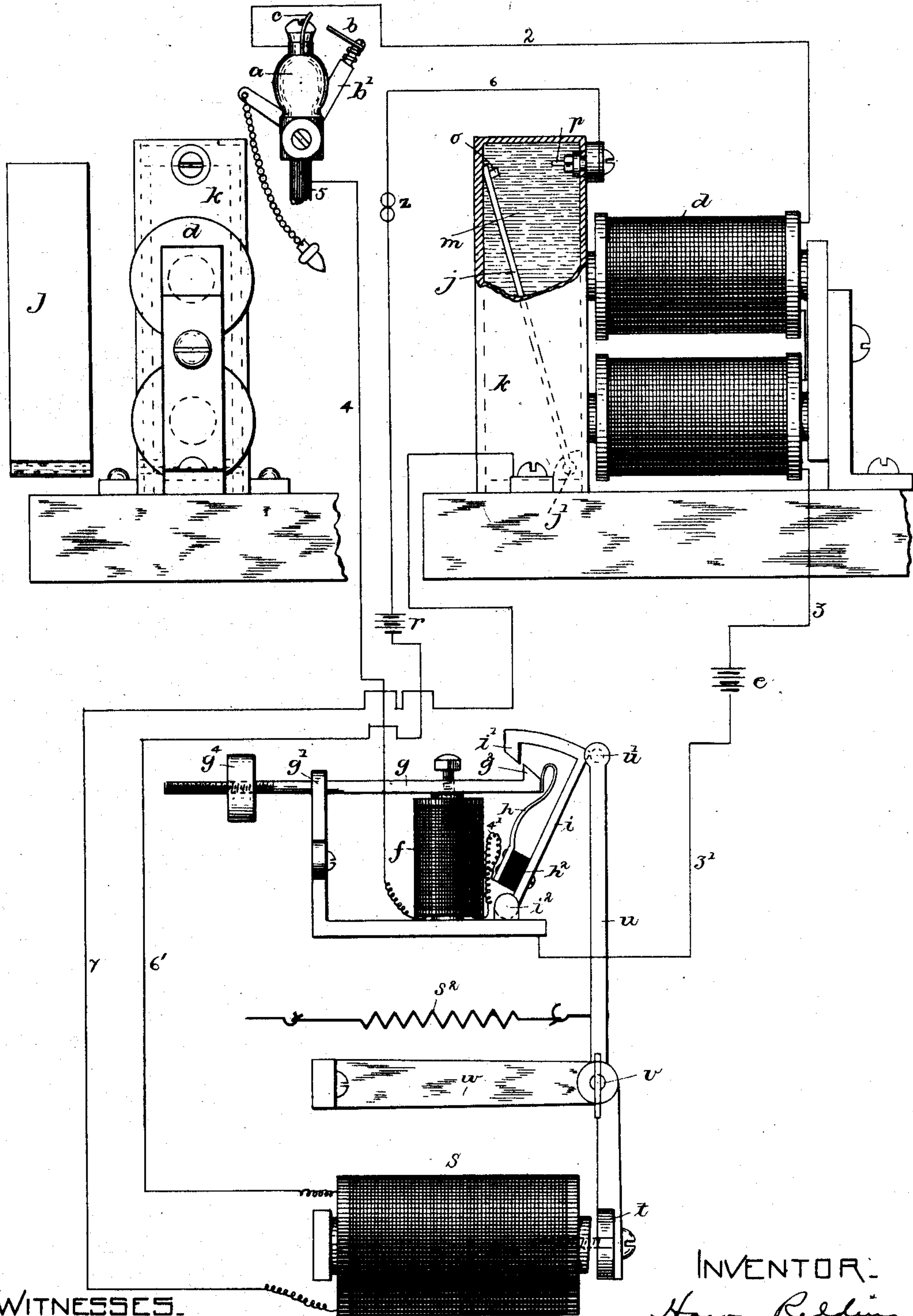


(No Model.)

H. REDDING:
APPARATUS FOR DETECTING SHORT CIRCUITS.

No. 432,215.

Patented July 15, 1890.



WITNESSES.
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UNITED STATES PATENT OFFICE.

HARVEY REDDING, OF EVERETT, MASSACHUSETTS.

APPARATUS FOR DETECTING SHORT CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 432,215, dated July 15, 1890.

Application filed April 14, 1890. Serial No. 347,758. (No model.)

To all whom it may concern:

Be it known that I, HARVEY REDDING, of Everett, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Detecting Short Circuits in Electric Gas-Lighting Systems, of which the following is a specification.

This invention relates chiefly to electric gas-lighting, in which gas rising from a burner is ignited by a spark or electric arc formed in the presence of the escaping gas by the separation of two terminals or electrodes included in a primary electric circuit, one of said terminals being usually attached to the burner and the other to an oscillatory arm, said movable terminal being adapted to wipe across the fixed terminal, thus momentarily forming a short circuit, and then to separate from the fixed terminal, and thus create a spark when said arm is moved to effect the lighting of the gas. It sometimes happens that the movable terminal is accidentally left in or moved to such position that it creates a protracted short circuit by contact with the fixed terminal or other part of the electric circuit, and to give notice of such accidental short circuit an electric bell has been included in a local circuit, said bell being adapted to be rung by the closure of the primary circuit when said closure is somewhat protracted. It has been found, however, that there is liability of closing the local circuit and ringing the bell by the ordinary wiping contact of the two terminals in the operation of lighting the gas, so that the bell is often rung when no occasion for its ringing exists.

My invention has for its objects, first, to overcome this difficulty and prevent the ringing of the bell, excepting when the short circuit is unduly prolonged, and, secondly, to provide means for automatically breaking the short circuit when the same has been established accidentally.

To these ends my invention consists, first, in the combination of an electro-magnet included in a main or primary electric circuit, an armature for said electro-magnet included in a local circuit which is closed by the movement of said armature toward the poles of the electro-magnet, a liquid-holding casing inclosing said armature, and a body of any suitable

liquid—such as glycerine—confined around the armature in said casing and serving to retard the movement of the armature toward the poles of the magnet, so that when the primary circuit is closed the local circuit cannot be closed until the said armature has had time to overcome the inertia of the retarding-liquid.

The invention also consists in the combination, with a primary circuit, including the said electro-magnet and a spring-contact, which is movable to break the circuit, of a local circuit, including the armature of said electro-magnet, a retarding device for said armature, an electro-magnet included in said local circuit, and a device controlled by the armature of the last-mentioned magnet, whereby the spring-contact in the primary circuit is moved to break said circuit when the local circuit is closed, so that a prolonged closing of the primary circuit and exhaustion of the battery therein is automatically prevented, all of which I will now proceed to describe.

The accompanying drawing represents a diagrammatic view of a primary electric circuit, including a gas-burner, a local circuit, including a bell or alarm, the improved means embodying my invention of causing a retarded closing of the local circuit, and automatic means for breaking the primary circuit by the closure of the local circuit.

In the drawing, *a* represents a gas-burner, which is provided with a fixed terminal *c* included in the primary circuit.

b represents the movable terminal or wiping contact-spring, which is also included in the primary circuit and is attached to a pivoted arm *b'*, adapted to be moved in the usual way to cause a brief closure of and then a breakage of the primary circuit by contact of the terminal *b* with the terminal *c* and by the separation of said terminals.

d represents an electro-magnet, which is included in the primary circuit and is engaged by the closure thereof.

j represents an armature, which is pivoted at *j'* and is arranged to be moved toward the poles of the electro-magnet *d* when the latter is energized. Said armature is included in a local circuit, which also includes wire 6, battery *r*, wire 6', and wire 7, said circuit being closed when a contact-point *o* on the swing-

ing end of said armature strikes a contact-point p , connected with wire 6. A suitable electric bell z may be included in the local circuit. Surrounding the armature j is a casing k , which contains a body m , of any suitable liquid—such as glycerine—adapted to retard the movement of the armature toward the poles of the magnet d . It will be seen, therefore, that the local circuit cannot be closed excepting by a closure of the primary circuit of sufficient duration to enable the armature j to overcome the inertia of the retarding body m ; hence the ringing of the bell in the local circuit by a brief closure of the primary circuit, such as would be caused by the ordinary wiping contact of the terminal b with the terminal c , is impossible.

To automatically break the primary circuit in the event of an accidental closure thereof of sufficient duration to close the local circuit, I provide, as a part of the primary circuit, a movable contact-spring h , which normally bears against a bar or lever g , also included in the primary circuit. Said spring h is supported by a pivoted lever i , presently described, and is connected by a flexible wire $4'$ with an electro-magnet f , which is connected with the wires $3'$ and 4 of the primary circuit. The electro-magnet f attracts the lever g when the primary circuit is closed, and thus draws a hook or detent g^2 on said lever out of engagement with a hook or detent i' on the lever i , which is pivoted at i^2 to a fixed support and supports the contact-spring h , the latter being insulated by block h^2 from lever i .

s represents an electro-magnet in the local circuit, and t represents the armature thereof, said armature being pivoted at v to a fixed bracket w . Attached to the armature t is an arm u , supporting a bar u' , which, when the local circuit is open and the armature is held by the spring s^2 in the position shown in Fig. 1, stands in position to support the lever i and cause the latter to hold the spring h in contact with lever g . So long as the primary circuit is open the lever g is held by a weight g^4 in position to cause its hook g^2 to

engage the hook i' of the lever i ; but when the primary circuit is closed said hook g^2 is withdrawn from hook i' , as shown in Fig. 1. When the primary circuit has been closed long enough to close the local circuit, in the manner above described, the armature t is attracted to the poles of the magnet s and the bar u' is moved back far enough to permit the separation of the spring h from the lever g , which breaks the primary circuit.

It is obvious that various other automatic devices may be used to break the primary circuit upon a closure of the local circuit; hence I do not limit myself to the automatic devices here shown and described.

I claim—

1. The combination of an electro-magnet included in a main or primary electric circuit, an armature for said electro-magnet included in a local circuit which is closed by a movement of the armature toward the poles of the electro-magnet, a liquid-holding casing enclosing said armature, and a body of liquid confined around the armature in said casing, whereby the movement of the armature to close the local circuit is retarded, as set forth.

2. The combination, with a primary electric circuit, an electro-magnet d , included in said circuit, a movable contact h , also included in said circuit and adapted to be moved to break the circuit, of a local circuit, an armature movable toward and from the poles of the electro-magnet d and included in the local circuit, a retarding device for said armature, an electro-magnet s included in the local circuit, and a device controlled by the armature of the electro-magnet s , whereby the contact h is moved to break the primary circuit when the local circuit is closed, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of April, A. D. 1890.

HARVEY REDDING.

Witnesses:

C. F. BROWN,

EWING W. HAMLEN.