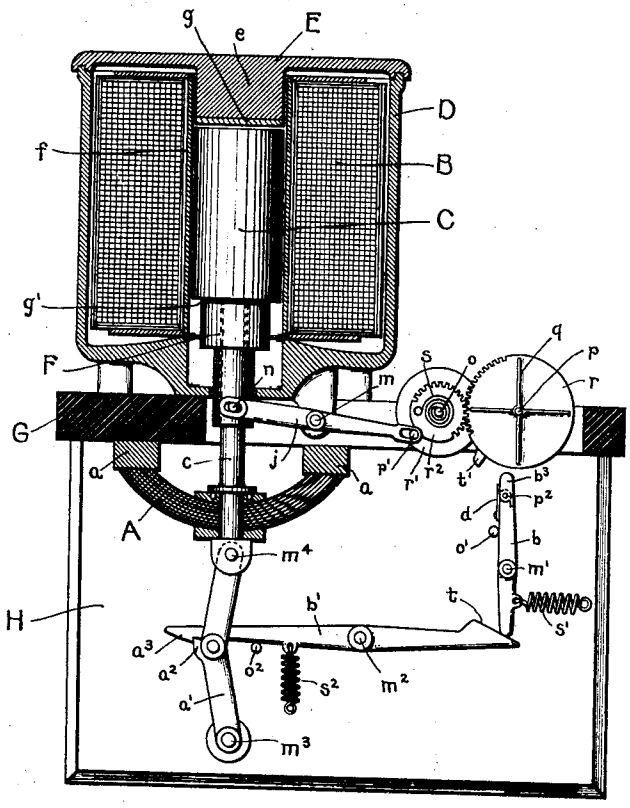
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S. B. STEWART, JR.

TIME LIMIT DEVICE FOR ELECTRIC SWITCHES.

APPLICATION FILED MAY 31, 1902.

NO MODEL.



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UNITED STATES PATENT OFFICE.

SAMUEL B. STEWART, JR., OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

TIME-LIMIT DEVICE FOR ELECTRIC SWITCHES.

SPECIFICATION forming part of Letters Patent No. 769,572, dated September 6, 1904.

Application filed May 31, 1902. Serial No. 109,606. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL B. STEWART, Jr., a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Time-Limit Devices for Electric Switches, of which the following is a specification.

My invention relates to improvements in electric switches, and more particularly to such electromagnetically-actuated switches as are used in sectional third-rail or surface-contact railway systems.

In surface-contact railway systems or sectional third-rail systems in which electromagnetic switches are used for the purpose of connecting the feeder to the successive sections of the working conductor or to the successive contact-studs great difficulty has been experienced due to the loss of current from the opening of the switches caused by slight obstructions on the third-rail or surface-contact studs, which will make the contact shoe or shoes carried by the car jump and break contact. Such slight obstructions as small pieces of wood or stone, also sleet and snow collected on the third-rail or on the surface-contact studs, will cause the collector-shoe carried by the car to jump. In systems in which the actuating-coil of the electromagnetic switch is connected in shunt to the car motor or motors the said actuating-coil is of such a high resistance that it takes a comparatively small current to actuate said coil. Therefore it takes a comparatively slight obstruction to cause a loss of contact between the collector carried by the car and the sectional conductor.

The object of my invention is to prevent the switches from opening due to a temporary loss of current or due to the jumping of the car-collector, so as to break contact with the sectional conductor, but to allow said switch to open automatically at a predetermined length of time after the collector carried by the car has left the section of working conductor controlled by said electromagnetic switch.

My invention consists, broadly, in combining with a switch of the character described a time-limit device which will operate to maintain the switch in its closed position for a predetermined time after the actuating means has become inoperative.

More specifically stated, my invention consists of a switch so constructed and arranged that the means for closing said switch actuates a mechanism which renders a tripping device inoperative while said closing means is operative, but allows the tripping device to operate to release a means for causing said switch to open at a predetermined time after the switch-closing means has been rendered inoperative.

In the drawing I have shown an electromagnetic switch, such as is commonly used on sectional third-rail railway systems, equipped with my invention.

Referring now to the drawing, A represents a switch comprising laminated strips of conducting material attached to the core C of the solenoid B and operating against the fixed contact-blocks *a*. The solenoid B is wound on the non-magnetic spool *f* and is inclosed in the magnetic casing D, supported on base G, which is made of insulating material. The cover E of the magnetic casing D carries a projection *e*, which forms a stationary core for the switch-actuating coil B. A disk *g*, of non-magnetic material, is inserted between the projection or stationary core *e* and the movable core C to prevent the movable core from sticking to the stationary core when the solenoid is deënergized.

Slidably mounted on the rod *c*, which connects the core C with the switch-brush A, is an armature F, which is attracted into the solenoid B with the core C whenever said solenoid is energized. A washer *g'*, of non-magnetic material, is inserted between the core C and the armature F to prevent the latter from sticking to the former.

A vertical plate H, of insulating material, is rigidly attached to the under side of the supporting-base G and forms the support for the independent switch-holding mechanism, which will now be described. A toggle-lever *a'*, one link of which is pivoted to plate H at

m^3 and the other link of which is pivoted to the switch A at m^4, carries a lug a^2, which is engaged by a catch a^3 on one end of the lever b', pivoted at m^2 to the base-plate H when the toggle is moved into the position shown in the drawing—that is, when said switch A is closed. The lever b' is held in its operative position against the stop o^2 by means of the spring s^2. The lever b, pivoted to the plate H at m', is normally held against the stop o' by means of the spring s' except when moved by the action of the tripping mechanism, at which time the lower end of the said lever rides up on the cam-surface t and moves the lever b' against the action of the spring s^2, thereby releasing the lug a^2 from the catch a^3. The tripping mechanism comprises a disk r, carried by the axle p, supported in bearings in the base G. The disk r has gear-teeth on its periphery which engage with similar teeth on the pinion r^2. The pinion r^2 is loosely mounted on the rigid shaft o, but is connected therewith through the spring s. The said pinion r^2 is rigidly connected with the disk r', which is also loosely mounted on the rigid shaft o and carries a pin p', which operates in a slot in one end of the lever j. The said lever is pivoted at m to a lug projecting from the casing D. The other end of said lever j is slotted to allow a pin n, carried by the armature F, to operate therein. Pivoted at p^2 to the upper end of the lever b is an extension b^3, which is held in the position shown by means of the leaf-spring d and is adapted to coact with the lug t', carried by the disk r.

The operation of the device will now be described. Considering the coil B energized, the various parts would be in the positions shown in the drawing. Now suppose the coil B becomes deënergized, the armature F would tend to drop away from the core C; but the core C and the switch A would be maintained in the position shown—that is, with the switch A closed—since the catch a^3, carried by the lever b', is maintained in engagement with the lug a^2 by means of the spring s^2 until released by the tripping mechanism. As the armature F moves downward and away from the core C the disk r', together with the pinion r^2, will be turned on the shaft o in a right-handed direction, assisted by the spring s, which will tend to unwind. The disk r will be turned in a left-handed or counter-clockwise direction, causing the lug t' to engage with the extension b^3 on the upper end of the lever b, thereby causing it to move to the right and throwing the lower end of said lever to the left against the action of the spring s' and causing it to ride upon the cam-surface t of the lever b', thereby moving said lever about m^2 as a pivot against the action of the spring s^2, so as to release the lug a^2 from the catch a^3 of the lever b', thereby allowing the switch A to open. A predetermined retardation of the tripping device is obtained by mounting air-vanes q on the disk r. The above-described movement of the disk r in a counter-clockwise direction carries the lug t' far enough to allow it to pass beyond the extension b^3 after the lever b has been moved to cause the switch-holding lever b' to release the toggle a' and allow the switch A to open. After the lug t' has moved past the extension b^3 the lever b returns to its normal position against the stop o' by the action of the spring s' and allows the lever b' to be returned to its normal position against the stop o^2 by the action of the spring s^2, thereby returning the switch-holding parts to their normal position, so that they will operate to hold the switch A closed the next time it is moved into its closed position by the action of the coil B. As the actuating-coil of the switch A is reënergized the core C is drawn into the said coil, thereby closing the switch A, the lug a^2, carried by the toggle-lever, moving into engagement with the catch a^3, so as to hold said switch closed. At the same time the armature F is drawn into said coil, thereby causing the pinion r^2 and disk r' to be turned counter-clockwise and wind up the spring s. This movement causes the disk r to be turned in a right-handed direction, and the lug t' is moved back into engagement with the extension b^3 of the lever b; but a movement of the lug t' in this direction will not cause a corresponding movement of the upper end of the lever b, since the extension b^3 is so pivoted to the said lever b as to allow a free movement of the extension against the action of the spring d without moving the lever b when said lever is resting against the stop o'. If the actuating-coil B is again deenergized, the operation of the time-limit device will be repeated, as above described. It will therefore be seen that a momentary deenergizing of the coil B will not operate to open the switch A, and the said switch cannot open until a predetermined time has elapsed after the deënergizing of said coil.

Although I have shown my invention as applied to an electromagnetically-actuated switch, such as is used in sectional third-rail systems, I do not intend to limit the application of my time-limit device to such a switch, since the time-limit mechanism is equally applicable to electric switches independent of the particular means used for closing the switch or for holding it closed.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination, a switch, means for closing said switch, an independent means for holding said switch closed and for maintaining said switch in its closed position for a definite predetermined length of time after said closing means has become inoperative.

2. In combination, a switch, electromagnetic means for closing the same, independent means for holding said switch in its closed position and for preventing said switch from

opening for a definite predetermined length of time after the electromagnetic means has been deënergized.

3. In combination, an electric switch, electromagnetic means for closing said switch and maintaining it closed, independent means for holding said switch in its closed position, and means for controlling said independent means so as to allow said switch to open at a certain time after said electromagnetic means has been rendered inoperative.

4. In combination, a gravity-opened, magnetically-closed switch, independent means for holding said switch in its closed position, and means for tripping said holding means to allow said switch to open at a predetermined time after the actuating-coil of said switch has been deënergized.

5. In combination, a switch, an actuating-coil for said switch, an independent device for holding said switch closed, a tripping device for said switch-holding device, and a time-lag mechanism set in operative position by the actuating-coil of said switch and released when said coil is deënergized so as to trip said independent switch-holding device at a predetermined length of time thereafter.

6. In combination, a switch, electromagnetic means for closing said switch, independent means for maintaining said switch in its closed position, and means for tripping said independent means when a certain length of time has elapsed after the said electromagnetic means has become inoperative.

7. In combination, a switch, an actuating-coil for said switch, a catch for holding said switch in its operative position after the switch has been moved into said position by its actuating-coil, a tripping device for said catch which is rendered inoperative so long as said actuating-coil is energized, and means for preventing said tripping device from operating to allow said switch to open until a predetermined length of time has elapsed after the said actuating-coil has been deënergized.

8. In combination, a switch, an actuating-coil for said switch, independent means for holding said switch in its closed position, and a tripping device for said independent holding means, said tripping device being rendered inoperative while said actuating-coil is energized and being rendered operative so as to trip said independent holding means at a predetermined length of time after said actuating-coil has become deënergized.

9. In combination, a switch, means for actuating said switch, a catch for holding said switch in its operative position after the switch has been moved into said position by said actuating means, a tripping device for said catch which is rendered inoperative so long as the switch-actuating means is operative, and means for operating said tripping device at a predetermined time after the switch-actuating means has been rendered inoperative.

10. In combination, a switch, means for actuating said switch, independent means for holding said switch in its operative position, and means operated by said switch-actuating means for rendering said independent switch-holding means operative, said means being released so as to render said independent switch-holding means inoperative at a predetermined length of time after the switch-actuating means has been rendered inoperative.

In witness whereof I have hereunto set my hand this 29th day of May, 1902.

SAMUEL B. STEWART, Jr.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.