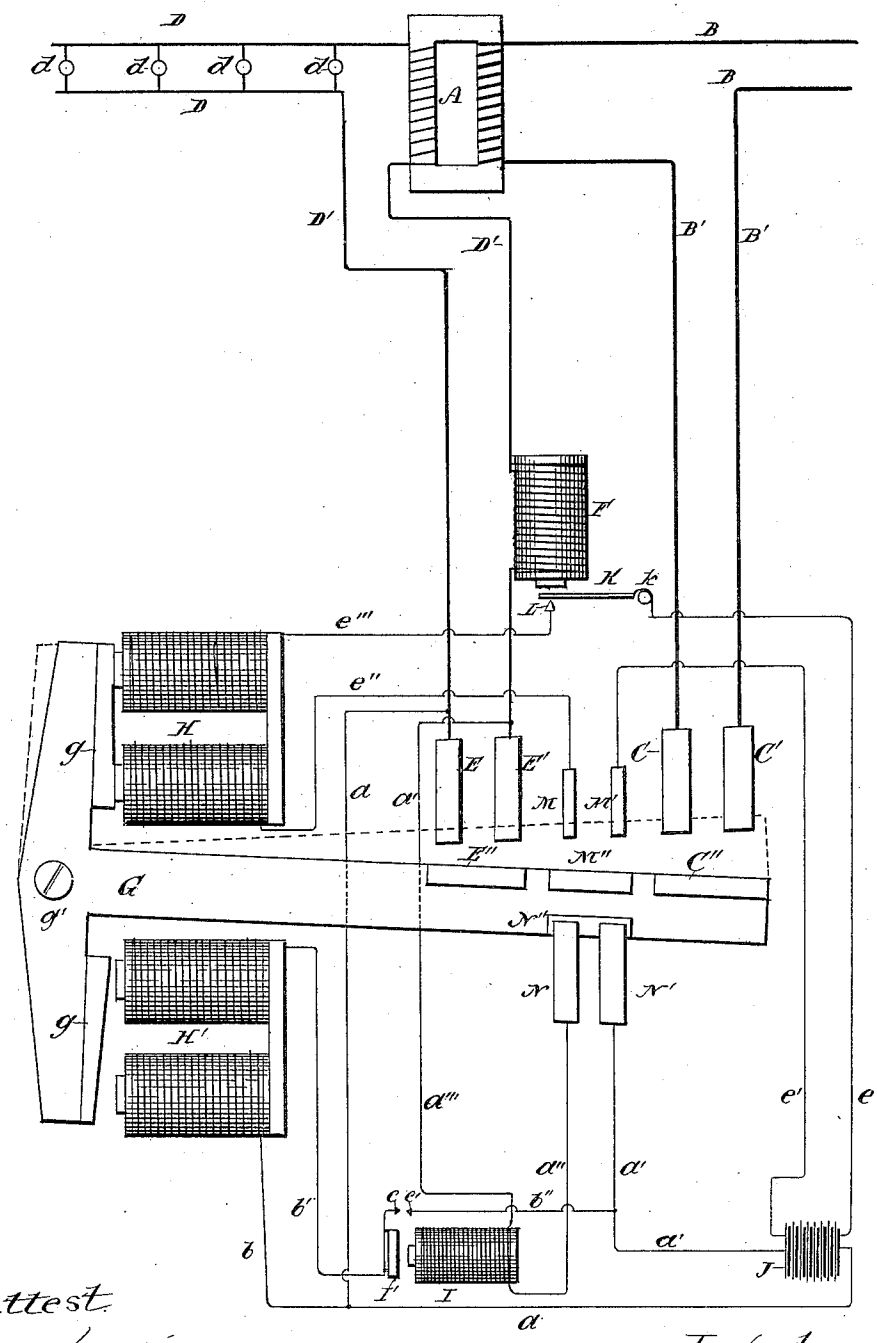
(No Model.)

A. C. BOOTH.

AUTOMATIC CUT-OUT FOR ELECTRICAL TRANSFORMERS.

No. 569,538. Patented Oct. 13, 1896.



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AUTOMATIC CUT-OUT FOR ELECTRICAL TRANSFORMERS.

SPECIFICATION forming part of Letters Patent No. 569,538, dated October 13, 1896.

Application filed February 6, 1895. Serial No. 537,517. (No model.)

To all whom it may concern:

Be it known that I, ALBERT C. BOOTH, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Automatic Cut-Outs for Electrical Transformers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to economize the operating of electric light and power plants by providing means for automatically cutting out any or all of the transformers whenever they are not needed to furnish a current for light or other work. This result is effected through the operation of mechanism hereinafter fully described, and illustrated in the accompanying drawing, which is an ideal representation of apparatus adapted for the purpose, the different parts thereof being for the most part of familiar construction.

Similar letters of reference indicate corresponding parts.

The operating of electric light and power plants or stations is at present attended with a considerable superfluous expenditure of power, owing to the fact that in general a large proportion of the transformers, if not all, must at all times be charged, inasmuch as the line may be tapped at any time, day or night, by the turning on of a light; but as the transformers are widely distributed and the circuits of a large proportion of them are but seldom used in the daytime the charging of these transformers involves the expenditure of a large amount of energy against an emergency—that is to say, this expenditure is necessary to keep them so charged, owing to the continual leakage, which cannot be avoided except by cutting out the transformer. The herein-described invention is designed to accomplish this result automatically by the simple opening of the last-closed switch or circuit-closer, as the last-lighted lamp or the like.

Referring now to the drawing, A designates a transformer of any well-known construction.

B B and the terminals B′ B′ are the wires of the primary circuit, of which the primary coil of the transformer is of course supposed to be a part. The terminal wires are connected with suitable contact-plates C C′.

The secondary circuit is formed of the wires D D, terminal wires D′ D′, the secondary coil of the transformer, contact-plates E E′, with means for closing this end of the circuit hereinafter to be described, and one or more lamps *d d d d*. It is to be noted that one of the terminal wires D′ connects with the terminals of the coil of an electromagnet F of low resistance.

In the drawing the transformer is shown as cut out. It is charged by means of a switch G, pivoted at *g′* and actuated by two electromagnets H H′. For this purpose the switch is conveniently made in the form of a T, with an armature *g* on each arm. It is provided with suitable contact-plates E″, M″, and C″, the first and last of which close the secondary and primary circuits, respectively. When the switch is thrown up, as indicated by the dotted lines, the transformer is of course charged. The actuation of this switch is effected through the agency of an auxiliary or local current, illustrated in the lower portion of the figure. This consists of a battery J or equivalent generator, a dry battery being preferred, a relay I I′, electromagnets H H′, electromagnet F, with an armature K poised to swing in contact therewith, and wires forming, with their terminals, three circuits brought into successive operation, as will hereinafter appear.

Assuming the transformer to be cut out, as shown in the drawing, the first circuit in chronological order consists of the wire *a*, making contact at one end with the wire D′, the battery J, the wire *a′*, the contact-plates N′, N″, and N, the wire *a″*, the coil of the relay I, and the wire *a‴*. It will be seen that it is only necessary to turn on any one of the lamps *d* to close this circuit. The effect of this is to close another circuit and open the first one, through the medium of the relay I. This circuit is formed of the coil of the electromagnet H′, the connected wires *b b′ b″ a a′*, and the battery J. This circuit is closed by contact of the points *c c′*, through the motion of the armature I′, the instant the relay is magnetized by the current in the first auxiliary circuit. This short circuit, through the operation of the electromagnet H′, throws up the switch G, thus switching in the pri-

mary and secondary lamp-circuit. It is to be understood that the coil of the magnet H′ is of very low resistance, as compared with that of the relay, so that the relay-circuit is shunted off the instant the magnet-circuit is closed.

The cut-out is effected by another auxiliary circuit, formed of the battery, the electromagnet H, connecting-wires *e e′ e″ e‴*, contact-plates M M′ M″, and armature K in connection with the contact-point L. The armature K is mounted at one end on a coil *k*, which forms a part of the circuit, and admits of free vibration of the armature between the point L and the magnet F. This armature drops to the point L the instant the current in F is cut out. This takes place when the last lamp is turned out. A local or battery circuit is then established with the magnet H, which throws the switch down, as shown in the drawing, completely cutting out the transformer, but reëstablishing the battery connection with the secondary wires, whereby the turning on of a lamp initiates the cycle of operations above described.

It is to be understood that the magnet F should be strong enough to hold the armature K firmly in contact with its pole-piece so long as a lamp is turned on. Otherwise the armature will drop, closing the battery-circuit with the upper switch-magnet and causing the switch to vibrate.

Having thus described my invention, I claim—

1. In an automatic cut-out for electrical transformers, the combination with primary and secondary circuit wires, of a switch of insulating material and provided with metal contact-plates to close the primary and secondary circuits, electromagnets to actuate said switch in two directions, an independent battery to energize said magnets, a magnet in the circuit between said battery and the secondary circuit to close the battery-circuit with one of the switch-actuating magnets, and a magnet in series with the secondary circuit for interrupting the circuit of the battery with the other switch-actuating magnet substantially as described.

2. The combination with primary and secondary wires, substantially as described, a switch adapted to close the circuits therein, a pair of electromagnets adapted to actuate said switch in both directions, an independent generator furnishing current to said magnets and also to said secondary wires, successively, a relay in circuit with the said generator and secondary wires, the armature of said relay being adapted to close the generator-circuit with one of said switch-actuating magnets, an electromagnet with its coil in circuit with said secondary wires, and a gravity-armature forming a part of the generator-circuit with the other switch-actuating magnet, and adapted to close said circuit when out of contact with the magnet above it.

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

ALBERT C. BOOTH.

Witnesses:
GEO. HENDERSON,
J. M. ST. JOHN.