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S. L. NAPHTALY, E. C. JONES & F. H. VARNEY.

ELECTRICAL DISTRIBUTION.

APPLICATION FILED SEPT. 12, 1901.

NO MODEL.

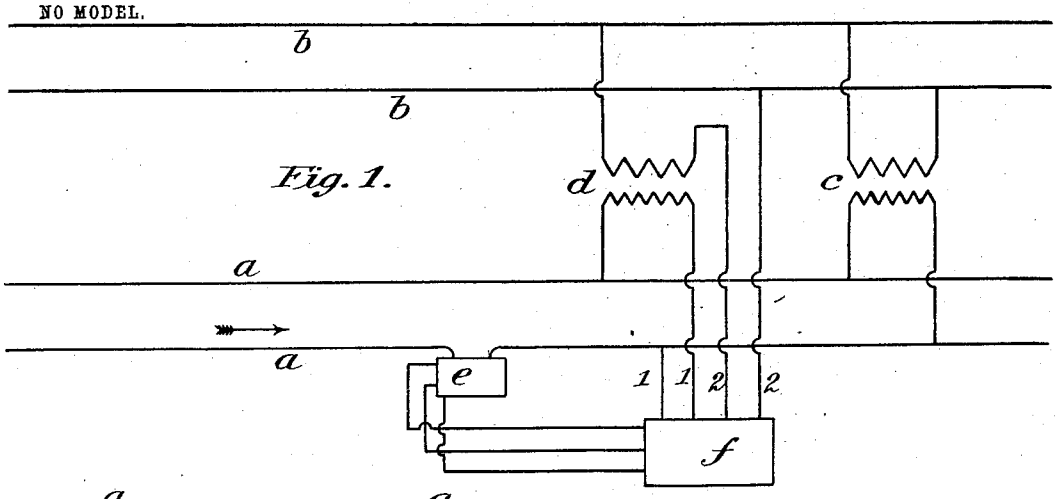


Fig. 1.

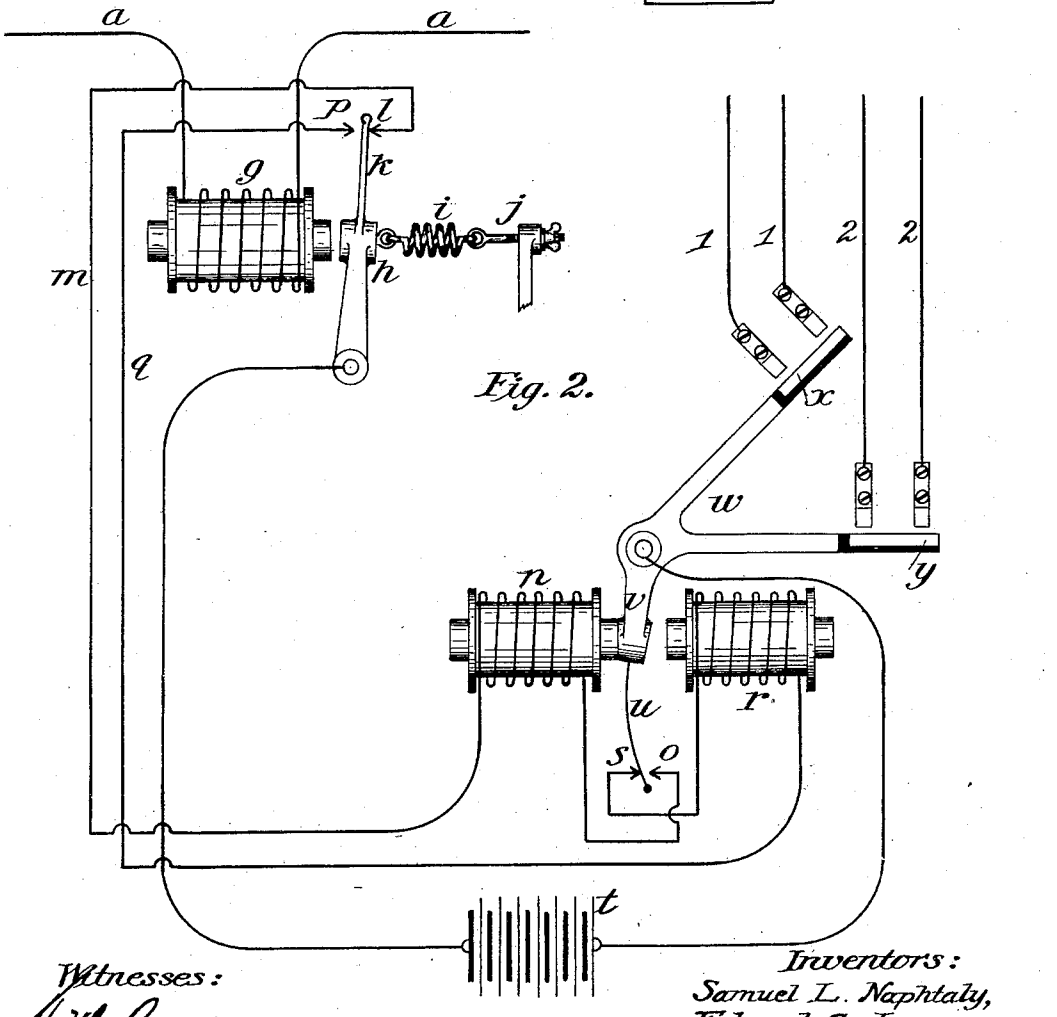


Fig. 2.

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UNITED STATES PATENT OFFICE.

SAMUEL L. NAPHTALY, EDWARD C. JONES, AND FRANK H. VARNEY, OF SAN FRANCISCO, CALIFORNIA.

ELECTRICAL DISTRIBUTION.

SPECIFICATION forming part of Letters Patent No. 728,752, dated May 19, 1903.

Application filed September 12, 1901. Serial No. 75,171. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL L. NAPHTALY, EDWARD C. JONES, and FRANK H. VARNEY, citizens of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Electrical Distribution, of which the following is a specification.

In using transformers between high-voltage and relatively low voltage or derived circuits it is the present practice to leave the transformers constantly in circuit. It has also been proposed to make special connections from the power-station switchboard to the several transformers, so that an operator by means of switches can at such times as judgment, experience, or regulations dictate place in operation one, more, or all the transformers in a circuit or district. The number of transformers in use is hence governed by the judgment of the operator. If the load on the circuit is in excess of the capacity of the transformer or transformers in the circuit, such transformers are liable to injury.

The object of our invention is to provide means for automatically cutting transformers in and out, according to the load on the circuit. Such means are set in operation by changes in the derived circuit, and the result is that the capacity for transformation is always in the proper relative proportion to the load.

The accompanying drawings show one embodiment of our invention.

Figure 1 is a diagram showing the main and derived circuits, a transformer between said circuits, and connections for automatically cutting in another transformer. Fig. 2 is an enlarged diagram of a portion of Fig. 1, showing details of the automatically-acting connections referred to.

In the drawings, *a a* are the wires of the high-voltage primary circuit, and *b b* the wires of the derived or secondary circuit. A transformer *c* is shown as normally in circuit with both the primary and secondary circuits and is supposed to remain in such normal relation. Said transformer can, however, if desired, be controlled from the power-station switchboard by a switch. For the purposes of the present case we consider it as normally in circuit, in order, for example, to furnish a one-hundred-and-ten-volt current to a small number of lamps used in day-time. A second transformer *d* is in normal open relation to the primary and derived circuits, and this transformer is illustrative of any greater number of additional transformers arranged in a similar relation, according to the necessities of the service. Our invention provides for the automatic cutting in and cutting out of such a transformer and can be applied to any number of transformers.

e and *f*, Fig. 1, may represent diagrammatically and separately the groups of devices represented in Fig. 2. A magnet *g* is included in the primary or main circuit, and its armature *h* has a tension-spring *i*, provided with the tension-regulator *j*. The spring keeps the armature out until sufficient excess of current over the normal overcomes the tension. The armature has an arm *k*, which is normally held by the spring against a contact *l*. From this contact a wire *m* extends to and includes the magnet-coil *n* and terminates at a contact *o*. Coil *n* and other devices immediately associated with it are represented by *f*, Fig. 1. The arrangement of the described devices is, however, not arbitrary, and all the mechanism of Fig. 2 can be grouped and located where it may be most convenient. The arm *k* of armature *h* when the latter is attracted makes a contact at *p*, from which a wire *q* extends to and through a coil *r* and contact *s* in proximity to contact *o*. Between the coils *n* and *r* is an armature *v*, which in the normal relation heretofore described has been attracted to coil *n*. The movements of this armature are controlled by the alternate energizing of coils *n* and *r* through a local battery *t*, whose poles are connected to armatures *h* and *v*. A lagging spring *u* is connected to armature *v* and is a connection from either *s* or *o* to said armature. The armature *v* is formed with a two-armed switch *w*, having insulated contacts *x* and *y*, adapted to make contact with wires 1 1 2 2, leading to the main and derived circuits, and which wires include the trans-

former d, normally out of circuit, but which is included in the circuit by the movement of the switch w. From the normal relation shown in the drawings, in which one transformer takes care of the comparatively few lamps supposed to be in use, changes are made automatically, as the use of more lamps calls for more current in the derived circuit. The tension of the armature-spring i having been so regulated that the armature will respond to a certain excess of current in its coil and which will take place when the number of lamps in use begins to exceed the capacity of transformer c, the armature will be attracted and held, and the circuit will be closed at p and opened at l. The course of the local circuit is now from the local battery to armature h, contact p, wire q, through magnet-coil r to armature v, and back to the local battery. This energizing of the coil r attracts armature v and throws the double-armed switch w and the transformer d into the main and derived circuits. The lagging spring u remains momentarily in contact at s and keeps the local battery in circuit until armature v has made its full movement. The spring, however, instantly follows the said armature and cuts out the battery by breaking the contact at s and then makes contact at o, where it remains so long as sufficient current is supplied to overcome the tension-spring at armature h. The local battery is now out of circuit and will remain so until the amperage in coil g is reduced, the spring acts, and contact is made at l. The battery is then momentarily in circuit and armature v restored to the position of Fig. 2, breaking the transformer switch-contacts. The lagging spring follows and cuts out the local battery. These simple mechanisms and electrical connections are supplied to the transformers throughout the circuit or district and are called into operation automatically as the additional load in the derived circuit requires them.

As an obvious modification of the construction shown in Fig. 2 the arm k of armature h can be caused to traverse a series of contacts instead of a single contact l and can thus energize several local circuits successively.

It is not necessary to use a special generator in the local circuit, as such circuit can be energized by electrical connections with the main source of power. We prefer the construction shown on account of its simplicity.

It is evident that the transformer c can be situated in normal open relation to the main circuits, if desired, and can be automatically cut in and out.

We do not limit ourselves to exact constructions and arrangements described herein and shown in the accompanying drawings, as we desire to avail ourselves of such modifications and equivalents as fall properly within the spirit of our invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

In combination with primary and derived circuits of a system of electrical distribution, a local circuit, including a battery, a pair of magnets in said local circuit, a common armature for the pair, a double switch operated by said armature, switch-contacts connected through a transformer to the primary and derived circuits, a pair of terminal contacts of the local circuit, a lagging spring between said armature and said terminal contacts, and means operated by variations in the load on the derived circuit for controlling the local circuit, and so cutting the transformer in or out; the said lagging spring being adapted to maintain a contact with one terminal of the local circuit, until caused to follow said armature in its motion between said magnets and to cut out the local battery by such following movement in either direction.

In testimony whereof we have affixed our signatures, in presence of two witnesses, this 26th day of August, 1901.

SAMUEL L. NAPHTALY.
EDWARD C. JONES.
FRANK H. VARNEY.

Witnesses:
L. W. SEELY,
F. M. BURT.