No. 708,006. Patented Sept. 2, 1902.

H. P. BALL.

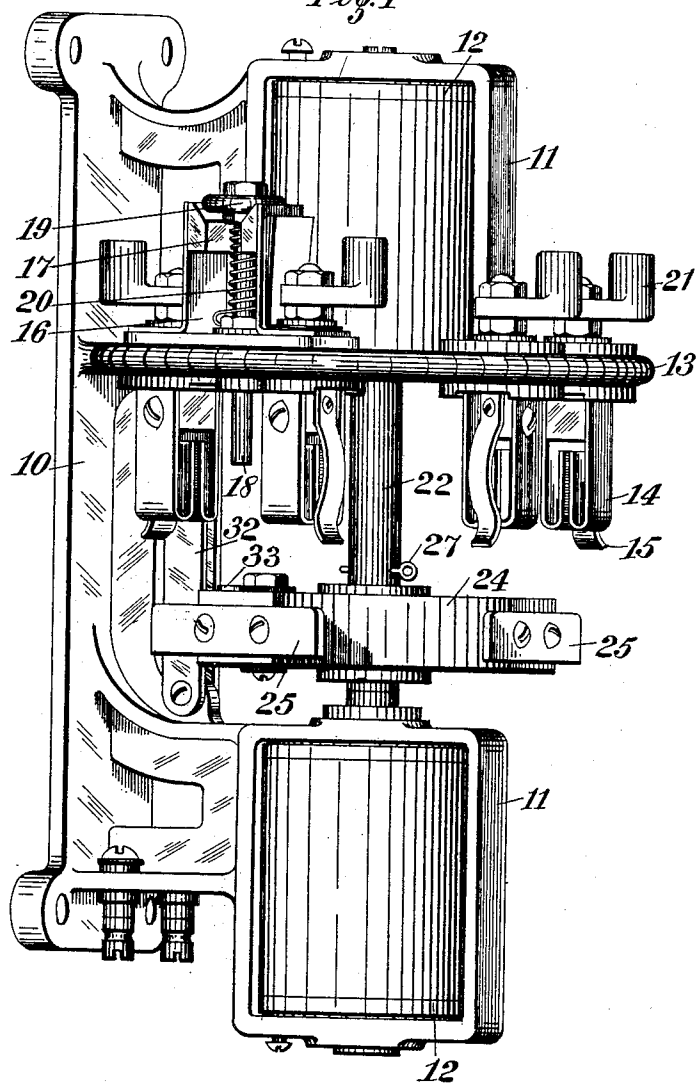
ELECTRIC SWITCH.

(Application filed Mar. 21, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1



Witnesses
Bert C. Jones.
Charles W. Hildreth

H. P. Ball
Inventor
By Geo. H. Graves & Co. Attorneys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 708,006. Patented Sept. 2, 1902.

H. P. BALL.

ELECTRIC SWITCH.

(Application filed Mar. 21, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2

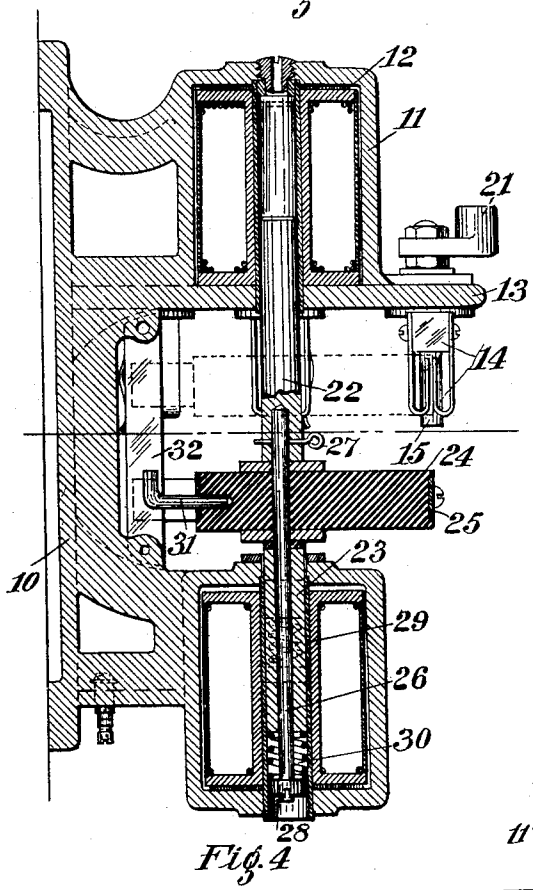


Fig. 3

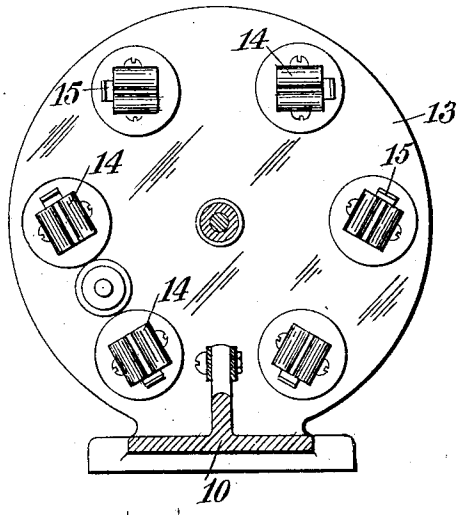


Fig. 4

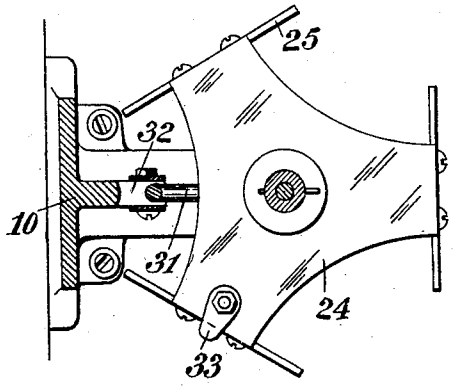
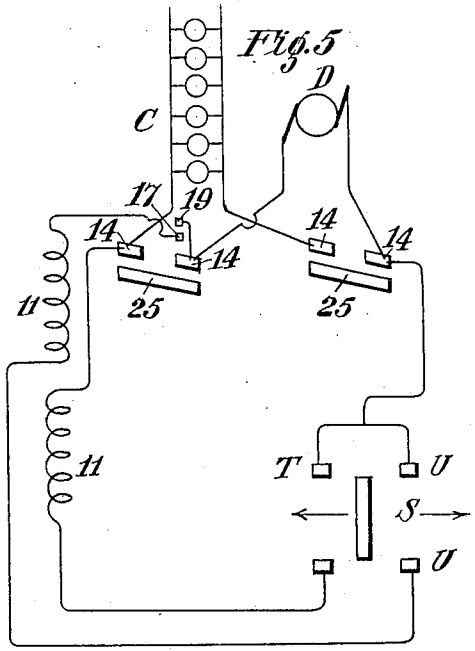


Fig. 5



Witnesses
Bert C. Jones.
Charles W. Hildreth

H. P. Ball
Inventor
By Geo. H. Bayamine
His Attorney

UNITED STATES PATENT OFFICE.

HENRY PRICE BALL, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL INCANDESCENT ARC LIGHT COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 708,006, dated September 2, 1902.

Application filed March 21, 1901. Serial No. 52,137. (No model.)

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York, county and State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches of the type designed to be included in a main-line circuit with any number of electric lights, motors, &c., and adapted to be actuated for making and breaking the circuit from one or more points at a distance from the switch.

The object of my invention is an electric switch which is simple, cheap of construction, and practically positive in its action.

Essentially the switch consists of a pair of solenoids held firmly in an iron frame which acts as a return path for the magnetic lines of force, a bridge-piece mounted upon the armatures of the solenoids, the lower armature having upon it and arranged to move freely a sleeve whose downward motion is resisted by a spring and a contact making and breaking device energized by the movement of the bridge-piece for making and breaking a circuit through one of the solenoids.

By reason of the construction described the pull of the solenoids upon their armatures will continually increase in strength until the maximum at the end of the stroke is reached, which is of advantage in overcoming the friction between the plates of the bridge-piece and the spring-terminal contacts, and so far as relates to the lower armature provided with the loose sleeve the pull of the lower solenoid will be exerted upon the sleeve, which causes the sleeve to impart a hammer-blow to the bridge-piece, and thus quickly break the main circuit between the bridge device and the spring-terminal contacts. Further, the upward movement of the bridge device will break a circuit through the upper solenoid, or, in other words, disconnect the upper solenoid and leave the switch in a condition to be instantly operated by the lower solenoid when it is desired to break the main circuit.

The accompanying drawings will serve to illustrate my invention, in which—

Figure 1 is a perspective view of a three-pole switch. This figure shows the bridge-piece down, the main circuit open. Fig. 2 is a vertical section of the switch shown in Fig. 1, showing the bridge-piece down in full lines and up in dotted lines. Fig. 3 is a bottom plan view of the top plate of the switch carrying the spring-contacts with its supports in section. Fig. 4 is a top plan view of the bridge-piece with its support in section. Fig. 5 is a diagram illustrating the circuit-connections of a similar switch with two poles.

In the drawings, 10 indicates the frame or support for the switch, which, as will be seen, is carried forward to form the rectangular portions 11, within which the solenoids 12 are located. By reason of the construction a return path for the magnetic lines of force created by the solenoids is provided, which materially strengthens the pull of such solenoids. Mounted upon the plate 13, which also forms a part of the frame or casting 11, are the spring-terminal contacts 14 and spark-arresters 15.

In Figs. 1, 2, and 3 six pairs of contacts are shown—*i. e.*, two pairs for each pole. In Fig. 5 but two pairs of contacts are shown, this diagram representing the circuit connections of a two-pole switch.

Mounted upon the top of the plate 13 is a circuit-breaker which consists of the spring-plates 16, carrying the carbon contacts 17. Between the plates 16 is located a vertically-moving rod 18, carrying on its upper end a carbon contact-disk 19. Surrounding the rod 18 and connected at one end to the rod and at the other end to the plate 13 is a spring 20, the effect of which is to draw the contact-disk 19 into contact with the carbon contacts 17.

21 represents terminal connections.

Mounted so as to reciprocate vertically in the solenoids 12 are the armatures 22 23, the construction of which is best shown in Fig. 2. Secured midway between the armatures is a plate of insulating material 24, carrying the contact-plates 25. This plate of insulating material and contact-plates 25 form the

bridge-piece. The armature 22 is rigidly secured to the bridge-piece. The body of the armature 23 is movable as regards the bridge-piece. The armature 23 consists of the rod 26, secured at one end through a pin 27 to the armature 22 and provided with an adjustable head 28 upon its lower end. Surrounding the rod 26 is a sleeve 29, and located between the sleeve and the head of the rod 26 is a spring 30. The bridge-piece 24 is prevented from rotating horizontally by means of the arm 31, located in the guide 32, which is attached to or forms a part of the main body or frame 10. 33 is a striking-plate on the plate of insulating material 24.

The diagram Fig. 5 will serve to illustrate the operation of the device.

In the diagram, D represents the source of electric energy; C, main-line circuit; S, hand-switch located at a distance from the main switch; T U, contacts of hand-switch.

Assuming the hand-switch S to be moved to the right to cover the contacts U, the circuit will be completed through the upper solenoid, which attracts its armature 22 and moves the bridge-piece 24 upward. As the bridge-piece moves upward and establishes contact between its plates 25 and contacts 14 and closes the main circuit it also strikes the rod 18 and breaks the circuit between the contacts 17 and the contact-disk 19, thereby cutting the upper solenoid out of circuit. If the hand-switch is carried to the left to cover contacts T, a circuit is made through the lower solenoid, which pulls the sleeve or body of the armature 29 forcibly downward, so that it will strike a hammer-blow upon the spring 30, supported upon the armature-rod 26, thereby forcing downward the plate of insulating material 24, carrying the contact-plates 25 and breaking contact between the contact-plates 25 and the spring-terminal contacts 14.

Having thus described my invention, I claim—

1. In an electric switch, the combination of a pair of solenoids in line, a series of spring-terminal contacts, a reciprocating bridge device, an armature actuated by one of said solenoids and fixed to said bridge device, and an armature actuated by the other of said solenoids and elastically connected to said bridge device.

2. In an electric switch, the combination of a pair of solenoids in line, a series of spring-terminal contacts, a reciprocating bridge device, an armature actuated by one of said solenoids and fixed to said bridge device, and means actuated by the other of said solenoids for imparting a hammer-blow to said bridge device.

3. In an electric switch, the combination of a pair of solenoids arranged in line, a series of spring-terminal contacts, a reciprocating bridge device, an armature actuated by one of said solenoids and fixed to said bridge device, an armature actuated by the other of said solenoids, and a spring between said armature and said bridge device.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY PRICE BALL.

Witnesses:
LEWIS J. DOOLITTLE,
J. E. PEARSON.