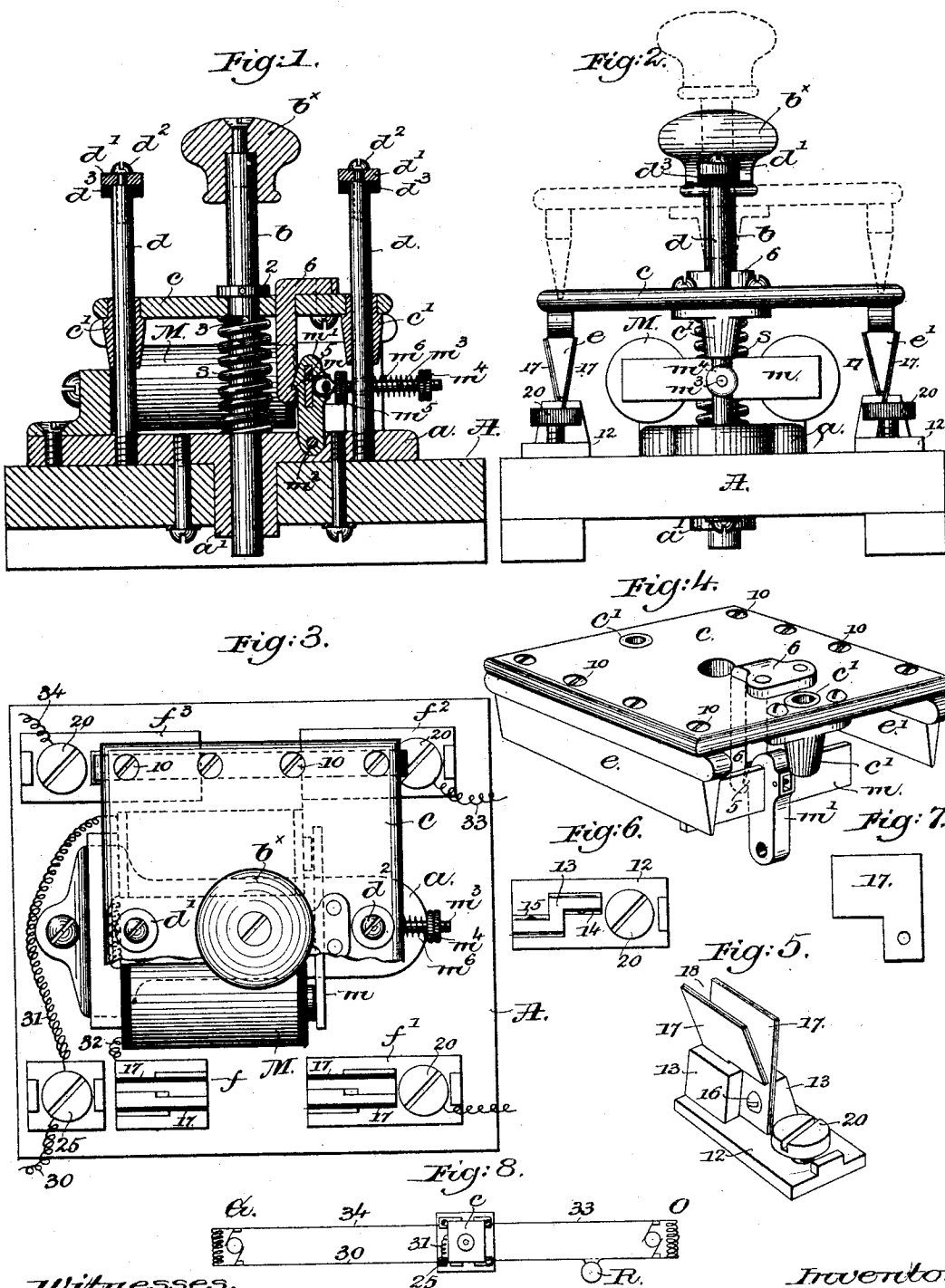


(No Model.)

C. H. HERRICK & W. M. RAND.
ELECTRO MAGNETIC SWITCH.

No. 463,192.

Patented Nov. 17, 1891.



Witnesses.

Charles A. Goddard
Fred S. Greenleaf

Inventors

Charles H. Herrick.
Willis M. Rand.
by Crosby & Gregory Attys

UNITED STATES PATENT OFFICE.

CHARLES H. HERRICK, OF WINCHESTER, AND WILLIS M. RAND, OF BOSTON,
MASSACHUSETTS.

ELECTRO-MAGNETIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 463,192, dated November 17, 1891.

Application filed October 20, 1890. Serial No. 368,678. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. HERRICK, of Winchester, county of Middlesex, and WILLIS M. RAND, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Automatic Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

In the employment of electricity for various uses—such, for instance, as driving electric motors, more especially those commonly known as “shunt-wound” motors—it frequently happens that the circuit is interrupted for a short period, it may be only momentarily, and is then suddenly restored to its original normal strength. This sudden restoration or throwing of the current at its full strength through the armatures of the motors frequently results in their partial or entire destruction by burning out, involving delay and expense.

This invention has for its object to produce an automatic switch or cut-out adapted to be placed in the circuit, and which, when the current is interrupted, will operate to break the continuity of the circuit to thus prevent the current from being again passed through the motor without the aid of an attendant, who will replace the switch and regulate the passage of the current through the motor gradually to prevent burning.

In accordance with this invention a switch bar or plate is normally held in position to preserve the continuity of the circuit against the tension of a spring by a holding device controlled by the armature of an electro-magnet, through which the current of electricity passes. If the current should be even momentarily interrupted, the armature of the electro-magnet will be retracted, releasing the switch bar or plate and permitting the same to be moved or thrown by its spring to break the circuit.

One part of our invention therefore consists in a base, fixed contacts thereon, a switch-plate carried by said base to co-operate with and made movable toward and from the said fixed contacts, combined with an electro-magnet, its armature, and mechanism controlled

thereby to hold said switch-plate in contact with said fixed contacts against the action of a spring, substantially as will be described.

Other features of our invention will be hereinafter described, and pointed out in the claims at the end of this specification.

Figure 1 represents in vertical section a switch or cut-out embodying this invention; Fig. 2, a right-hand end elevation of Fig. 1; Fig. 3, a top or plan view, partially broken away, of Fig. 1; Fig. 4, a perspective view of the switch-plate and its locking mechanism, to be referred to; Figs. 5 and 6, details of one of the fixed contacts. Fig. 7 shows one of the contact-plates detached, and Fig. 8 is a diagram showing one method of employing the switch.

Referring to the drawings, the base A, of suitable shape and preferably of insulating material, has secured to its upper side the base-plate *a*, provided centrally upon its under side with a boss *a'*, fitted to receive the vertically-movable operating-spindle *b*, provided at its upper end with a suitable handle *b'*. The switch bar or plate *c*, fixed to and movable with the spindle *b* by means of the collar 2 and pin 3, is provided, preferably, at diametrically-opposite points with two thimbles *c'*, which slide on the guide-rods *d*, tapped into the base-plate *a* and provided at their upper ends with limiting stops or washers *d'*, secured by screws *d''* and protected by the yielding cushions or washers *d'''* to be referred to. A spiral spring *s*, encircling the spindle *b* and interposed between the base-plate *a* and the switch-plate *c*, normally acts to throw said switch-plate into its uppermost position, as shown by dotted lines, Fig. 2. The base-plate *a* has secured to it the electro-magnet M, the armature *m* of which is secured to the armature-carrying lever *m'*, pivoted at *m''* in the said base-plate. (See Fig. 1.) The armature-carrying lever *m'* has a hook or projection 5, (see Figs. 1 and 4,) adapted to engage a hook 6, secured to the switch-plate *c*, to hold said switch-plate in its lowermost or operative position, as shown, against the tension of the spring *s*. The armature-carrying lever *m'* has loosely connected with it the rod *m''*, which passes loosely through an opening in one of the guide-rods *d*, as shown, the

said bar being threaded to receive upon opposite sides of the said guide-rod the limiting-nuts m^4 m^5 , a spring m^6 being interposed between the nuts m^4 and the guide-rod, as shown, the said spring tending to draw the armature m away from the magnet M and to disengage the hook 5 from the hook 6. The switch-plate c , which is represented as of insulating material, has secured to it, as by screws 10, two longitudinal wedge-shaped contacts e e' , adapted to make contact with the fixed contacts f f' f^2 f^3 , secured to the base A , as shown best in Figs. 2 and 3.

Referring to Figs. 5, 6, and 7, each of the contacts referred to consist, essentially, of a base 12, having a rib or projection 13 formed to present two oppositely-inclined faces 14 15, to which are secured, as by screws 16, the contact pens or plates 17, one of which is shown separately in Fig. 7, the said pens presenting a V-shaped opening 18 between them for the reception of the contacts e e' on the switch-plate c . (See Fig. 2.) The fixed contacts on the base may be provided with binding-screws 20.

Referring to Fig. 8, the current is conducted by the wire 30 from the + pole of the generator G to the binding-screw 25 of the switch, thence by wire 31 to and through the electro-magnet M by wire 32 to the contact f , through the contact e on switch-plate c to the contact f' , thence to and through the rheostat R to the motor O , returning by wire 33, contact f^2 , bar e' , and contact f^3 and the wire 34 to the - pole of the generator G . The current of electricity passing through the magnet M holds the armature m in its attracted position, as shown in Fig. 1, locking the switch-plate c in its lowermost or operative position with the circuit completed; but if for any reason the current flowing from the generator should be interrupted the armature m will be retracted, disengaging the hook 5 from the hook 6 and permitting the spring s to throw the switch-bar into its uppermost or dotted-line position, breaking the circuit at each contact in four different places, so that if the circuit is suddenly thrown upon the line again it cannot pass to the motor and burn out the armature. When the operator discovers that the current is cut off, he replaces the switch by hand, and by means of the rheostat R he is enabled to regulate the passage of the current through the motor M gradually to thus prevent damage, which would ordinarily result if the current were turned on suddenly at its full strength. The cushions d^3 take up the shock and prevent jarring and noise when the switch operates. The hook 6 is herein shown as carried up through the switch-plate c and bent over at right angles upon the top, where it is secured by screws, as shown, the screws in this instance being practically relieved from any strain and danger of breaking the switch-plate avoided.

The construction of contacts herein shown is very simple and enables the elasticity of

the contact-plates for their entire length to be utilized.

We have herein shown the electro-magnet M as included in series in the circuit; but it may be placed in a shunt or derived circuit as well.

This invention is not limited to the particular application of the switch herein shown, and it is also obvious that the form and arrangement of its various parts may be varied without departing from the scope of this invention.

We claim—

1. An automatic electric switch comprehending a base, fixed contacts thereon, an electro-magnet arranged on said base, its armature having a hook or projection, a sliding spindle arranged in a vertical plane extended between the coils of said electro-magnet, a switch-plate, movable contacts thereon, a spring to normally separate said fixed and movable contacts, and a locking finger or projection movable with said spindle to be engaged by the hook or projection on the armature of the electro-magnet to hold the said fixed and movable contacts in electrical connection with each other while the electric current is maintained, substantially as described.

2. An automatic electric switch comprehending a base, an electro-magnet arranged with the axes of its coils parallel with said base, its armature and a hook or projection thereon, fixed contacts arranged at opposite sides of said electro-magnet, a sliding spindle arranged vertically between the coils of said magnet, a switch-plate and movable contacts carried thereby, a spring interposed between said switch-plate and base to normally separate said fixed and movable contacts, and a locking finger or projection on the said switch-plate to be engaged by the hook or projection on the armature of the electro-magnet when the said armature is attracted to hold said fixed and movable contacts in electrical connection with each other against the action of said spring so long as the electric current is maintained, to operate substantially as described.

3. The base, fixed contacts thereon, a base-plate, a longitudinally-movable spindle mounted therein, a switch-plate carried by said spindle, and contacts on said switch-plate, the hook 6, mounted on the switch-plate, and spring s , combined with the electro-magnet M , its armature m , and hook 5, and a spring to normally maintain said armature in its retracted position against the pull of the said magnet, to operate substantially as described.

4. The base, fixed contacts, substantially as described, thereon, a base-plate, a longitudinally-movable spindle mounted in said base-plate, a switch-plate carried thereby and having wedge-shaped contacts e e' to co-operate with said fixed contacts, a hook on said switch-plate, and a spring s , combined with an electro-magnet M , its armature m , a hook thereon to engage the hook on the said switch-

plate against the action of a spring, to operate substantially as described.

5 5. The base and the fixed contacts thereon, a vertically-movable spring-actuated switch-plate to co-operate with said fixed contacts, and the guide-rods d , combined with an electro-magnet M , its armature m , the bar m^3 , nuts m^4 m^5 , and spring m^6 , and mechanism controlled thereby to hold the said switch-
10 bar in operative position, substantially as described.

15 6. In an electric switch or cut-out, a contact consisting of a base, a projecting rib formed thereon to present two oppositely-inclined faces, and contact-plates secured to said oppositely-inclined faces and presenting

a V-shaped opening between them, substantially as described.

7. In an electric switch or circuit-controller, a contact consisting of a base 12, a projecting 20 rib 13, formed to present oppositely-inclined faces 14 15, and the contact-plates 17, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of 25 two subscribing witnesses.

CHARLES H. HERRICK.
WILLIS M. RAND.

Witnesses:

BERNICE J. NOYES,
EDITH F. GUILD.