

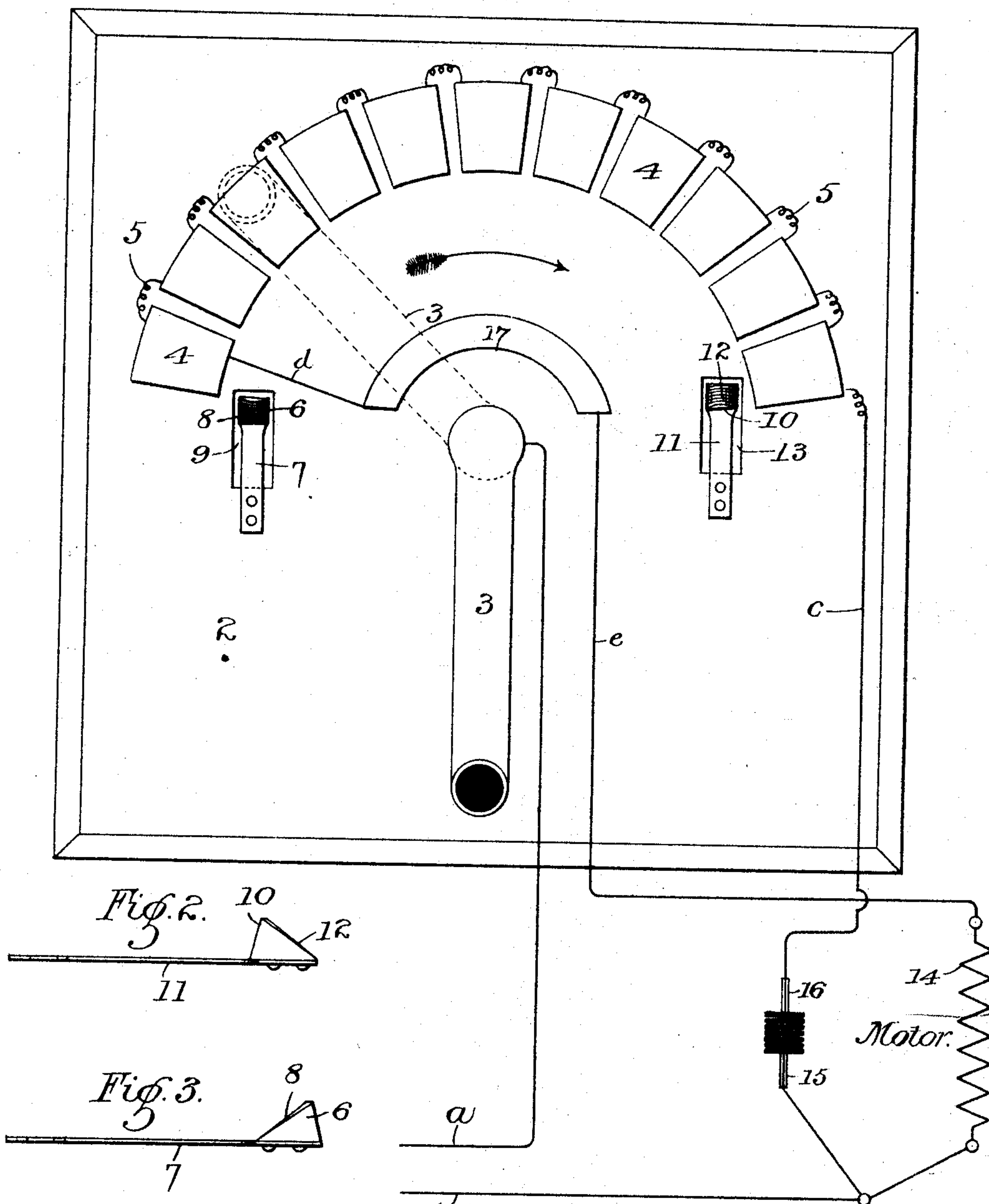
(No Model.)

A. D. ADAMS.
STARTING DEVICE FOR ELECTRIC MOTORS.

No. 503,568.

Patented Aug. 22, 1893.

Fig. 1.



Witnesses:-

C. R. Caldwell

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b

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UNITED STATES PATENT OFFICE.

ALTON D. ADAMS, OF ST. PAUL, MINNESOTA.

STARTING DEVICE FOR ELECTRIC MOTORS.

SPECIFICATION forming part of Letters Patent No. 503,568, dated August 22, 1893.

Application filed October 19, 1891. Serial No. 409,142. (No model.)

To all whom it may concern:

Be it known that I, ALTON D. ADAMS, of St. Paul, Ramsey county, Minnesota, have invented certain Improvements in Starting-
5 Boxes for Electric Motors, of which the following is a specification.

My invention relates to improvements in starting boxes for electric motors, its object being to provide means whereby in the case
10 of shunt or compound wound motors, the motor can be cut in only when all of the resistance of the box is interposed in the armature circuit, so as to protect the armature from excessive current, and can be cut out only
15 when working under full pressure, or when no resistance of the box is interposed in the armature circuit, so that, when the motor is cut in and while in circuit, the shunt coil of the field shall receive the full pressure of the
20 line, and when the motor is cut out said coil shall remain connected with the armature, whereby excessive sparking may be prevented in the cutting out of the motor, and danger of burning out the armature prevented
25 in the cutting in of the motor.

To this end my invention consists in arranging in combination with the series of contact plates, and the contact arm of the starting box, a stop to engage the arm as it breaks
30 the circuit at the last plate of the series, or the one with which the arm makes contact when none of the resistance of the box is interposed in the armature circuit, so as to prevent its return thereto by a reverse movement; and necessitating its being swung
35 around on its pivot to the first contact of the series, or the one with which the arm makes contact when all of the resistance of the box is interposed in the armature circuit, in order to start the motor; and in arranging another stop to engage the arm to prevent the
40 breaking of the circuit at said first contact plate.

It further consists in arranging a secondary contact plate directly connected with the shunt coil of the field, and also with said first contact plate, in such position that said arm is in electrical connection with it during all the time it is in contact with the plates of the
50 starting box, such contact being broken when the arm leaves said last plate of the box.

My invention further consists in the con-

struction and combination hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming
55 part of this specification, Figure 1 is a plan view of my improved starting box, the line wire connections and motor being shown conventionally, and Figs. 2 and 3 are detail side
60 elevations of the stops.

In the drawings, 2 represents the base or support of the box, 3 the contact arm pivoted centrally thereon, 4 the contact plates arranged in a series preferably in an arc of a
65 circle, of which the center is the pivot of the arm 3, and connected in the usual way by resistance coils 5.

17 is a contact plate arranged preferably intermediate of the pivot of the arm and the
70 series of contacts of the box, of such length that the arm is in direct electrical connection or contact with it, whenever in contact with any of the plates of the series, but the contact of the arm with it is broken when the
75 arm leaves the last of said plates. Its preferred form is therefore, as shown in the drawings, that of an arc of a circle having its center at the pivot of the arm. The line wire *a* is electrically connected with the contact arm
80 3, and the line wire *b* with the shunt coil 14 of the field of the motor, and also with its armature brush 15. The last plate of the series of the box is connected by the wire *c* with the armature brush 16, and the contact plate
85 17 is connected by means of the wire *d* with the first plate of the series, and by the wire *e* with the shunt coil 14 of the motor.

Arranged adjacent to the first contact plate of the series, or the one shown at the extreme
90 left in Fig. 1, is the stop 6, shown in detail in Fig. 3, having the spring connection 7 with the base, and standing over a recess 9 in the base into which it may be depressed. This stop has a beveled face 8 which permits the
95 arm to slide over it, when turned in the direction of the arrow, the spring yielding to the pressure but thrusting the stop upward as the arm passes over it, so as to engage the arm and prevent its return movement. Similarly placed with reference to the last plate
100 of the series, or that shown at the extreme right of Fig. 1, is the stop 10, having a similar spring connection 11 with the base, and

standing over the recess 13 in the base. Its beveled face 12 permits the arm 3 to pass over it when carried in the direction of the arrow, but return movement is prevented in the same manner as by the stop 6. With this construction and arrangement, the arm is necessarily in contact with the adjacent plate when resting against the stop 6, and necessarily out of contact with the adjacent plate when bearing against the stop 10. By this means, freedom of movement of the arm is permitted over the entire series of plates of the box, but breaking of the circuit is prevented when there is any interposed resistance. Also the closing of the circuit is prevented except when all of the resistance is interposed, whereby burning out of the armature is prevented. It is also evident that as soon as the arm 3 is brought into contact with the first plate of the series, the shunt coil 14 of the motor receives the full pressure of the line current from the wire *a* through the arm, the plate 17 and the wire *e*, while all of the resistance of the box is interposed between the armature of the motor and the wire *a*. With the forward movement of the arm over the plates of the box, the same connection is maintained between the wire *a* and the shunt coil, but as the resistance interposed between it and the armature is decreased, the armature thus receives greater and greater pressure of current. When the arm 3 is carried off the last plate 4 of the box, so as to break the circuit with the armature, it at the same time leaves the plate 17 and breaks the circuit with the shunt coil, the coil and armature being however connected through the starting box as above described, whereby excessive sparking is prevented.

I have shown my improved starting box connected with a shunt wound motor, but it is adapted to be used also with a series motor, the secondary contact being omitted.

I claim—

1. In a device of the class described, the combination of the series of contacts with intermediate resistances, the pivoted contact arm, and the stop engaging said arm as it breaks the circuit at the contact in circuit

with no included resistance, so as to prevent reverse movement of the arm, and compel it to be turned forward through a complete rotation in the same direction to reach said contact again, substantially as described.

2. In a device of the class described, the combination of the series of contacts, the intermediate resistances, the pivoted contact arm, and stop devices for said arm permitting it to be turned to close the circuit at one end of said series, and break it at the other end thereof, but preventing it from making and breaking the circuit by a reverse movement, substantially as described.

3. In a device of the class described, the combination of the series of contacts, the intermediate resistances, the pivoted contact arm, and the stops engaging said arm and preventing it from reverse movement to break the circuit at the first contact, or to close it at the last contact, substantially as described.

4. In a device of the class described, the combination of the series of contacts, their intermediate resistances, the pivoted contact arm, and the stop devices for said arm preventing a reverse movement to break the circuit at the first contact, or to close it at the last contact, and compelling it when the circuit is broken to be turned forward in the same direction to the first contact, substantially as described.

5. In a device of the class described, the combination of the series of contacts, the intermediate resistances, the pivoted contact arm and the spring controlled stops permitting said arm to be turned forward onto the first contact to close the circuit therethrough, but preventing reverse movement to break the circuit thereat, and permitting the arm to be turned forward to break the circuit at the last contact, but preventing reverse movement over it, substantially as described.

In testimony whereof I have hereunto set my hand this 14th day of October, 1891.

ALTON D. ADAMS.

In presence of—

T. D. MERWIN,
A. M. WELCH.