawls M M′, they being shown as mounted on the handle H at H^3 and preferably being under the stress of a spring M^2,

tending to keep them in engagement with the teeth of the ratchet L. With this arrangement so far described it will be seen that any movement of the handle H will impart a corresponding movement to the arm I, and as the handle is turned to the right or the left it will move the arm I into contact with the terminals B B′ or C C′, as the case may be. It is desirable, however, that the arm I may make contact with the terminals B or C before the resistance represented by the contacts D is cut out of circuit, and some means must be provided to allow the handle H to move after the arm I has made contact with the main-line terminals. To accomplish this, I have shown a plate N, mounted on the base A and having cam-like projections n n' n^2, and the pawls M and M′, respectively, are provided with pins m m', which normally rest upon the periphery of the plate N. Connected with the handle H is a plate O, which is adapted to bear upon the segment E and one or more of the resistance-contacts D, according to the position of the handle H. This plate is preferably connected to the handle by means of spring connections O′, properly insulated from the handle, but so as to move with the latter and at the same time maintain good and satisfactory contact with the segment and resistance-contacts.

Such being the general construction of my switch its operation will be manifest to those skilled in the art, it being understood that the terminals are suitably connected in a well-known way and that when the handle and arm I are in the central position shown in Fig. 1 no current passes to the motor or other translating devices and the greatest amount of resistance is in the line between the switch and the armature of the motor. It is understood, of course, that when the motor is to rotate in one direction the handle is moved to the right and when in another direction the handle is moved to the left, thus directing the current through the armature or the fields of the motor, as the case may be, in opposite directions, so as to reverse the motion of the motor. Suppose, for instance, that it is desired to start the motor in a direction corresponding to the movement of the handle to the left. As soon as the stop device H′ is pressed the handle may be moved to the left and the pawl M′, engaging the tooth l of the ratchet L, causes the arm I to be moved to the right, so that the contacts J J′, respectively, engage the contacts B B′, and these contacts are preferably held in position by friction against the stress of the spring K. At this moment the pin m' of the pawl M′ rides over the cam-surface n of the plate N, so as to disengage the pawl from the ratchet L, and the handle H may be moved to any desired extent and speed to cut in or out the remaining portion of the resistance device represented by the contacts D, as a further movement of the handle does not move the arm I until the handle is moved far enough for the pawl M to engage one of the ratchet-teeth l l' on the opposite side of the ratchet L. This pawl M is prevented from engaging the ratchet-teeth by the cam projection n^2, on which the pin m of the pawl rides, until the handle is brought in such a position that the pawl can engage one of the teeth l or l', when the arm I is forcibly released from the contacts B B′, and the spring K, exerting its force, quickly restores the arm I to its normal position, completely breaking the circuit of the switch. It will be observed that the arrangement of the cams n' n^2 is such that the arm I can be released from the contacts B B′, so that the spring K will cause it to assume its normal position, completely breaking the circuit, but that the arm cannot be moved again to close the circuit until the handle H is brought into its central position, insuring the inclusion of all the resistance in the circuit before the circuit is closed. It will also be observed that the arm I is moved during the first part of the return movement of the handle, breaking the circuit of the switch at the double contacts B B′ before the resistance-contacts are cut into the circuit, and sparking at the resistance-contacts is thereby prevented, while the sparking on the main circuit is inconsiderable on account of the use of the double contacts and the quick movement of the arm I. The same operation will take place if the handle H is moved to the right, which will cause the arm I to be moved to the left, closing the circuit between J J′ and C C′ and changing the direction of the current through the armature or fields, according to the particular arrangement of circuit connections well understood. It will thus be seen that with this arrangement, which is adapted for use with various kinds of translating devices and motors, but preferably with a series-wound motor, it is impossible to cut out the resistance before the circuit is closed, thus insuring the safety of the translating device, and, furthermore, after the circuit is broken it is impossible to again close it until the resistance is all included in the circuit.

It is evident that the minor details of construction may be varied, and while, for instance, I have shown but three cam projections and four ratchet-teeth there may be any number, and they may be relatively arranged to suit the requirements of each particular case. Furthermore, it will be seen that the construction of the device is exceedingly simple and adapted for use with heavy currents, and the contacts are such that they are not liable to burn or become injured by arcing, and, further, that the circuit is broken by a snap or spring controlled or actuated contact-arm, thus embodying desirable features which render the switch practicable.

What I claim is—

1. A switch comprising a base provided with stationary contacts, a contact-arm, a spring adapted to hold said arm in its normal open position, a handle, and connections between

the handle and arm to move the arm in either direction to close the circuit and to release the arm and permit it to assume its normal position under the influence of the spring to break the circuit, substantially as described.

2. A switch comprising a base, contacts mounted thereon, a contact-arm, a spring adapted to hold said contact-arm in its normal open position, a handle, pawl-and-ratchet connections between the handle and arm, and means for releasing the pawl-and-ratchet connections at predetermined points, substantially as described.

3. In an electric switch, the combination with a base having stationary contacts, of a contact-arm, a spring controlling said contact-arm, a handle, pawls connected to the handle, a ratchet connected to the arm, and a cam-plate controlling the pawls and ratchet, substantially as described.

4. In an electric switch, the combination with a base having stationary contacts, of a contact-arm, a spring controlling said arm, a ratchet connected to the arm, a handle, pawls connected to the handle and engaging the ratchet, and a cam-plate having cams controlling the pawls, the cams being arranged to permit the movement of the arm to close the contact and then to disengage the pawls and ratchet and also to permit the moving of the arm to break the contact and to then disengage the pawls and ratchet, substantially as described.

5. In an electric switch, the combination with a base having contacts, of a spring-controlled contact-arm, a handle, connections between the handle and contact-arm, resistance devices, and a contact carried by the handle controlling the resistance devices, the arrangement being such that the arm is moved to close the contact before the resistance devices are cut out of circuit, while the circuit can be broken after the resistance devices are cut in, substantially as described.

6. In an electric switch, the combination with a base having main-circuit terminals and resistance-contacts, of an arm arranged to make contact with the main terminals, a handle controlling the resistance-terminals, and connections between the handle and arm whereby the main circuit is closed before the resistance is cut out and may be broken after most of the resistance is cut in, but cannot be again closed until all the resistance is included in the circuit, substantially as described.

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

WILLIAM ALFRED DREWETT.

Witnesses:

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