No. 770,405. PATENTED SEPT. 20, 1904.

J. F. TRACY.

STARTING BOX FOR MOTORS.

APPLICATION FILED MAY 4, 1904.

NO MODEL.

FIG. 2.

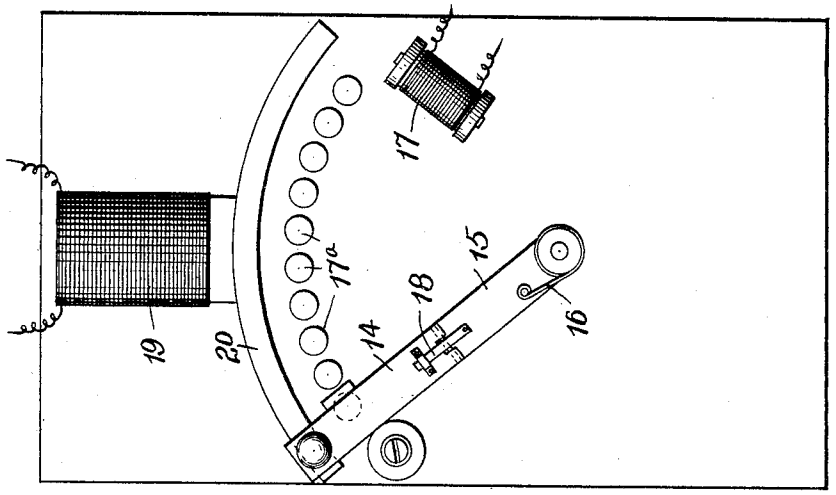
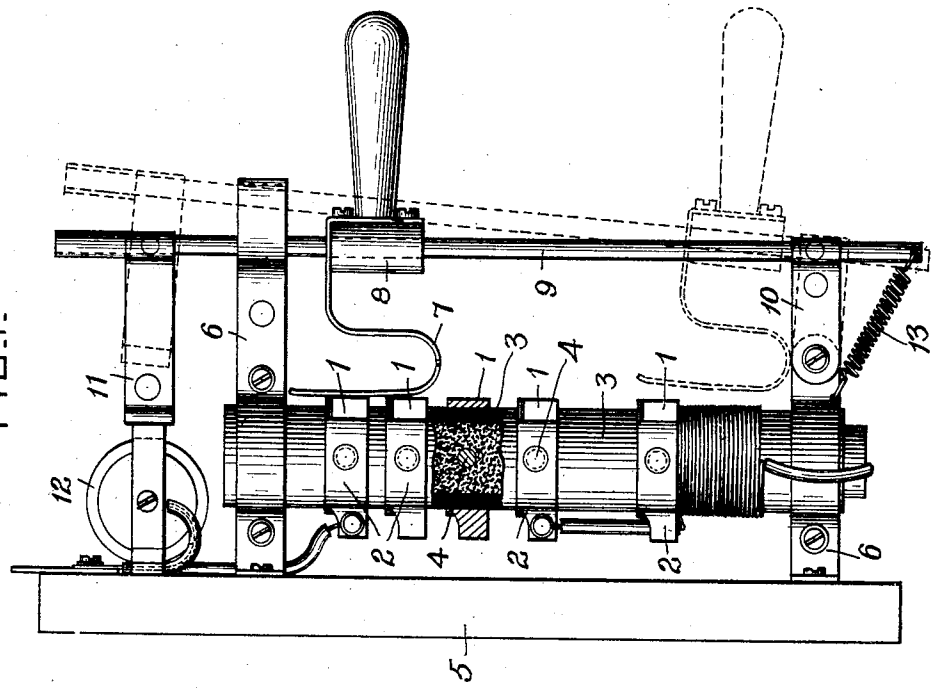


FIG. 1.



WITNESSES:

Herbert Bradley.

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INVENTOR

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by Christy & Christy, Atty's

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UNITED STATES PATENT OFFICE.

JAMES F. TRACY, OF SHERIDANVILLE, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO WILLIAM H. McFADDEN, OF PITTSBURG, PENNSYLVANIA.

STARTING-BOX FOR MOTORS.

SPECIFICATION forming part of Letters Patent No. 770,405, dated September 20, 1904.

Application filed May 4, 1904. Serial No. 206,376. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. TRACY, a citizen of the United States, residing at Sheridanville, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Starting-Boxes for Motors, of which improvement the following is a specification.

The invention described herein relates to certain improvements in starting-boxes for electric motors.

Means have heretofore been employed for automatically returning the switch of starting-boxes to normal position on the drop or cessation of the current through the field of a shunt-wound motor. While such starting-boxes have given good results, they are defective in that the contact-spring carried by the switch-arm will bear upon the contact-plates of the box during the reverse movement, and if one or more of these plates are out of line—*i. e.*, either high or low with respect to the others—an arc will be formed, destroying or injuring the starting-box.

The object of the present invention is to provide for the automatic movement of the spring-contact away from the plane of the stationary contact plates or prints simultaneous with the reverse movement of the switch-arm.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of an improved form of starting-box embodying my improvements, and Fig. 2 is a plan view of a starting-box of the usual form or construction and having my improvement applied thereto.

My improvement can be applied to starting-boxes differing materially in the construction and arrangement of their parts or elements. My preferred form or type of starting-box is shown in Fig. 1 and consists of a series of contact-surfaces 1, formed as a part of and integral with jaws 2, which pass around a non-conducting tubular support 3. Within this tubular support is packed a finely-divided conducting material, such as cast-iron. The jaws of the contact-surfaces are secured in position by means of pins 4, passing through the wall of the non-conducting tube and through the conducting-filling within the same, so that these pins form not only a support for the conducting-surfaces, but also electrical connections between the contact-surfaces and the finely-divided conducting material of the core. These contact-surfaces may be spaced any suitable distance apart, according to the amount of resistance desired between adjacent surfaces. The tube carrying the contacting surfaces is secured to a suitable base 5 in any suitable manner—for instance, by brackets 6, having semicircular portions embracing the tubes near their ends. The movable contact 7, preferably made in the form of a spring, is secured to a head 8, movably mounted on a bar 9, which is pivotally connected, preferably by an arm 10, to one of the brackets 6. On the free end of the bar 9 is secured the armature 11 of an electromagnet 12, which is designed to be included in the circuit of the field of the motor. When the magnet is excited, the bar 9 will be held in such relation to the contact-surfaces 1 that a movement of the sliding head 8 will cause the contact-spring 7 to move along and in electrical contact with the surfaces 1. As soon as the current in the field is reduced or cut off the magnet 12 becomes deënergized, so that the bar 9 is free to be shifted either by its own weight, if the starting-box is arranged in a vertical position, as shown, or by spring 13, if the starting-box is arranged horizontally. By this movement of the bar, which is automatic, the latter will assume such an inclined position that the head 8 will slide freely to the lower end of the arm to normal position, as clearly shown by dotted lines in Fig. 1. It will be observed that this movement of the head and contact-spring is subsequent to the shifting of the arm with the contact head and spring, so that the latter will be entirely away from the contact-surfaces during the automatic return movement of the head 8.

In applying my improvement to the form or construction of starting-boxes now in general use where the switch-arm swings in the arc of a circle along a series of contact-knobs

provision is made for the movement of at least a portion of the switch-arm away from the plane of the contact-knobs simultaneous with or prior to the return movement of the switch-arm. A convenient construction to this end is shown in Fig. 2, wherein the switch-arm is formed in two sections 14 and 15, pivotally connected together. A spring 16 is employed, as is customary, to return the arm to normal position when a circuit of the field of the motor is reduced to broken, said circuit including an electromagnet 17 for holding the switch-arm in operative position. In order to shift the outer section of the arm away from the plane of the knobs 17^a, a spring 18 is secured to one of the sections and so connected to the other section that when the outer section of the arm 14 is in operative position the spring will be placed under considerable tension. In order to hold the contact-plate carried by the section 14 in contact with the knobs or plates 18 during the normal operation of the starting-box, an electromagnet 19 is so arranged that one pole, as 20, which is so constructed to be parallel with the line of knobs 17, will be parallel with the line of movement of the armature secured to the outer end of the section 14. By this construction and arrangement of an electromagnet the section 14 will be held down in operative position so long as the magnet 19, which is to be included in the circuit of the field of the motor, is excited.

It is characteristic of my improvement that contact carried by the switch-arm is not only returned to normal position on a reduction or cessation of current in the field of the motor, but its return movement is in a different plane and therefore out of contact with the surfaces or knobs included in the circuit.

I claim herein as my invention—

1. A starting-box for shunt-wound motors having in combination a series of contact knobs or surfaces, a movable bar, a contact spring or plate movable along the bar, means controlled by the field-current for holding the bar in such position that the spring or plate will contact with the knobs or surfaces in its movement along the bar, and means automatically operative on a rupture of the field-current for shifting the bar from normal position, substantially as set forth.

2. A starting-box for shunt-wound motors having in combination a series of contact knobs or surfaces, a movable bar, a contact spring or plate movable along the bar, means controlled by the field-current for holding the bar in such position that the spring or plate will contact with the knobs or surfaces in its movement along the bar, means automatically operative on a rupture of the field-current for shifting the bar from normal position, the spring or plate being automatically returnable along the bar to normal position when the latter is moved from normal position, substantially as set forth.

3. A starting-box for shunt-wound motors having in combination a series of contact knobs or surfaces arranged in line vertically, a bar pivotally supported in the plane of the knobs or surfaces and automatically movable away from the knobs or surfaces, a contact spring or plate movably mounted on the bar, means controlled by the field-current for holding the bar in such position that the spring or plate will contact with the knobs or surfaces in its movement along the bar, and means automatically operative on a rupture of the field-current for shifting the bar and contact spring or plate, substantially as set forth.

4. A starting-box for shunt-wound motors having in combination a column of comminuted conductive material, a series of contact knobs or surfaces electrically connected to such column, a pivotally-mounted bar, a contact spring or plate movable along said bar, an electromagnet for holding the bar in such position that the plate or spring will in its movement along the bar contact with the knobs or surfaces and means automatically operative on the deënergization of the magnet for shifting the bar from normal position, substantially as set forth.

5. A starting-box for shunt-wound motors having in combination a series of knobs or surfaces, a bar pivotally mounted in the plane of the knobs or surfaces, a contact spring or plate movable along the bar, an electromagnet for holding the bar in such position that the spring or plate will in its movement contact with the knobs or surfaces, means automatically operative on the deënergization of the magnet for shifting the bar from normal position, and means for automatically returning the spring or plate to initial position, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES F. TRACY.

Witnesses:
F. E. GAITHER,
DARWIN S. WOLCOTT.