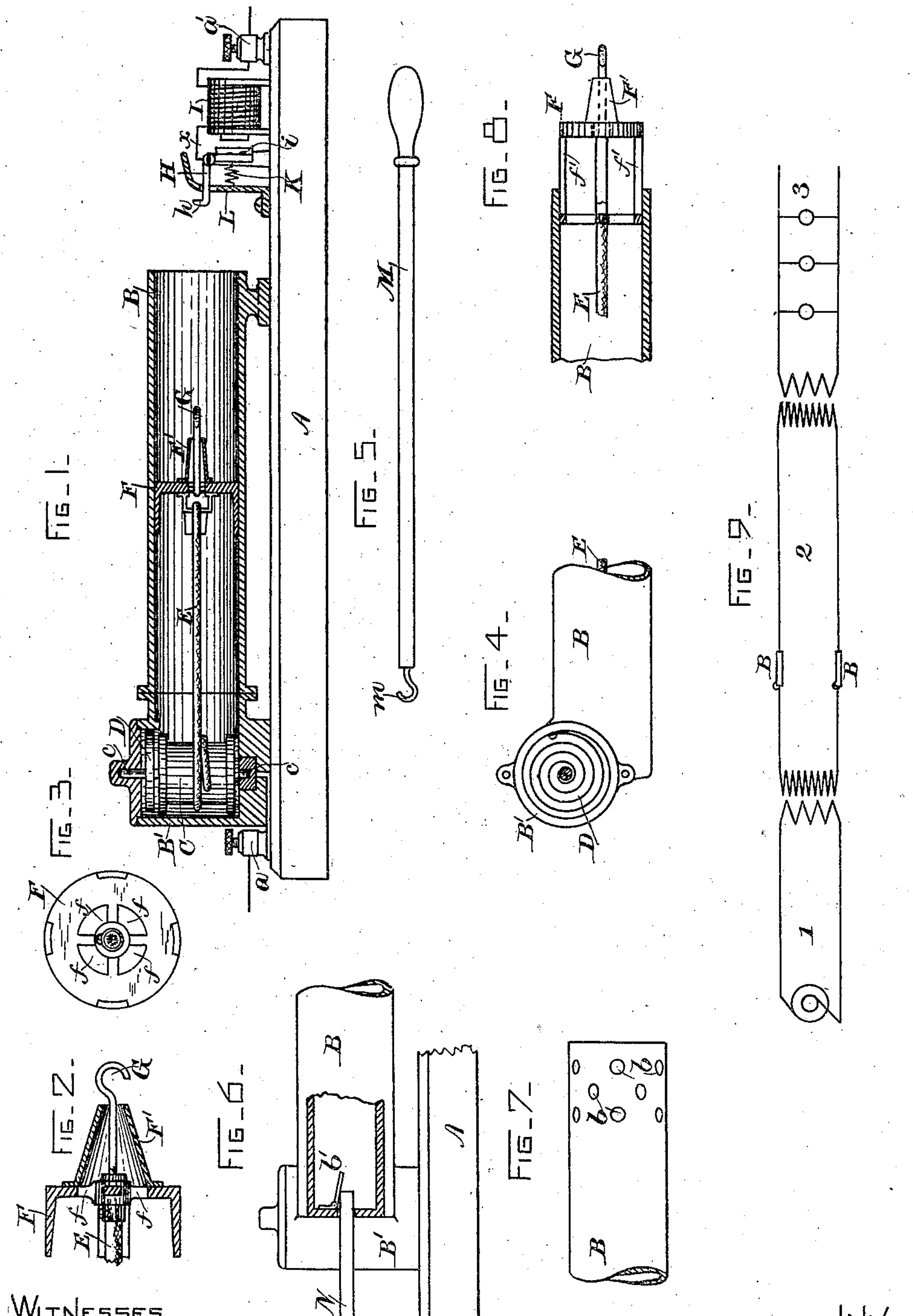
(No Model.)

E. THOMSON.

CURRENT INTERRUPTER FOR HIGH POTENTIAL CIRCUITS.

No. 522,865. Patented July 10, 1894.



WITNESSES_

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CURRENT-INTERRUPTER FOR HIGH-POTENTIAL CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 522,865, dated July 10, 1894.

Application filed February 6, 1893. Serial No. 461,154. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, and State of Massachusetts, have invented certain new and useful Improvements in Current-Interrupters for High-Potential Circuits, of which the following is a specification.

My invention relates to devices for interrupting high potential circuits, such for instance as used in the transmission of power by alternating or multiphase currents, where the potential is as high as five thousand or ten thousand volts, or more. When such a circuit is broken there is formed an arc which it is necessary to extinguish at once to prevent injury to the apparatus. My invention aims to accomplish this by simultaneously separating the terminals very quickly and subjecting the arc to an air blast. These effects may be produced in a variety of ways, but it is preferred to use a spring drum for separating the terminals, said drum operating to reel up a flexible conducting cable to which one of said terminals is attached. It is also preferred to so arrange the apparatus that the winding up of the cable actuates the air pump for giving the blast. An apparatus for embodying these features is shown in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation. Figs. 2 and 3 are enlarged views of the piston. Fig. 4 is a plan of the spring. Fig. 5 is a view of the setting handle. Figs. 6, 7 and 8 are modifications, and Fig. 9 is a diagram of a circuit including two interrupters.

Upon a suitable base A of insulating material is mounted a tube B, also of non-conducting material, such as hard rubber or porcelain. At one end of the tube is a cylindrical chamber B′ arranged transverse to the tube B and preferably a little to one side, as shown in Fig. 4. Housed in the chamber is a drum C turning freely on journals *c*. A spiral spring D has one end attached to the wall of the chamber and the other end to the drum or to one of its journals, as shown. Wound on the drum is a flexible conducting cable E, the free end of which is attached to a head F sliding in the tube B, being preferably a piston snugly fitting the tube. To the head F is fastened a hook or eye G, adapted to engage with the hooked end *h* of a lever H, suitably mounted on the base A in line with the open end of the tube. The lever carries the armature *i* of an electro magnet I, the armature being held normally away from the magnet by a spring K. A shield L is interposed between the tube and the magnet, the hooked end *h* projecting through a slot in the shield. When the hook G is released from the hook *h* the spring D rotates the drum and winds up the cable E, thereby drawing the head F into the tube.

The hooks G and *h* constitute the terminals of the circuit, the current entering at the binding post *a*, and passing thence to a journal of the drum C, with which one end of the cable E is electrically connected, its other end being electrically connected with the hook G. The hook *h* is connected by wire *x* with the binding post *a*′ through the electro magnet I.

Fig. 9 shows the arrangement of circuits, the interrupter being inserted in a secondary circuit, 2, between the primary, 1, and the work circuit, 3. It is preferred to use two interrupters, one in each branch of the closed secondary circuit.

To reset the instrument, a long insulating handle M is used, with a hook *m* on the end of it, by means of which the attendant reaches into the tube and pulls out the head F till the hook G engages with the hook *h*. The electro magnet I is wound to respond only to an abnormal current, upon the passage of which the hook G is released, and the spring rapidly separates the terminals G *h*, thereby breaking the circuit and also the arc which follows their separation. In order to extinguish this arc more quickly and positively, the head F is made to act as a piston in connection with the tube B, compressing the air and forcing it out through a suitable vent in the piston directly against the arc. To this end, the head is preferably a solid disk except the openings *f* near its center, said openings leading into a nozzle F′ surrounding the hook G and preferably somewhat tapering in order to concentrate the strength of the blast at the desired point.

To intensify the effect of the blast, by caus-

ing it to start with a sudden puff, the air may be allowed to escape freely through some other vent until the piston has acquired a certain velocity. Thus the tube may be perforated with holes *b* for a portion of its length; or the piston may be mounted on a cage *f'* which allows it to stand out beyond the end of the tube when the hooks G *h* are engaged.

Instead of the hooked handle M, a rod N may be used to reset the instrument, being inserted through a hole in the closed end of the tube, to shove the piston out till the hooks engage. A flap valve *b'* closes the hole when the rod is withdrawn.

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

1. An interrupter for high potential circuits, comprising two separable terminals, an insulating tube, a head sliding in said tube and carrying one of said terminals, and automatic means for quickly moving said head when the terminals are separated, substantially as described.

2. An interrupter for high potential circuits, comprising two separable terminals, an insulating tube, a head sliding in said tube and carrying one of said terminals, and a spring actuated drum connected with said head, substantially as set forth.

3. An interrupter for high potential circuits, comprising two separable terminals, an insulating tube, a head sliding in said tube and carrying one of said terminals, a spring actuated drum, and a conducting cable wound on said drum and connected with the terminal on the sliding head, substantially as described.

4. The combination with two separable terminals, of a spring actuated drum connected with one of said terminals, and an electro magnet adapted to disconnect said terminals, substantially as described.

5. The combination with a sliding head carrying one terminal, of a hooked lever constituting the other terminal and an electromagnet for actuating said lever to disconnect the two terminals, substantially as set forth.

6. The combination with an insulating tube having a chamber at one end, of a spring actuated drum in said chamber, a head sliding in the tube, a flexible conducting cable wound on the drum and connected with said head, a hook carried by said head and electrically connected with said cable, a hooked lever and an electromagnet adapted to vibrate said lever, substantially as described.

7. The combination with two separable terminals, of a releasing device for disconnecting them, a spring for quickly separating them, and a device operated by said spring for generating an air blast to extinguish the arc, substantially as described.

8. The combination with two separable terminals, of a tube, a piston sliding therein and carrying one of said terminals, and having openings adjacent thereto, substantially as set forth.

9. The combination with two separable terminals, of a tube, a piston sliding therein carrying one of said terminals, and having openings adjacent thereto, and a nozzle surrounding said openings, substantially as described.

10. The combination with two separable terminals, of a tube, a piston sliding therein carrying one of said terminals and having openings adjacent thereto, and means for permitting the air to escape until the piston has gathered headway, substantially as set forth.

11. The combination with two separable terminals, of a tube, a piston sliding therein, carrying one of said terminals, and having openings adjacent thereto, and a spring drum connected with said piston, substantially as described.

In witness whereof I have hereunto set my hand this 2d day of February, 1893.

ELIHU THOMSON.

Witnesses:
JOHN W. GIBBONEY,
BENJAMIN B. HULL.