No. 798,915. PATENTED SEPT. 5, 1905.

McGONIGALE MILLER.

ELECTRIC SWITCH.

APPLICATION FILED SEPT. 30, 1904.

Fig. 2.

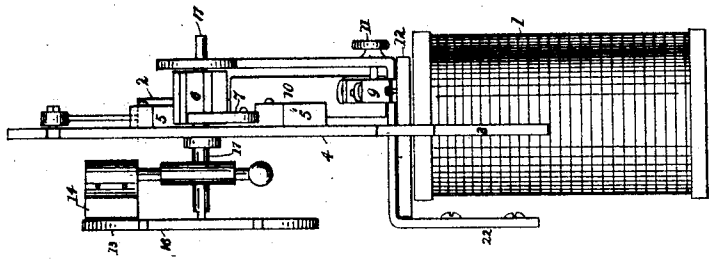
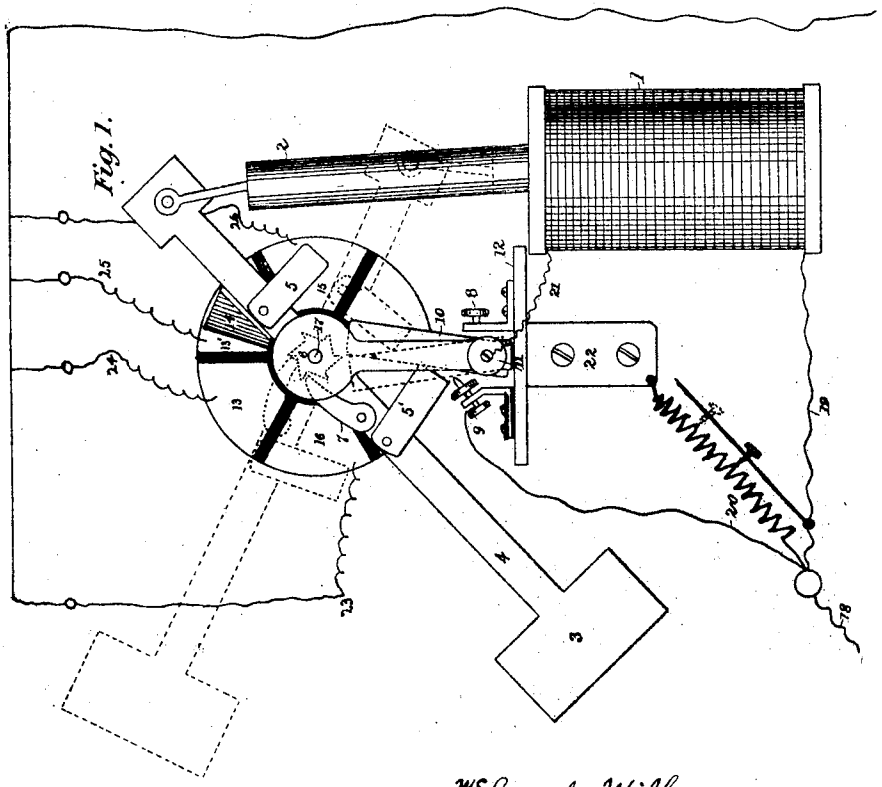


Fig. 1.



WITNESSES.

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McGONIGALE MILLER, OF LOUISVILLE, KENTUCKY, ASSIGNOR OF ONE-HALF TO HERMAN C. TAFEL AND ONE-HALF TO EDWARD W. WOLFF, OF LOUISVILLE, KENTUCKY.

ELECTRIC SWITCH.

No. 798,915. Specification of Letters Patent. Patented Sept. 5, 1905.

Application filed September 30, 1904. Serial No. 226,614.

To all whom it may concern:

Be it known that I, McGONIGALE MILLER, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Improvement in Electric Switches, of which the following is a specification.

My invention relates to a mechanism by which a reciprocating motion may be given to an armature in the shape of a core moving within a solenoid. This movement is effected in a general way as follows: The metallic core is attracted into the solenoid while the current is passing through the coil, and thus making it an electromagnet. When it has entered fully or to a certain fixed point, a short circuit becomes completed through a mechanism operated by said core or armature, the current leaves the solenoid, the magnet becomes dead, and the core is by some constantly-operating mechanical force, such as a spring or counterweight, withdrawn. This counterweight may be made adjustable, so as to vary its force and the consequent rapidity of the beam's motion. On the receding core's reaching a certain point this short circuit is broken, the current again passes through the solenoid, attracts the core, and the process is thus repeated indefinitely. It will be seen that at no time is the main current broken, but by alternate use of the short circuit and of the solenoid it at all times flows uninterrupted through the remainder of the circuit. This reciprocating motion can be converted by suitable means into any motion desired. In my present contrivance I use the motion in order to operate a switch, by which the current itself is automatically diverted to several connections one after another in regular sequence. My arrangement for effecting this result is described below. I accomplish these results by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front view of the contrivance, and Fig. 2 is a side view.

The same numbers represent the same parts in both figures.

1 is the solenoid.

2 is the core. 4 is a beam loosely attached thereto, having the lugs 5 5′ and the spring-actuated pawl 7 and terminating in a counterweight 3. The beam moves on the axle 17, to which are rigidly attached a brush 14, which may be so arranged as to be adjustable, and the ratchet-wheel 6, which is engaged by the pawl 7.

13 13′ 15 16 are parts of a metallic plate, which are touched by the brush and which form circular segments insulated from each other.

18 is the feed-wire, which branches into two parts—namely, the wire 19, which passes to the solenoid and through the coil, and the wire 20, which passes to the adjustable pin or screw 9, which is insulated from the metallic framework.

21 is the wire leading from the coil to the screw 11 in the metallic framework 12 22, which holds the axle 17. 10 is a swinging metallic piece attached to said framework and actuated sidewise by the lugs 5 5′.

23 24 25 26 are the wires leading out from the different segments of the circular plate 13 13′ 15 16.

Having indicated how the reciprocating motion is produced without breaking the current, I now show this matter more in detail and also show how the switch operates itself. With the reciprocating motion of the core the pivoted beam swings back and forth. When it moves inward (as I prefer to arrange it) to the point indicated by dotted lines on Fig. 1, the lug 5 on the beam pushes the piece 10 over against the screw 9. The short circuit is thus formed through the wire 20, the screw 9, the piece 10, framework 22, axle 17, brush 14, and plate 13. The current in the solenoid is thereby diverted, and it is demagnetized, so that the core is released, and it is mechanically drawn back by force of the counterweight until it reaches the position shown in black lines in Fig. 1. The lug 5′ on the beam then throws aside the piece 10, thus breaking its contact with the screw 9 and destroying the short circuit. The current resumes its course over the long circuit, which has at all times been closed—namely, through the wire 19, the solenoid 1, the wire 21, the screw 11, the framework, axle, brush, and plate. Now when the beam moves toward the solenoid the pawl attached to it engages a tooth of the ratchet-wheel on the axle and produces a fractional or sectional rotary motion—that is, it carries the axle and the brush attached thereto around a certain portion of a circle, which fraction is inversely as the number of

segments into which the plate 13 13′, &c., is divided, so at each motion the brush is carried from one segment to the next. The brush is arranged at an angle to the radii dividing the segments, so that it always touches on a succeeding segment before entirely losing contact with the preceding one, and therefore the current is never at any time broken.

In order to vary the amperage of the solenoid, I provide an adjustable shunt from the feed-wire to the framework or to the wire 21. By this means the strength of the current passing through the solenoid may be diminished as circumstances may render desirable.

Having now fully described my contrivance, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In electric switches the combination of a solenoid inclosing a removable metallic core, a mechanically outwardly actuated beam connected with said core and pivoted on an axle; a ratchet-wheel journaled on the axle and a pawl attached to said beam engaging the ratchet-wheel, so as to give the wheel and axle an intermittent fractional rotatory motion with each reciprocating motion of the core and beam; a contact-brush rigidly attached to the axle, and insulated conducting-surfaces adjacent to said brush; wires leading from each of said surfaces; electric connections between the solenoid and the framework of the machine and electric connections leading direct from the feed-wire to an insulated point on the machine, and means actuated by the beam for making connection between said point and the axle, so as to shunt the current out of the solenoid, while maintaining at all times a current through the axle, contact-brush and one conducting-surface adjacent thereto, substantially as described.

2. In electric switches the combination of a solenoid inclosing a removable metallic core, an adjustable shunt, regulating the current to said solenoid, a mechanically outwardly actuated beam connected with said core, and pivoted on an axle; a ratchet-wheel journaled on the axle and a pawl attached to said beam, engaging the ratchet-wheel so as to give the wheel and axle an intermittent fractional rotatory motion with each reciprocating motion of the core and beam; a contact-brush rigidly attached to the axle and insulated conducting-surfaces adjacent to said brush; wires leading from each of said surfaces; electric connections between the solenoid and the framework of the machine, and electric connections leading direct from the feed-wire to an insulated point on the machine, and means actuated by the beam for making connection between said point and the axle, so as to shunt the current out of the solenoid, while maintaining at all times a current through the axle, contact-brush and one conducting-surface adjacent thereto, substantially as described.

3. The combination of an electric switch, a solenoid actuating same and in circuit with one side of a main feed-line to said switch, means for short-circuiting the current from the solenoid, a core within the solenoid adapted to be reciprocated by the periodic short-circuiting, and means for maintaining a closed circuit through the switch, substantially as described.

4. The combination of an electric switch, a solenoid actuating same and in circuit with one side of a main feed-line to said switch, means for short-circuiting the current from the solenoid, a core within the solenoid adapted to be reciprocated by the periodic short-circuiting, means for maintaining a closed circuit through the switch, and an adjustable shunt regulating the current to said solenoid, substantially as described.

In testimony of which I have set my name this 28th day of September, 1904.

McGONIGALE MILLER.

Witnesses:

A. LINCOLN DEMBITZ,

H. C. TAFEL.