No. 727,870. PATENTED MAY 12, 1903.

H. WOLF, JR.

INTERMITTENT AUTOMATIC SWITCH.

APPLICATION FILED DEC. 22, 1902.

NO MODEL.

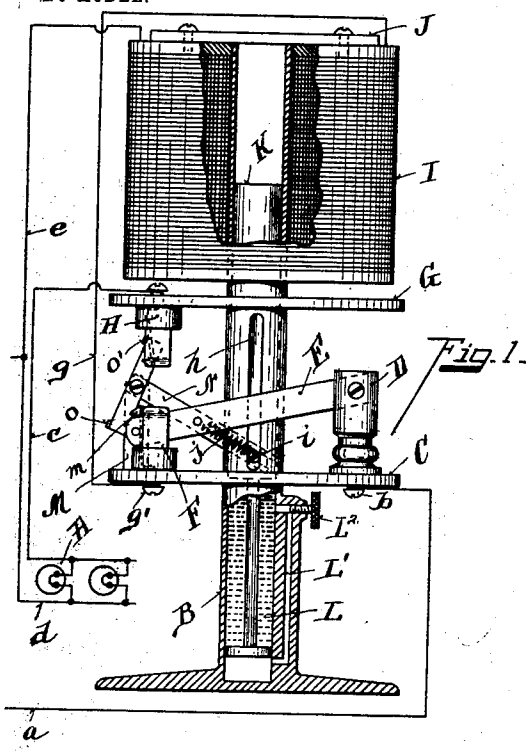


Fig. 1.

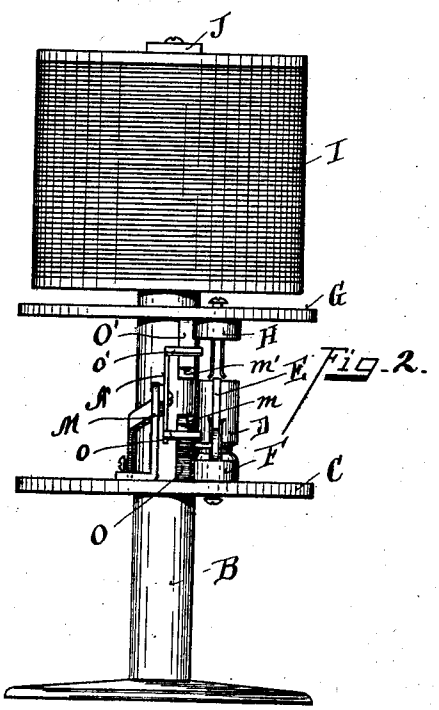


Fig. 2.

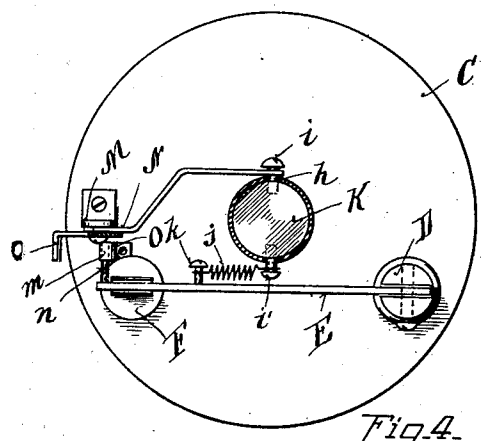


Fig. 4.

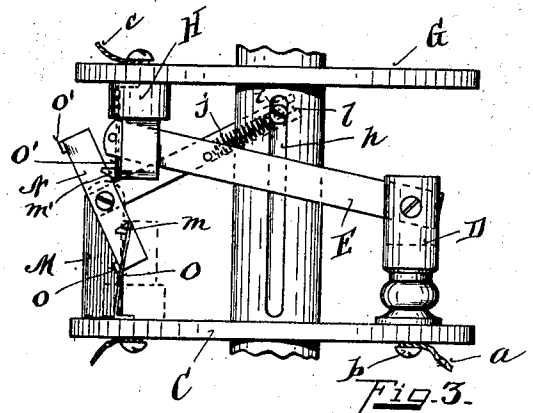


Fig. 3.

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No. 727,870. Patented May 12, 1903.

UNITED STATES PATENT OFFICE.

HENRY WOLF, JR., OF CINCINNATI, OHIO, ASSIGNOR TO EMIL BLOCH, OF CINCINNATI, OHIO.

INTERMITTENT AUTOMATIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 727,870, dated May 12, 1903.

Application filed December 22, 1902. Serial No. 136,151. (No model.)

To all whom it may concern:

Be it known that I, HENRY WOLF, Jr., a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Intermittent Automatic Switches, of which the following is a specification.

My invention relates to a magnet-operated electric switch primarily adapted to make and break an electric-light circuit.

The object of my invention is to produce a simple magnet-operated mechanism in which the switch is operated at given intervals with such a quick shift as to avoid danger of burning out.

Other objects of my invention relate to the cushioning of the movements and to the providing of instrumentalities governing the time and degree of movement, the intervals between movements, and, in general, to produce an efficient instrument.

Other features of my invention are more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an elevation of my improvement, partly in sections. Fig. 2 is an end elevation thereof. Fig. 3 is a detailed view of the tripping device in a reverse position from that shown in Fig. 1. Fig. 4 is a top sectional view of the circuit-breaking mechanism.

A represents the electric lights to be actuated intermittently.

B represents the upright tubular standard, carrying a bracket or platform C, upon which is a contact-post D, to which is pivoted the end of the switch-blade E.

F represents a yoke-electrode on the platform C, in the yoke of which the free end of the blade E rests. G represents a platform supported by the standard B above the platform C, from which platform is suspended a similar yoke-electrode H. The yokes of the electrodes F and H are in the same vertical plane and point toward each other, between which yoke-electrodes the switch-blade is reciprocated.

I represents a magnet-coil; J, the magnet-plate.

The standard B is a hollow column within which reciprocates the piston-armature K. A portion of the standard below the platform constitutes an oil-well for cushioning the movements of the piston-armature. This oil-well L has a by-pass L′ communicating therewith at the bottom and extending upward in parallel direction. When the core K is drawn into the solenoid I, the liquid in the well and lying above the piston is forced into the lower part of the well by such magnetic action and when the piston descends, actuated by the weight of the solenoid-core, the liquid lying below the piston is forced by such action of gravity into the space above the piston.

L^2 represents a screw for regulating the size of the by-pass L′.

a represents the main electric-light wire connecting through the screw *b* to the post D. The break occurs between the electrodes F and H, and when the end of the switch-blade E is engaging the electrode H the circuit continues through the wires *c* down to the lights. *d* represents a return-wire. *e* represents a branch wire connected to the wire *d*, which wire *e* when the electric-light circuit is broken becomes a main wire to the magnet-coil. *g* represents a return-wire of the magnet-coil, which is connected by a screw *g′* to the electrode F. It is therefore evident that when the electric-light circuit is broken, as shown in Fig. 1, the magnet-circuit is complete and the magnet-plate attracts the armature-piston, and with it the switch-blade, until the switch-blade breaks connection with the electrode F, thus breaking the magnet-circuit and establishing connection with the electrode H, which establishes the electric-light circuit; also, as soon as the magnet-circuit is broken the electric-light circuit is formed, and vice versa, and so the operation of the switch-blade is continued intermittently. In order to avoid burning out, which would result from the slow shifting of the switch-blade, and, in fact, in order to render the device operative at all times, it is necessary to provide connecting actuating devices between the switch-blade and the piston-armature and an accessory trip device adapted to give the desired movement to the switch-blade. This desired movement consists in a retention of

the switch-blade in contact with the yoke-electrodes in either direction of movement of the switch-blade until the piston-armature has approximately completed the length of its travel in either direction, and it is also necessary that when the switch-blade is given its release substantially at the end of the piston-armature travel that it have an almost instantaneous shift into contact with its adjacent electrode and that the same result be produced in the return travel of the piston-armature. My invention has largely for its object the production of suitable instrumentalities to accomplish these ends.

That portion of the column or standard B lying between the platforms C and G is provided with opposite vertical slots *h*, through which project the screws *i i'*, connected to the stem of the piston-armature, as shown in Figs. 1 and 4.

j represents a coil-spring connected to the screw *i'* and to the pin *k*, attached to the switch-blade E.

M represents a standard erected upon the platform C, to which is pivoted a T-shaped lever N, the other end of the said lever N being provided with a slotted bearing *l*, (shown in dotted line, Fig. 5,) engaging the screw *i'* of the armature-piston stem.

O O' represent springs attached, respectively, to the platforms C and G and pointing toward each other, the ends thereof being provided with catch-lugs *m m'*, respectively, beveled on their opposing faces. These springs are projected in such relation to one another and to the switch-blade that the catch-lugs are interposed in the path of travel of the pin *n* upon the free end of the switch-lever E. The outer T ends of the rocking lever N are provided with release-lugs *o o'*, adapted to engage against the springs O O' at the extreme point of movement of the T ends.

Mode of operation: The parts being in the position shown in Fig. 1, a current is applied and circuit is made through the magnet by means of the wire *e* through the magnet-coil, thence through wire *g*, the screw *g'*, electrode F, the switch-blade E, post D, screw *b*, and wire *a*. As the piston rises to a given point beyond the middle of the slot *h* it begins to raise, through the spring *j*, the switch-blade E, at the same time extending the spring under tension. When the free end of the switch-blade moves toward the yoke of the electrode F, the pin *n* engages the catch-lug *m* of the spring O on the platform C. It is thus arrested from further rising, and so holds closed the magnet-circuit until the armature-piston has nearly made its contact with the armature-plate. At this position the spring *j* is under considerable tension and the lug *o* of the T-lever N is bearing against the said spring O. As the piston completes its upward movement further tilting of the lever N bends over the spring O and releases the catch *m* from engaging with the locking-pin *n* on the switch-blade E. The end of the switch-blade thus being free, the tension of the spring *j* snaps the switch-blade into the yoke of the electrode H. This breaks the magnet-circuit and establishes the electric-light circuit almost instantaneously. As the armature-piston begins to lower by its own weight, its descent being retarded by the oil as previously explained, the electric-light circuit is continued by means of the engagement of the pin *n* with the catch-lug *m'* of the spring O' until the lug *o'* on the other T end of the lever N engages the spring O' and releases the switch-lever just as the piston-armature is about to complete its descent. This movement again imparts tension to the spring *j*, so that when released the end of the switch-lever is snapped back into contact with the yoke of the electrode F, thus breaking the electric-light circuit and again establishing the magnet-circuit, hence starting over the operation just described. Of course the pin *n* in its travel toward the springs O O', respectively, engages and passes over the beveled face of the catch-lugs *m m'*, respectively, depressing the spring slightly for the purpose. By these instrumentalities, organized substantially as herein described, a very delicate, accurate, and almost instantaneous make-and-break contact of the switch-bar between the electrodes is produced.

Various mechanical changes obvious to a skilled mechanic may be devised from a proper understanding of the device herein described without deviating from the principles of the invention.

By "partial circuit" is meant an incomplete circuit.

Having described my invention, I claim—

1. In an electric switch, a magnet-coil and armature-piston, two yoke-electrodes, a switch-blade pivoted between the open ends of said yokes, a partial circuit formed through said magnet-coil and one of said electrodes, adapted to be closed by the switch-blade, an independent circuit formed through the other of said electrodes, adapted to be closed by the switch-blade, a coil-spring connecting the armature-piston with the switch-blade, spring-catches, a T-lever pivoted between said electrodes connected to said armature-piston, whereby the T ends of the said lever are alternately rocked in contact with the spring-catches, releasing the same, substantially as described.

2. In an electric switch, a magnet-coil, piston-armatures, means for retarding the armature travel by fluid-pressure, two yoke-electrodes, a partial circuit formed through one of said electrodes and the magnet-coil, an independent partial circuit formed through the other of said electrodes, a switch-blade pivoted between said electrodes, adapted to alternately close the said partial circuits, a coil-spring connecting the said armature-piston and the switch-blade, spring-catches adapted to engage the free end of the switch-

blade and retain it in contact with the electrode from which it is being moved by the armature, thereby imparting tension to the spring between the blade and armature, a release-lever pivoted between the said electrodes and connected to the armature, adapted to alternately release said spring-catch at points near the ends of the movement of the armature in either direction, whereby the compression of the connecting-spring imparts a quick shift to the switch-blade, making a practically instantaneous make-and-break contact between said electrodes, substantially as described.

3. In an electric switch, a standard comprising an oil-well and by-pass at the base, two cross-brackets, a magnet-coil, piston-armature adapted to be actuated by the magnet, a piston end traveling in the said oil-well, a sleeve surrounding the stem of the piston between the said cross-brackets, a yoke-electrode supported on one cross-bar and suspended through the other, a switch-blade post, a switch-blade pivoted thereto with the free end adapted to travel between said electrodes, vertical slots in the said sleeve, a fastening-pin secured to the stem of the piston projected through said slots, a coil-spring attached to one of said pins and to the switch-blade, spring-catches erected on said brackets adapted to engage the free end of the switch-blade and detain it in contact with the electrode from which it is being moved, a second post on one of said brackets, a T-lever pivoted thereto between the electrodes, one end of said lever being connected to the other pin of the piston-stem by means of a slidable bearing, said end of the lever being adapted to alternately engage and release said spring-catches, a partial circuit formed through one of said electrodes and the magnet-coil for actuating the armature, a second partial circuit formed through the other of said electrodes for conveying the power which it is desired to switch, both partial circuits adapted to be alternately closed and broken by the reciprocation of the switch-blade, substantially as described.

In testimony whereof I have hereunto set my hand.

HENRY WOLF, JR.

Witnesses:
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IDA J. LUCAS.