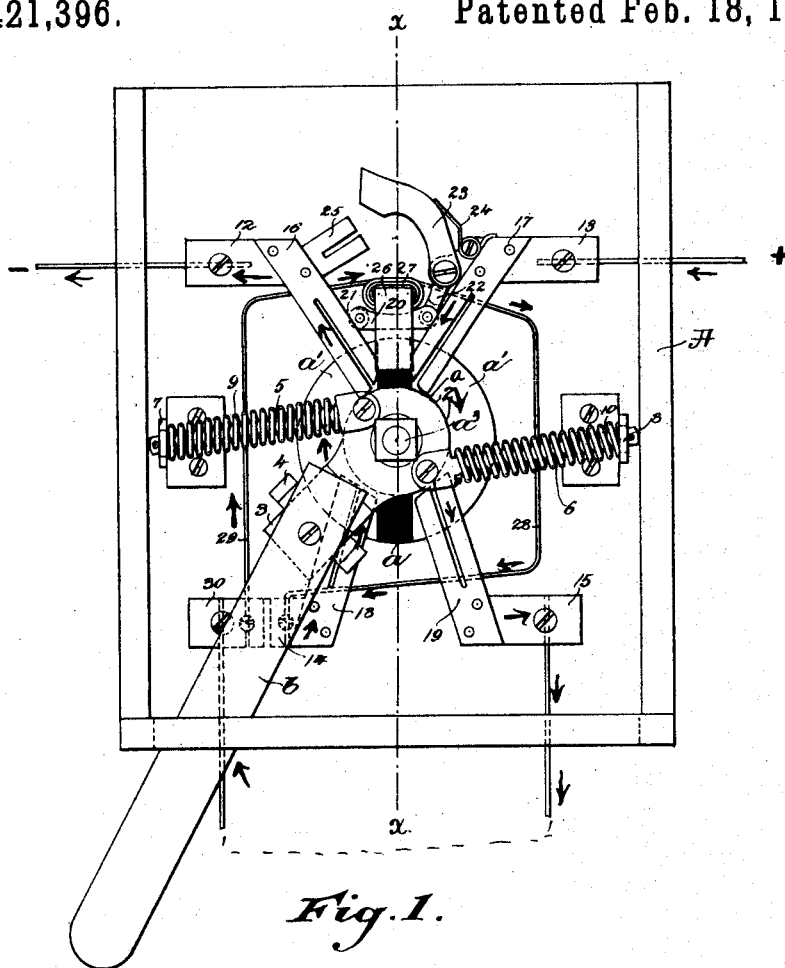


G. A. FREI.  
CUT-OUT.

No. 421,396.

Patented Feb. 18, 1890.



Witnesses.  
Fred. S. Grundleaf  
Hiram A. Emery.

Inventor.  
Gustav A. Frei,  
by Leroy Gregory Atty

(No Model.)

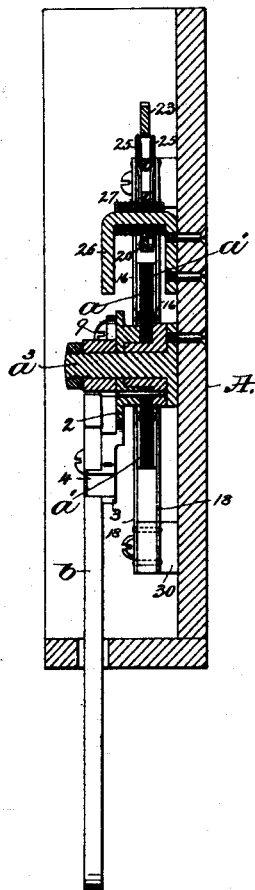
2 Sheets—Sheet 2.

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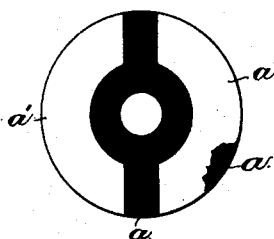
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*Fig. 2.*



*Fig. 3.*



*Witnesses.*

*Marion L. Emery-  
Edgar A. Goddard*

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*Gustav A. Frei,  
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Attys.*

# UNITED STATES PATENT OFFICE.

GUSTAV A. FREI, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE BERNSTEIN  
ELECTRIC LIGHT MANUFACTURING COMPANY, OF PORTLAND, MAINE.

## CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 421,396, dated February 18, 1890.

Application filed October 12, 1888. Serial No. 287,935. (No model.)

*To all whom it may concern:*

Be it known that I, GUSTAV A. FREI, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Switches and Cut-Outs for Electric Lights, 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 an application of Mr. O. S. Bussmann, Serial No. 252,122, filed October 12, 1887, a safety-switch for incandescent lights, &c., is shown designed to be operated manually to cut into and out of circuit one or several electrically-controlled devices to preserve the continuity of the main circuit, or the continuity of both the main and the auxiliary or local circuit containing the electrically-controlled devices, the said safety-switch being provided with an automatic circuit-changing device or contact-maker normally held disengaged by a fusible retaining device, but which, when released, is adapted to preserve the continuity of the circuit. This safety-switch was designed for use when the circuit containing the lamps or other electrically-controlled devices was found open—as, for instance, by a broken filament or broken wire, in which instance the main line would be opened; but under such circumstances the automatic circuit-changing device or contact-maker was released and the continuity of the main line preserved.

This invention has for its object to improve the construction of the switch in several particulars.

It has been found in practice that the contacts between which an arc would be formed if the auxiliary circuit was found open, when placed near enough together to properly establish the arc and fuse the retaining device, were so near that an arc was liable to be established at other times and accidents therefrom liable to occur. In accordance with this invention I have provided a magnet, preferably an electro-magnet, in the magnetic field of which the main-line contacts are placed. The magnetic force serves in well-known manner to suppress an arc if established. In lieu of the spring-controlled plugs shown in the application referred to, a pivoted lever or

arm held in its abnormal position against the tension of a spring by a fusible retaining device, herein shown as a link, is employed, the said link being adjacent to the main-line contacts, so as to be heated by the arc established.

Figure 1 shows in front elevation a safety-switch embodying this invention; Fig. 2, a vertical section of the switch shown in Fig. 1, taken on the dotted line  $xx$ ; and Fig. 3, a detail showing the segmental contact-plates, the plate on the right being broken away to show insulating-disk  $a$ .

The circular disk  $a$ , of insulating material, having upon each side two contact-plates, as  $a'$ , the shaft  $a^3$ , to which the disk is secured, and the case  $A$ , are substantially as in the application referred to. A crank-disk 2 is secured to the shaft  $a^3$ , it having an arm 3, to which is loosely connected the operating-lever  $b$ . A yoke or strap 4 is fastened to the arm 3, between the upwardly-extending sides of which the lever  $b$  works. Two rods 5 6 are loosely connected to the crank-disk 2 eccentrically but at opposite sides of the shaft  $a^3$ , the outer or free ends of the said rods passing through guides or brackets 7 8. Spiral springs 9 10 surround the rods 5 6, the outer ends of which bear against the guides or brackets 7 8 and the opposite ends bear against shoulders formed on the rods 5 6. By this construction it will be seen that as the lever  $b$  is moved in one or the other direction it may be moved slowly until the disk  $a$  arrives at a certain position near the limit of its movement in one or the other direction, when one or the other spring 5 6 will tend to continue the movement quickly. The result thus obtained is well known in the art in safety-switches.

Plugs 12 13 14 15 are secured to the case  $A$ , to each one of which, respectively, is attached contact-pens 16 17 18 19, although for safety a duplicate set of pens is employed to cooperate with the opposite side of the disk  $a$ . These pens 16 17 18 19 bear upon the contact-plates  $a'$ , and, as herein represented, the pens 16 17 will be denominated the "main-line contacts" and the pens 18 19 the "auxiliary-circuit contacts." As herein shown, the pens 16 18 bear upon the same plate, and

hence a path is offered for the current through the pen 16, plate *a'*, pen 18, and through the auxiliary circuit in the manner to be described, returning through the pen 19, plate *a'*, and pen 17 to the main line. By moving the operating-lever *b* into its other position the pens 16 and 17 bear upon the same plate and the pens 18 19 upon the same plate, and hence the auxiliary circuit is cut out.

10 The contacting ends of the pens 16 17 are arranged close together, so that an arc may be established between them if the auxiliary circuit is found open by accident or inadvertence, and the fusible retaining device or link 20 is as near to the contacting ends of the pens 16 17 as possible, it being loosely connected at one end with the bracket or arm 21 and at the opposite end with the short arm 22 of a pivoted lever or arm 23.

15 The link 20 holds the lever 23 in its abnormal position against the tension of the spring 24; but when the said link is fused the lever 23 is released, and is moved by the spring 24 into engagement with the contact-pen 25 to preserve the continuity of the circuit. As the pens 16 and 17 are arranged very close together, an arc is liable to be established when the auxiliary circuit is complete, and to provide against accident in such cases an electro-magnet 26 is provided, the pole-pieces of which receive between them the contacting ends of the pens 16 17, so that the arc established will lie in the magnetic field. The coil 27 of said electro-magnet is connected by wire 28 with the block 14, and by wire 29 with the block 30, from which leads the auxiliary circuit. Thus it will be seen that when the auxiliary circuit is included the coil 27 will also be included. The magnetic force of the magnet 26 tends to suppress or destroy the arc which may be formed between the

pens 16 and 17, when another path for the current is offered.

The safety-switch above described is simple, compact, and very efficient, and not liable to get out of order. The magnet 26 may be connected directly in the main line, if desired.

I claim—

1. In a safety manually-operable switch, the combination, substantially as described, of the following instrumentalities: the movable member and hand-lever for moving it, the main-line contacts 16 17, located adjacent to each other, the auxiliary-line contacts 18 19, constituting stationary members, with which the movable member co-operates, and the magnetic device in the magnetic field of which the ends of said contacts 16 17 lie, the contact-maker 23, and the fusible link 20, also located near the ends of the said contacts 16 17, for holding the said contact-maker 23 in its abnormal position.

2. In a safety manually-operable switch, the combination, substantially as described, of the disk having two contact-plates constituting the movable member, the hand-lever for moving it, the main-line contacts 16 17, auxiliary-line contacts 18 19, constituting the stationary members, the pivoted spring-controlled contact-lever 23, and fusible link 20, located near the ends of the contacts 16 17, connected at one end to and normally holding the said lever 23 in its abnormal position.

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

GUSTAV A. FREI.

Witnesses:

BERNICE J. NOYES,  
F. L. EMERY.