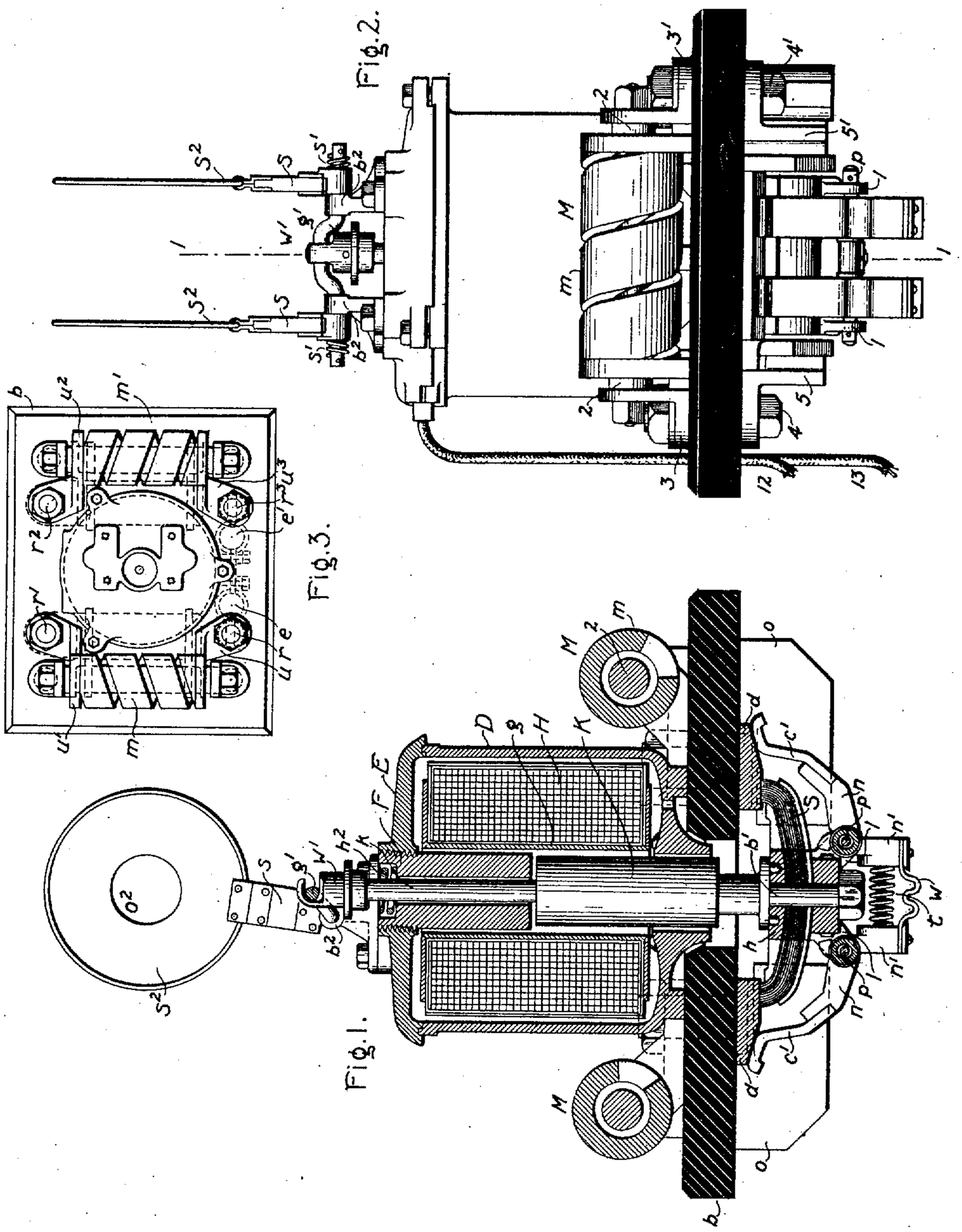
No. 768,549. PATENTED AUG. 23, 1904.

S. B. STEWART, JR.

ELECTROMAGNETIC SWITCH.

APPLICATION FILED FEB. 14, 1903.

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.

ELECTROMAGNETIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 768,549, dated August 23, 1904.

Original application filed May 20, 1902, Serial No. 108,283. Divided and this application filed February 14, 1903. Serial No. 143,319. (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 Electromagnetic Switches, of which the following is a specification.

My invention relates to electromagnetically-actuated switches, and especially to such switches as are adapted for use in sectional-conductor electric-railway systems such, for instance, as that illustrated and described in my application Serial No. 108,283, filed May 20, 1902, of which the present case is a division.

The object of my invention is to provide a switch of such construction that it will handle heavy currents in a quick and efficient manner and with much less injury to the working parts of the switch than is possible with the switches at present in use.

In the accompanying drawings, which represent the preferred embodiment of my invention, Figure 1 is a vertical section of the switch on the line 1 1 of Fig. 2. Fig. 2 is a side elevation of the switch, and Fig. 3 is a plan view showing the relative position of the switch-actuating coil and the blow-out magnet-coils.

Referring now to the figures of the drawings, *b* represents an insulating-base which carries the switch and switch-actuating mechanism. The base *b* may be made of slate, pressed fiber, or other insulating material. A casing D, of magnetic material, is provided with a cover E, which has a portion F extending as a stationary core into a non-magnetic spool *g*, on which an energizing coil or solenoid H is wound. The leads to said coil are indicated at 12 and 13. The stationary core F (shown in Fig. 1) is separable from the cover E; but it may be formed integral therewith. The solenoid-core K carries at its lower end, which projects through an opening in the case *b*, a switch or contact-brush S, which engages with the contacts *d*, of conducting material, secured to the under side of the base *b*. The switch S is preferably made of laminated copper strips, which are mounted in the block *h*, which is fastened to the core K by the bolt *b'*. Formed integral with the block *h* are the lugs *l* which act as bearings for the shafts *p*, on which the bell-crank levers *n n'* are mounted. The auxiliary contacts *c'*, which also engage with the fixed contacts *d*, are removably mounted on the ends *n* of the bell-crank *n n'*. The arms *n'* are normally spread apart by the spring *t* and are electrically connected together by the conducting-band *w*. This construction permits the auxiliary contacts *c'* to engage the fixed contacts *d* with a sliding action, which is transverse to the direction of the movement of approach of said auxiliary contacts, thereby obtaining a better electrical contact than would otherwise be obtained, and also permitting the contacts *c'* to leave the contacts *d* later than the switch S, and thereby form a secondary break. Therefore the only parts liable to injury by arcing when heavy currents are used in this type of switch are the auxiliary contacts *c'*, which are made replaceable for this reason. To reduce the injury due to arcing at the contacts the blow-out magnets M are provided, one for each contact-block *d*. The magnetic circuit of one of these magnets may be traced on Fig. 2, in which 2 represents the core of the magnet, 3 3' pieces for supporting the core above the base *b*, and 5 5' the poles below the base *b*, between which poles one of the contacts *d* is mounted. The magnet-poles and core-supporting pieces are held in place by means of bolts 4 4', which pass through the base *b* and form part of the magnetic circuit. On either side of each of the contact-blocks *d* are strips of insulating material *o*, which depend from said base *b* at right angles thereto and form chutes along which the arcs formed when the switch is opened are blown. The electrical circuit for each of the blow-out magnets may be traced as follows, (see Fig. 3:) The terminal *e* is connected to the angle-piece *u* by means of the bolt *r*, which passes through the base *b*, the current flowing from said terminal through the bolt *r*, angle-piece *u*, coil *m*, angle-piece *u'*, bolt *r'*, which connects angle-piece *u'* to

one of the fixed contacts *d* on the under side of the base *b*, through the contact-switch S and the auxiliary switch to the other contact *d* through bolt r^2, which connects the angle-piece w^2 with said fixed contact *d*, thence through said angle-piece w^2, coil *m'*, angle w^3, bolt r^3, and terminal *e'*.

The core K has an extension *k* attached to its upper end. On the upper end of said extension is fixed a slotted head *w'*, which engages with a crank-shaft *g'*, supported in the bearings b^2, bolted to the cover E. Loosely mounted on the shaft *g'* and connected therewith through the springs *s'* are the semaphore-arms *s*, carrying the disks s^2. The semaphore-arms *s* are in a horizontal position when the switch is open, but are raised to a vertical position, as shown in Figs. 1 and 2, when the switch is closed. A spring h^2, against which the head *w'* strikes in its downward movement, is provided in a recess in the fixed core F for the purpose of reducing the shock to the apparatus when the switch opens. The semaphore-disks act as signals to indicate the condition of the switch, and when said switch is used in sectional-conductor electric railways the semaphores serve to indicate whether the sectional third rail is energized or not. The specific form of semaphore-signal herein shown is not claimed in this application, since it forms the subject-matter of my application above referred to.

When the switch-actuating coil becomes de-energized, the switch S opens by gravity and the arcs which occasionally form between the auxiliary contacts *c'* and the fixed contacts *d* are projected by the blow-out magnets M along the chute formed by the insulating-guides *o*.

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

1. In a switch, a solenoid mounted on an insulating-base, the core of said solenoid passing through an opening in said base, fixed switch-contacts attached to the under side of said base, a movable switch element comprising a main contact-maker of laminated conducting-strips, and an auxiliary spring-pressed contact-maker carried by said core at its lower end and adapted to make a sliding engagement with said fixed contacts, the said auxiliary contact-maker being arranged to engage the fixed contacts prior to and leave said contacts later than the main contact-maker.

2. In a switch, a solenoid mounted on an insulating-base, the core of said solenoid passing through an opening in said base, fixed switch-contacts attached to the under side of said base, a movable switch element comprising a main contact-maker of laminated conducting-strips and an auxiliary spring-pressed contact-maker carried by said core at its lower end and adapted to engage said fixed contacts, the said auxiliary contact-maker being arranged to engage said fixed contacts prior to and to leave said fixed contacts later than the main contact-maker, and a blow-out magnet for each fixed contact having its poles arranged to embrace said contact and its coil mounted on the upper side of said base.

3. In an electromagnetic switch, a solenoid, a core for said solenoid carrying a main and an auxiliary contact-maker, and relatively fixed contacts with which said contact-makers are adapted to engage, said auxiliary contact-maker comprising electrically-connected spring-pressed arms pivoted to said core in such a manner as to allow said auxiliary contact-maker to engage the relatively fixed contacts with a sliding action.

4. In an electromagnetic switch, a solenoid, a core for said solenoid carrying main and auxiliary contact-makers adapted to engage fixed contacts, a blow-out magnet for each fixed contact having its poles embracing said fixed contacts, and insulating-chutes along which the arcs which tend to form between the movable contact-makers and the fixed contacts are projected by the blow-out magnets.

5. In an electromagnetic switch, a solenoid mounted on an insulating-base, a core for said solenoid passing through an opening in said base, fixed switch-contacts attached to the under side of said base, a movable switch-element carrying contact-makers adapted to engage said fixed contacts, and a blow-out magnet for each fixed contact the poles of which are adapted to embrace said fixed contact.

6. In an electromagnetically-actuated switch, a solenoid mounted on an insulating-base, the core of said solenoid passing through an opening in said base, fixed switch-contacts attached to the under side of said base, a movable switch element comprising contact-makers carried by said core at its lower end and adapted to engage said fixed contacts, and a plurality of blow-out magnets having their coils mounted on the upper side of said base adjacent to said solenoid and having their magnetic poles adapted to embrace the said fixed contacts on the under side of said base.

In witness whereof I have hereunto set my hand this 12th day of February, 1903.

SAMUEL B. STEWART, JR.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.