H. C. GRANT.

SWITCH USED WITH ELECTRIC MOTORS.

APPLICATION FILED JUNE 6, 1908.

955,154.

Patented Apr. 19, 1910.

3 SHEETS—SHEET 1.

Fig. 1

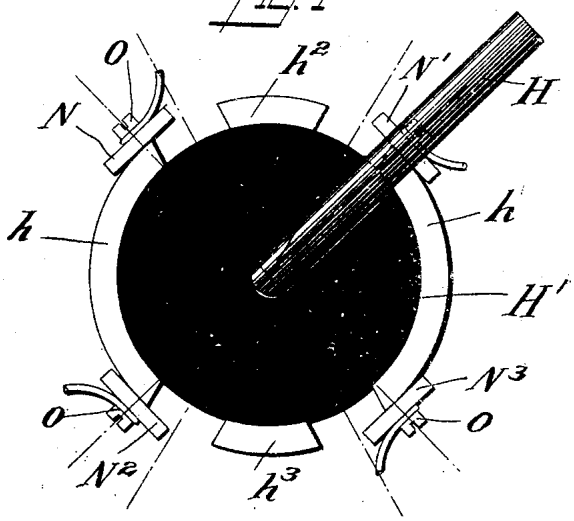
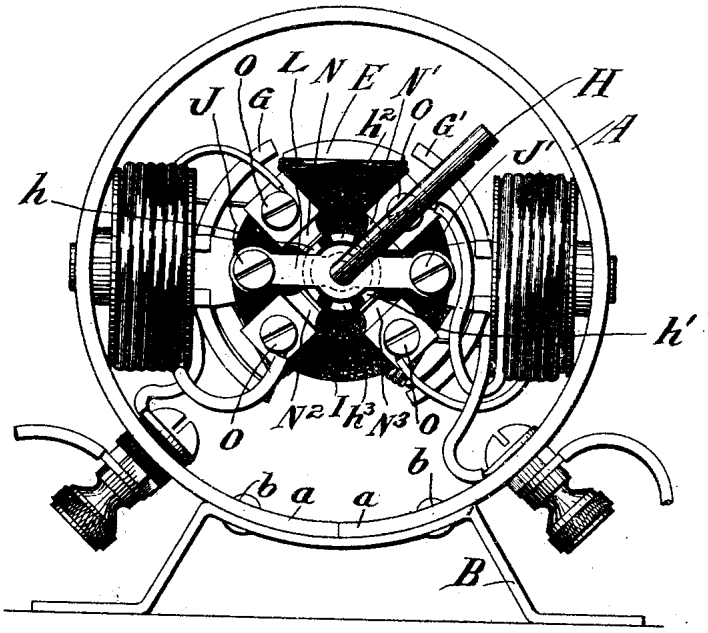


Fig. 2



Witnesses:
Albert Mahin
F. E. Alexander

Inventor
Harry C. Grant
By his Attorney
Frank M. Ashley

H. C. GRANT.

SWITCH USED WITH ELECTRIC MOTORS.

APPLICATION FILED JUNE 6, 1908.

955,154.

Patented Apr. 19, 1910.

3 SHEETS—SHEET 2.

Fig. 3

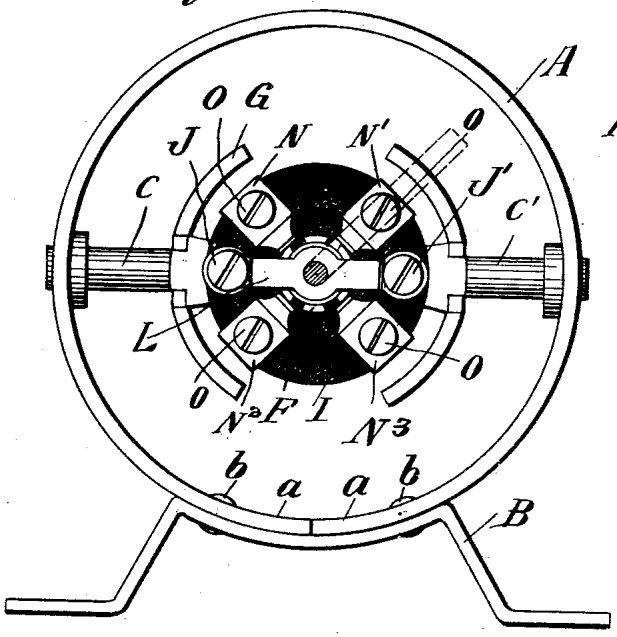


Fig. 4

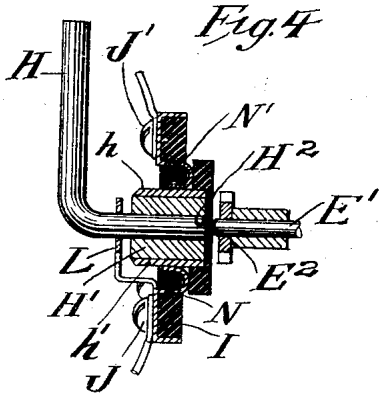


Fig. 5

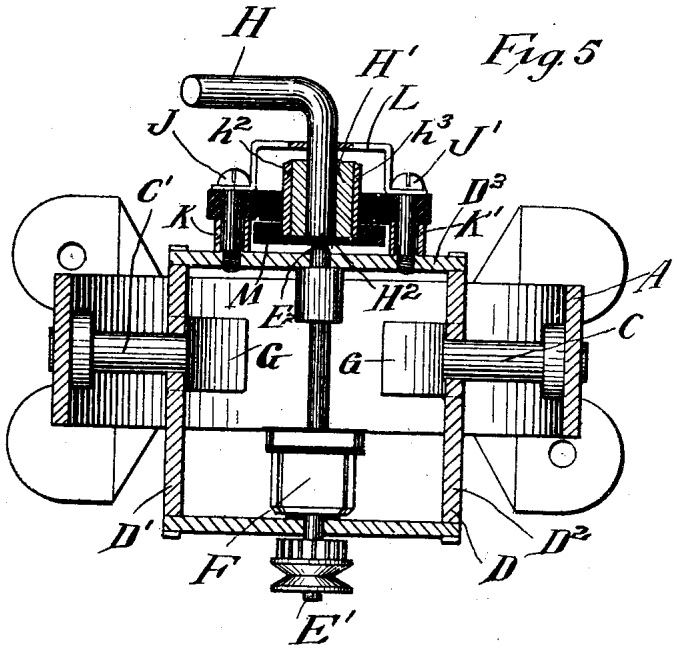
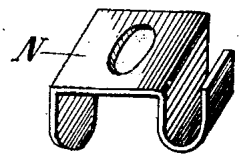


Fig. 6



Witnesses:

Albert Mahin

F. E. Alexander

Inventor

Harry C. Grant

By his Attorney

Frank H. Ashley

H. C. GRANT.

SWITCH USED WITH ELECTRIC MOTORS.

APPLICATION FILED JUNE 6, 1908.

955,154.

Patented Apr. 19, 1910.

3 SHEETS—SHEET 3.

Fig. 7

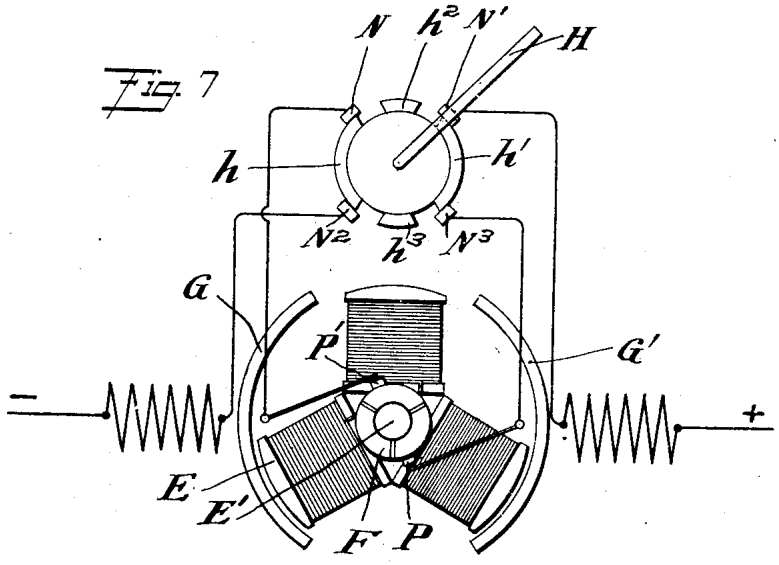
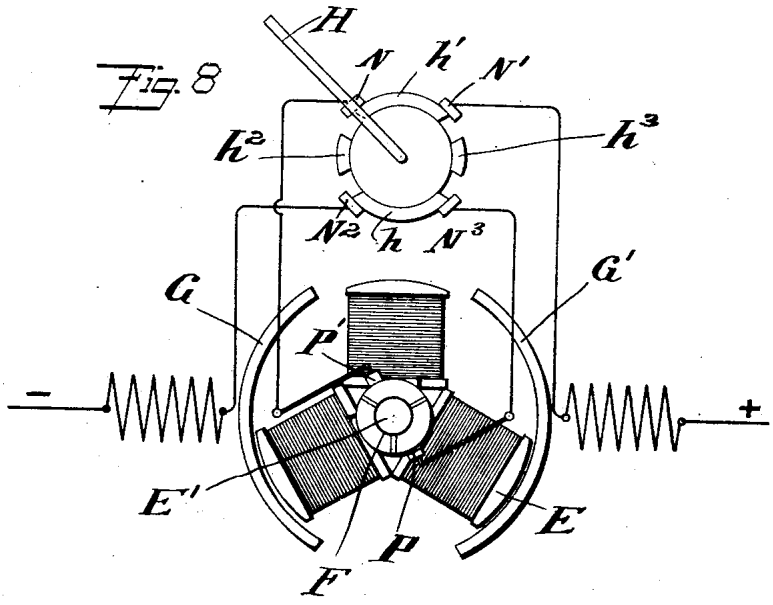


Fig. 8



Witnesses:

Albert Molin

F. E. Alexander

Inventor

Harry C. Grant

By his Attorney

Frank H. Ashley

UNITED STATES PATENT OFFICE.

HARRY C. GRANT, OF BAYONNE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE LIONEL MANUFACTURING COMPANY, A CORPORATION OF CONNECTICUT.

SWITCH USED WITH ELECTRIC MOTORS.

955,154. Specification of Letters Patent. Patented Apr. 19, 1910.

Application filed June 6, 1908. Serial No. 437,117.

To all whom it may concern:

Be it known that I, HARRY C. GRANT, a citizen of the United States, and resident of Bayonne, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements for Switches Used with Electric Motors, of which the following is a specification.

My invention relates to improvements for switches used with electric motors, and my object is to provide a simple and durable construction which may be used to reverse the direction of rotation of the armature of a motor.

In the drawings the switch is shown mounted upon and in operative relation with an electric motor.

Referring to the drawings which form part of this specification, Figure 1 is an end view of the switch. Fig. 2 is an end view of the motor showing the position of the switch. Fig. 3 is an end view of the motor, the armature and field coils being removed. Fig. 4 is a cross sectional view through the switch, and discloses the U shaped spring contact. Fig. 5 is a plan sectional view through the frame of the motor with the armature and field coils removed. Fig. 6 is a perspective view of the spring shown on an enlarged scale. Fig. 7 is a view illustrating the electric circuit through the motor when the switch is in one position; and Fig. 8 is a view illustrating the circuit when the switch is set in the opposite position.

A, indicates a band of sheet metal formed circular as shown, the ends a, a, of which are held together by a base strip B, which is riveted by rivets b, b, to said band A. Supported by band A, and firmly connected thereto are rods C and C', which in turn support a rectangular shaped frame D, in which rotates the armature E, (clearly illustrated in Fig. 7) which is mounted on a shaft E'. The coils of the armature are connected to a commutator F in the usual manner.

G and G' indicate the field poles which are formed integral with the frame members D' and D^2 respectively.

Connected to and supported by the frame members D^3, is the switching device which comprises a rod H, a cylinder of insulating material H' mounted thereon, and sectional conductors h and h' mounted thereon, each of which has a length exceeding 90° of the circle, and two short sections h^2 and h^3 spaced between the ends of sections h and h' as shown, for the purpose hereinafter set forth.

I, indicates a ring of insulating material, which is held to element D^3 by screws J and J', which pass through spacing tubes K and K' as shown.

L, indicates a metal strip which supports the lever rod H on one side of the switch.

M, indicates a ring of insulating material which encircles the sectional conductors h—h' h^2 and h^3, and assists in holding same in position on element H'.

One end of rod H is provided with a counterbored center at H^2 which engages with the cone shaped end E^2 of shaft E', and serves the dual function of supporting rod H and attached parts, and preventing excessive end play of shaft E'.

Located in the ring I and held in operative relation therein, are spring contact elements N, N'—N^2 and N^3, (the shape of which is clearly illustrated in Fig. 6) said spring elements being held to ring I by binding screws O, O, etc., which connect the ends of the wires, the circuits through which are clearly illustrated in Figs. 7 and 8.

The relative width of the spring elements N, N', N^2 and N^3 and the sectional conductor segments h, h', h^2 and h^3, is clearly illustrated in Fig. 2, which shows segment h in contact with switch members N, and N^2, and segment h' in contact with switch members N' and N^3, and shows segments h^2 and h^3 in their relative positions. These segments h^2 and h^3 serve the function of partly filling the gap between the ends of segments h and h', and obviate the necessity of filling said gap with insulating material, and are of sufficient length to come under the spring elements before elements h and h' break contact therewith, thereby preventing the springs from projecting below the outer circle of segments.

I have not shown the brushes except in Figs. 7 and 8, since their construction and management is the usual construction and embodies nothing new over the prior art in so far as this application is concerned.

The operation of the motor will be clearly understood by referring to Figs. 7 and 8. In Fig. 7, the current flows from the positive pole through switch member N', segment h', switch member N^3 to brush P and through commutator F to brush P' to switch

member N, and through segment h to switch N^2 and thence to negative pole. In Fig. 8, the current flows from the positive pole through switch member N′ and segment h' to switch member N, and to brush P′, through commutator F to brush P and member N^3 segment h, N^2, and thence to negative pole, thus reversing the direction of current through the armature and in consequence, reversing the direction of rotation of the armature, since the field coils are energized by a series field circuit in one direction at all times. It will be noted that this reversal of rotation is effected by turning the lever rod H through an arc of 90° which feature has proved to be of considerable value to me by reason of the fact that when the motor is mounted on a truck and propelling cars on rails, the motor may be reversed by placing an obstruction in the path of the lever H sufficient to turn said lever 90°. I can automatically cause the motor to reverse its direction of rotation, thereby permitting me to operate a car which will go to the end of the line, dump its load, and reverse the motor, thus causing the car to return to the starting point, without any manual operation. It is particularly adapted to toy motors and cars.

Having thus described my invention, what I claim as new and desire to secure by Letters. Patent is,

A switch for an electric motor comprising a lever having a cylindrical bushing mounted thereon, a plurality of conducting segments mounted on said bushing, a ring of insulating material encircling said bushing and said segments, a plurality of sheet metal switch members fastened to said ring the inner ends of which are bent in U shaped form to serve as springs and abutting said conducting segments, and means for holding said ring to the frame of said motor.

Signed at New York in the county of New York and State of New York this 4th day of June A. D. 1908.

HARRY C. GRANT.

Witnesses:

FRANK M. ASHLEY,

A. T. SCHARPS.