(No Model.) 2 Sheets—Sheet 1.

S. BERGMANN.

SWITCH.

No. 457,572. Patented Aug. 11, 1891.

Fig. 1

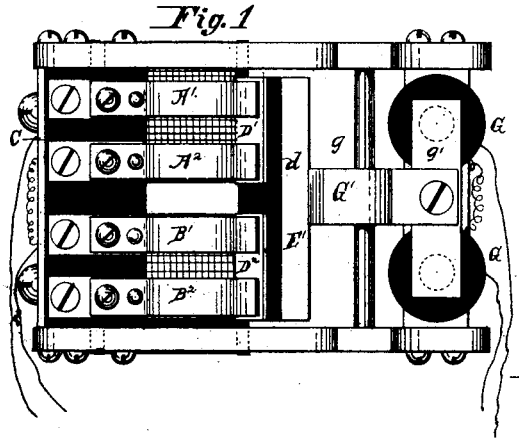

Fig. 2.

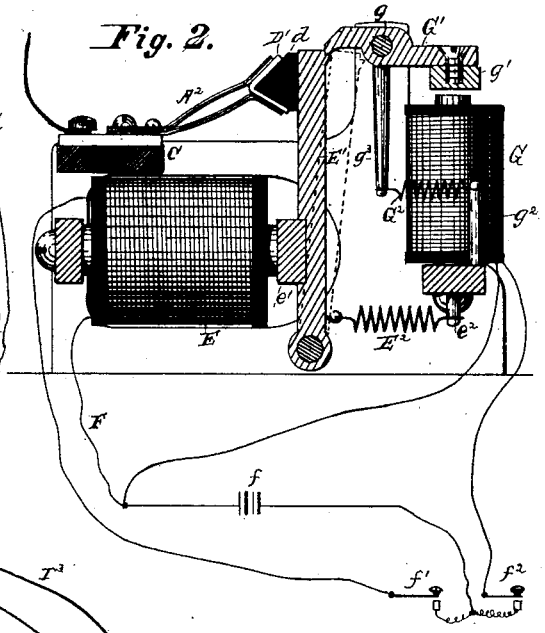

Fig. 3.

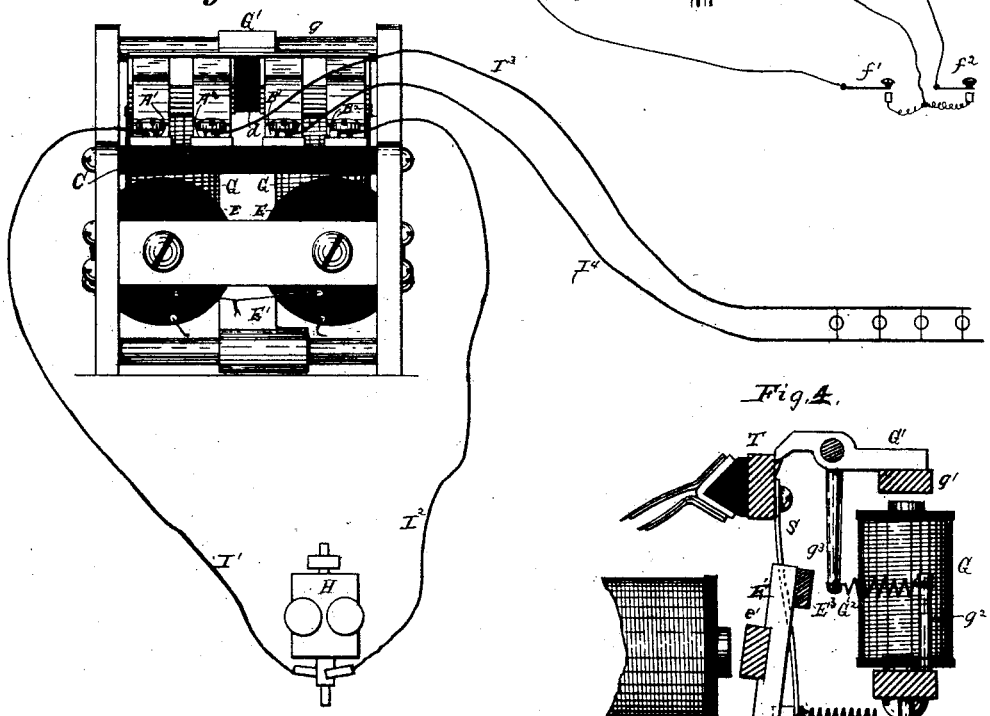

Fig. 4.

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Fig. 5.

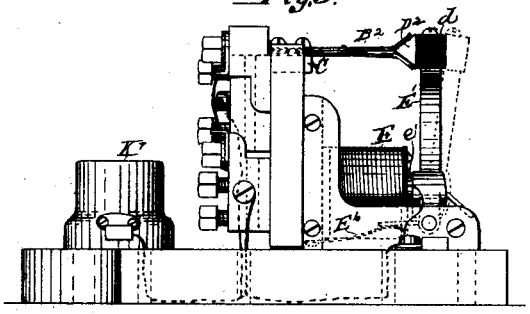


Fig. 6.

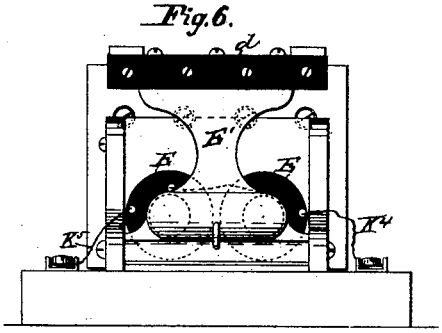


Fig. 8.

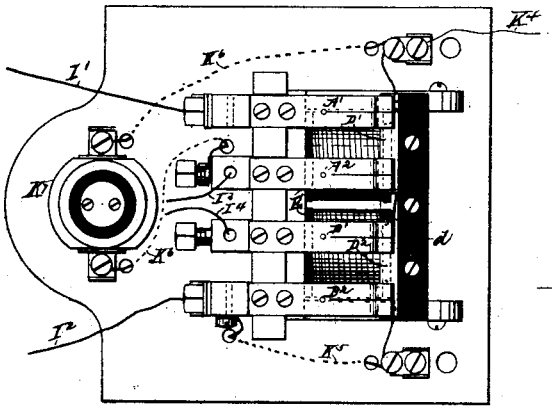


Fig. 7.

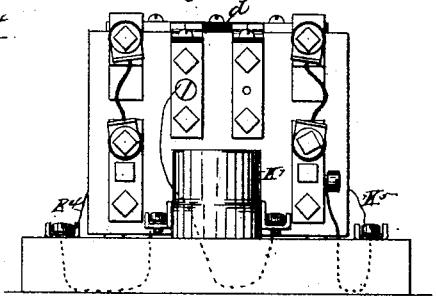
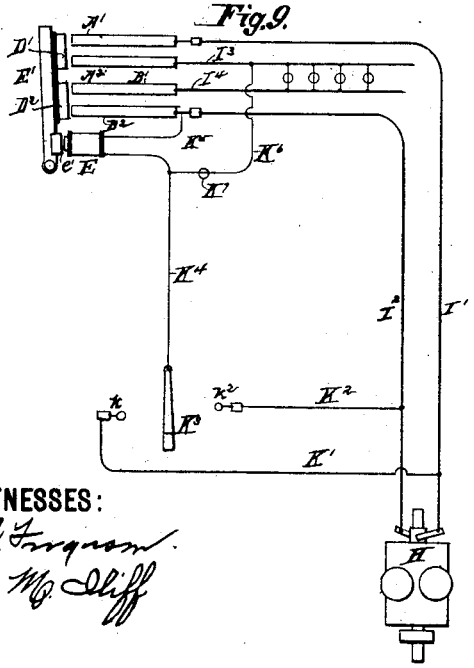


Fig. 9.



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SIGMUND BERGMANN, OF NEW YORK, N. Y., ASSIGNOR TO THE BERGMANN MANUFACTURING COMPANY, OF SAME PLACE.

SWITCH.

SPECIFICATION forming part of Letters Patent No. 457,572, dated August 11, 1891.

Application filed January 26, 1891. Serial No. 379,008. (No model.)

To all whom it may concern:

Be it known that I, SIGMUND BERGMANN, of New York, in the county and State of New York, have invented a certain new and useful Improvement in Switches, of which the following is a specification.

I will describe a switch embodying my improvement and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a top view of a switch embodying my improvement. Fig. 2 is a sectional side view of the same. Fig. 3 is an end view. Fig. 4 is a sectional side view of certain parts, illustrating a modification. Fig. 5 is a side view of a different form of switch. Fig. 6 is a view of one end of the latter. Fig. 7 is a view of the other end. Fig. 8 is a top view. Fig. 9 is a diagram illustrating the circuit.

Similar letters of reference designate corresponding parts in all the figures.

I will first refer to Figs. 1, 2, and 3. A' A^2 B' B^2 designate terminals for electric-circuit wires. As here shown, each consists of a number of strips, which at one end are fastened to a block of insulating material C and at the other are spread apart to receive between them connecting-pieces D' D^2. Each of the connecting-pieces D' D^2 is here shown as made of a strip of metal bent transversely at an angle, so as to be V-shaped in the cross-section. This strip is fitted to a block of insulating material *d*. The connecting-piece D' is arranged on the block of insulating material *d* opposite the terminals A' A^2, and the connecting-piece D^2 opposite the terminals B' B^2. Obviously whenever the connecting-pieces D' D^2 are forced between those ends of the strips forming the terminals A' A^2 B' B^2, which are spread apart, the terminals A' A^2 will be electrically connected and the terminals B' B^2 will be electrically connected. As the connecting-pieces D' D^2 are insulated from each other, they will not establish electrical communication between the terminals A' A^2 and the terminals B' B^2. The block *d*, on which the connecting-pieces D' D^2 are mounted, is affixed to an armature-lever E', whose armature *e'* coacts with an electro-magnet E. Whenever this electro-magnet E is energized, its armature will be attracted and the lever E' will be swung into such position as to force the connecting-pieces D' D^2 between those ends of the strips forming the terminals A' A^2 B' B^2, which are spread apart. Thus electrical communication will be established between the pairs of terminals. The armature-lever E' is retracted by a spring E^2, extending between it and a fixed pin e^2. G' designates a lever, which is fulcrumed between its ends to a pin *g*. At one end this lever carries an armature *g'* for an electro-magnet G, and at the other it is constructed to engage with the armature-lever E' when the latter is attracted by the electro-magnet E. A spring G^2, extending between a pin g^2 and an arm g^3, extending from the lever G, oscillates the lever in such direction as to retract the armature *g'* from the electro-magnet G. It is not intended that the electro-magnets E and G shall be energized at the same time. When the electro-magnet E is energized and the armature-lever E' is swung toward it, the lever G' will drop behind the upper end and prevent it from swinging back, even if the electro-magnet E be de-energized. If the electro-magnet G is energized at a time when the electro-magnet E is not energized, it will attract its armature *g'*, and therefore disengage the lever G' from the armature-lever E', whereupon the latter will be retracted by the spring E^2, so as to break the connection between the pairs of terminals A' A^2 B' B^2. I have shown circuit-wires F extending from the coils of the electro-magnets E G to switches *f' f²* and as including a battery *f*. The wires of the electro-magnets and the circuit-wires F may be very fine, as they do not have to carry any heavy current. This is desirable for many reasons, among which is the safety secured by leading a light current into the place whence the electro-magnets are to be operated. The terminals A' A^2 B' B^2 may be used in connection with any circuit-wires. In the present instance from a dynamo H wires I' I^2 lead to the terminals A' B^2, and wires I^3 I^4 lead from the terminals A^2 B' and constitute the main wires of a multiple-arc-lighting system. This is of course only one illustration of the use of the switch which I have described.

The construction illustrated by Fig. 4 differs slightly from that already described. The

magnets, their armatures, and the levers whereby the armatures are supported are not changed; but the block *d*, to which the connecting-pieces D′ D² are attached, is secured to a block T, supported by a spring or springs S, having a tendency to move away from the terminals. The armature-lever E′ has affixed to its upper portion a cross-bar E³, which extends behind the spring or springs S, and when the armature *e′* is attracted forces the spring or springs S forward, so as to cause the connecting-pieces D′ D² to contact with the terminals A′ A² B′ B².

It will be seen that in each of these examples of my improvement the switch is closed by an electro-magnet energized by a light current and is locked when the main circuit, which includes the terminals A′ A² B′ B², is completed, and yet can be unlocked by a magnet energized with a light current.

In Figs. 5 to 8, inclusive, A′ A² B′ B² represent terminals. E designates an electro-magnet; E′, an oscillating armature-lever; *e′*, an armature, and D′ D² metal connecting-pieces carried by the lever E′, but insulated therefrom and from each other. These parts are like the parts similarly lettered previously described. E⁶ designates a spring for swinging the lever E′ in a direction to retract the armature *e′* from the magnet E. In this example of my improvement there is no second magnet; but the switch is operated by changing a circuit, including the electro-magnet E.

Referring to Fig. 9, which illustrates the latter form of switch diagrammatically with its circuit, H designates a dynamo-electric machine or source of electricity. I′ designates a wire electrically communicating with the terminal A′, and I² designates a wire leading from such dynamo or source of electricity to the terminal B². Line-wires I³ I⁴ are connected respectively with the terminals A² B′. Obviously when connecting-pieces D′ D² are caused by the attractive force of the electro-magnet E to contact with the terminals and electrically connect the terminals A′ and A², and also electrically connect the terminals B′ and B², the line-wires I³ I⁴ will be put into electrical communication with the wires I′ I², and, therefore, will receive an electric current from the dynamo or source of electricity H. K′ designates a wire leading from the wire I′ and terminating in a contact-piece *k′*. K² is a wire leading from the wire I² and terminating in a contact-piece *k²*. K³ is a switch-arm capable of being oscillated to touch the contact-piece *k′* or the contact-piece *k²*. From it a wire K⁴ extends to one end of the coils of the electro-magnet E. A wire K⁵ extends from the other end of the coils of this electro-magnet and is in electrical communication with the wire I². Obviously, therefore, whenever the switch-arm K³ is swung onto the contact-piece *k′* a circuit will be completed from the dynamo along the wire I′ to the wire K′, thence through the contact-piece *k′* and switch-arm K³ to the wire K⁴, thence to the electro-magnet E, and afterward through the wire K⁵ and wire I² back to the dynamo. When this circuit is established, the electro-magnet E will be energized, its armature will be attracted, and consequently the connecting-pieces D′ D² will be caused to contact with the pairs of terminals A′ A² and B′ B² to connect the line-wires I³ I⁴ with the dynamo or source of electricity H. From the wire K⁴ a wire K⁶ extends to the line-wire I³ or to any other part in electrical communication with the terminal A². When the switch-arm K³ is shifted over to the contact-piece *k²*, there will be a current from the dynamo along the wire I′ to the terminal A′, thence along the connecting-piece D′ to the terminal A², thence along the wire I³ to the wire K⁶, thence to the wire K⁴, and from there along the switch-arm K³, contact-piece *k²*, wire K², and wire I² back to the dynamo or source of electricity. Preferably there will be a resistance device—as, for instance, an electric lamp K⁷—introduced into the wire K⁶. On the establishment of a circuit as last described the electro-magnet E will be so weakened as to be no longer able to hold the connecting-pieces in contact with the terminals A′ A² B′ B² against the force of the spring E².

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a switch, the combination, with terminals, connecting-pieces, and a source of electricity, of wires leading from the source of electricity to certain of said terminals, line-wires connected to the others of said terminals, a wire leading from each of the first-named wires and terminating in contact-pieces, a switch movable to touch either of said contact-pieces, an electro-magnet, a wire extending from the movable switch to one end of the electro-magnet, a wire extending from the other end of the electro-magnet to one of the wires first named, and a wire extending from one of the line-wires to the wire connecting the movable switch and electro-magnet, substantially as specified.

2. In a switch, the combination of the terminals consisting of strips of metal secured at one end to a block of insulating material and spread apart at the other end, connecting-pieces opposite and adapted to enter the spread ends of the terminals, a locking device for securing the connecting-pieces against the terminals, an electric circuit for operating the locking device, an armature-lever, upon which the connecting-pieces are mounted, and an electro-magnet coacting with the armature on the lever to force the connecting-pieces into contact with the terminals, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIGMUND BERGMANN.

Witnesses:
P. H. KLEIN, Jr.,
GEORGE A. SCOTT.