

E. GARSIDE.
 STARTING SWITCH FOR ELECTRIC MOTORS.
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950,130.

Patented Feb. 22, 1910.

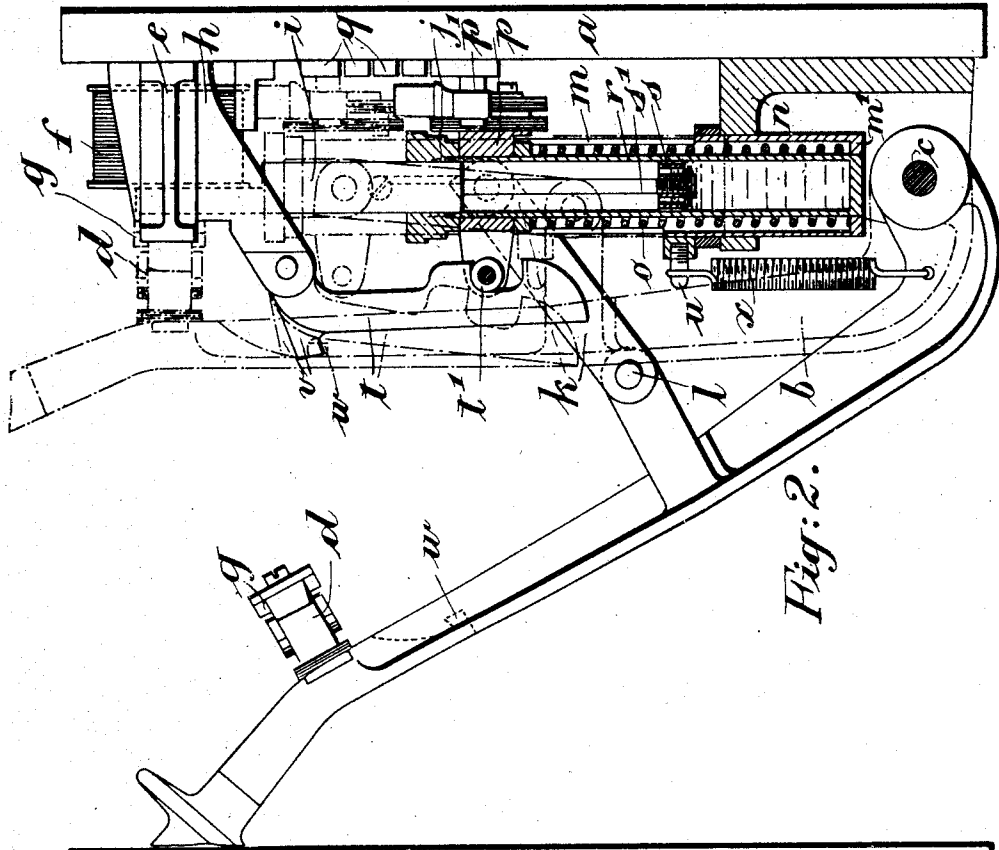


Fig. 2.

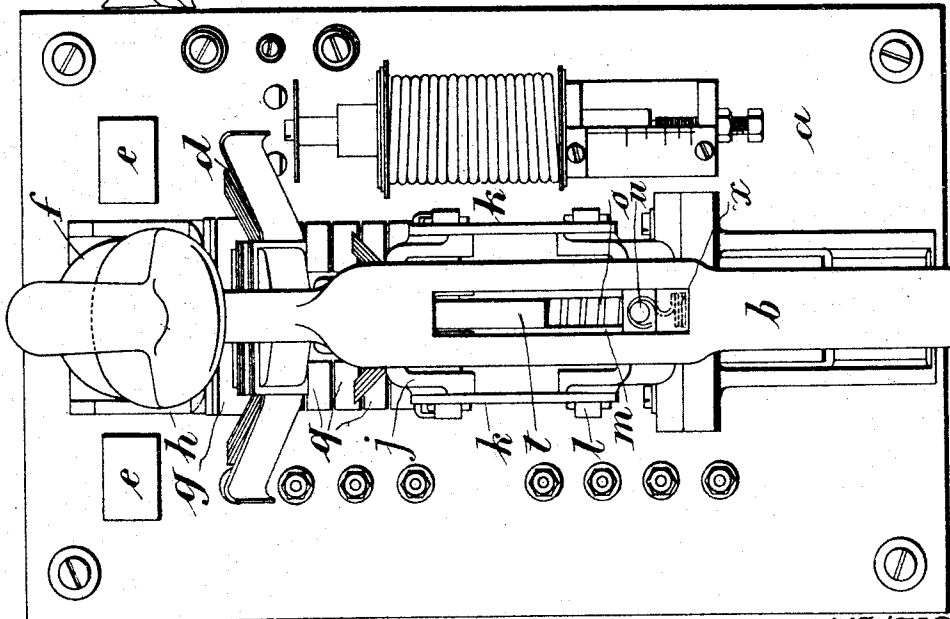


Fig. 1.

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UNITED STATES PATENT OFFICE.

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STARTING-SWITCH FOR ELECTRIC MOTORS.

950,130.

Specification of Letters Patent.

Patented Feb. 22, 1910.

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To all whom it may concern:

Be it known that I, EDMUND GARSIDE, a subject of Great Britain, residing at Darlington, in the county of Durham, England, have invented new and useful Improvements in Starting-Switches for Electric Motors, of which the following is a specification.

This invention relates to starting switches for electric motors of that class in which a series of resistances are gradually cut out of the motor circuit when the current is first switched on and in which the switch is held on by a "no load release" arrangement.

The object of the invention is to construct such a device in a simple and effective manner, with little or no risk of derangement and to be operated by a simple push into the "closed" position.

In a sister specification accompanying this application for Letters Patent, I have described the switch arm having a detent pivoted to it for engaging the piston rod which carries the resistance brush contacts, said detent being tripped from its engagement with the piston rod just when the main switch is being closed. If the switch arm is not drawn fully back in order to engage the piston rod, the detent coming in contact with the tripping device, prevents the arm from being completed in its stroke so as to close the main switch. I have devised an alternative arrangement, in which the detent is pivoted to a fixed support and engages the contact brush carrier so as to hold it stationary during the major portion of the movement of the switch arm. The switch arm is adapted, during the closing movement, to compress the spring against the resistance of the stationary contact brush carrier. As the switch arm reaches the end of its travel and just before the main switch is closed, the detent is tripped by coming in contact with an abutment on the spring compressing device and the carrier with its brush contacts follows the spring compressing device and moves over the resistance contacts cutting out the resistance in its travel, its movement being controlled by a dash-pot arrangement. If the switch arm has not been started in its extreme open position and the detent has not engaged the contact brush carrier, the detent is arranged in this position so as to form a stop

against the movement of the switch arm to prevent the main circuit being closed.

In order that the invention may be the better understood, I will now proceed to describe the same in relation to the accompanying drawing, reference being had to the letters and figures marked thereon.

Like characters refer to like parts.

Figure 1 is a front elevation of a switch constructed in accordance with my invention, the switch being shown in the open position. Fig. 2 is a side elevation of the same as shown in Fig. 1, and with the mechanism shown in dotted lines in the closed position.

Upon the base *a* the switch arm *b* is pivoted at *c* and carries at its upper end the brush contacts *d* adapted to complete the circuit between the terminals *e*, an electromagnet *f* mounted on the base *a* and an armature *g* carried by the arm *b* holding the switch in the closed position while the current is on, and forming a "no volt" release should the current fail.

Upon a bracket *h* rigidly carried by the base *a* is fixed a cylindrical guide rod *i* on which slides a yoke *j* to which are pivoted the connecting rods *k* which in turn are coupled to the arm *b* by the pins or trunnions *l*. This yoke *j* has fixed to it a slotted tubular extension *m* which is slidably supported at its lower end in the guide *n* rigidly carried by the base *a*, within the extension *m* the spiral spring *o* is disposed so as to abut against a shoulder *m*¹ at the bottom end, while the top end of the spring engages against a shoulder on the carrier *p* on which the connecting brushes *p*¹ are mounted for bridging the resistance contacts *q* mounted on the base *a*.

To the carrier *p* is attached the cylinder *r* of the dash-pot arrangement in the lower part of which the controlling liquid is contained and is acted on by the piston *s* carried by a rod *s*¹ rigidly mounted on the guide *i*.

Upon the bracket *h* is pivoted the detent *t* which is adapted to engage a roller *t*¹ carried by the resistance contact carrier *p* in order to form a temporary abutment against which the spring *o* can be compressed.

The part *m* is provided with a tripping stud *u* which on its upward movement contacts with the beveled end of the detent *t* and trips it out of engagement with the

roller t^1 . The detent t is provided at its upper part with a nose v which contacts with a projection w on the switch arm b should the detent t not be properly tripped and prevents the main switch being closed but when such tripping does take place as shown in dotted lines the nose v and projection w miss one another and allow the main switch to be closed. This arrangement prevents the main switch being closed except when all the resistance is in the circuit and involves the necessity of pulling the switch arm into the extreme open position before the closing action is commenced. For example, if when the main switch is closed it is opened by hand and the switch arm is partially drawn back, the detent t directly the nose v and projection w are out of contact with one another falls from the inclined position as shown in dotted lines, into the vertical position as shown in full lines, and therefore the switch arm is stopped from completing the closing action again by the nose v and projection w abutting against one another until the switch has been completely reset with all the resistance in the circuit. In order to return the parts to the initial positions a spiral spring x is attached at one end to the stud u and at the other end to the arm b , the spring being compressed or released by the arm b in its movement as may be necessary for the conditions obtaining at each opening and closing motion of the arm b .

The operation of the switch is as follows:—Assuming the switch is open as shown in Fig. 1, and in full lines in Fig. 2 and the detent t has engaged the roller t^1 of the contact carrier p , immediately the switch arm b is moved in the closing motion the connecting rods k push the yoke j upward and compress the spring o and just at the end of the stroke the stud u trips the detent t out of engagement with the roller t^1 and allows the contact brush p^1 to travel over the resistance contacts q under the action of the spring, thus cutting out resistance. On the switch arm completing its stroke for closing the main circuit it is held in such position by the electromagnet of the “no volt” release. Directly the main switch is opened either by short circuiting the electromagnet or by pulling the arm backward by hand, the contact brush p^1 and the dash-pot cylinder r are brought down by the yoke j into the initial position so that the detent t again engages the roller t^1 for the next operation.

I claim:—

1. An electric motor starting switch consisting of in combination a pivoted switch arm carrying a main circuit closing device, a series of resistance contacts, a rectilinearly movable contact device adapted to slide over said contacts, a spring adapted to be stressed by a rectilinearly movable yoke through a toggle lever mechanism operated by the switch arm so as to act on the contact device, a detent pivoted to a stationary pivot and adapted to engage the said movable contact device so as to cause the detent to be a temporary abutment against which the spring of the contact device is compressed in a direction parallel to the movement of the contact device and means carried by the spring compressing mechanism adapted to trip the detent out of engagement with the spring pressed contact device when the said movable yoke is nearly at the end of its stroke, substantially as described.

2. An electric motor starting switch consisting of in combination a pivoted switch arm carrying a main circuit closing device, a series of resistance contacts, a rectilinearly movable contact device adapted to slide over said contacts, a spring adapted to be stressed by a rectilinearly movable yoke through a toggle lever mechanism operated by the switch arm so as to act on the contact device, a detent pivoted to a stationary pivot and adapted to engage the said movable contact device so as to cause the detent to be a temporary abutment against which the spring of the contact device is compressed in a direction parallel to the movement of the contact device means carried by the spring compressing mechanism adapted to trip the detent out of engagement with the spring pressed contact device when the said movable yoke is nearly at the end of its stroke, and a stop on the detent adapted to engage the switch arm and prevent the main circuit being closed when the detent is in the untripped position in order to avoid the possibility of switching on the main current unless the proper resistance has been inserted in the main circuit, substantially as described.

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

EDMUND GARSIDE.

Witnesses:

JOHN WILLIAM SHAW,
WILLIAM CHARLES FLETCHER.