

(No Model.)

2 Sheets—Sheet 1.

A. H. LUCAS.
SWITCH FOR ELECTRIC PLANTS.

No. 551,170.

Patented Dec. 10, 1895.

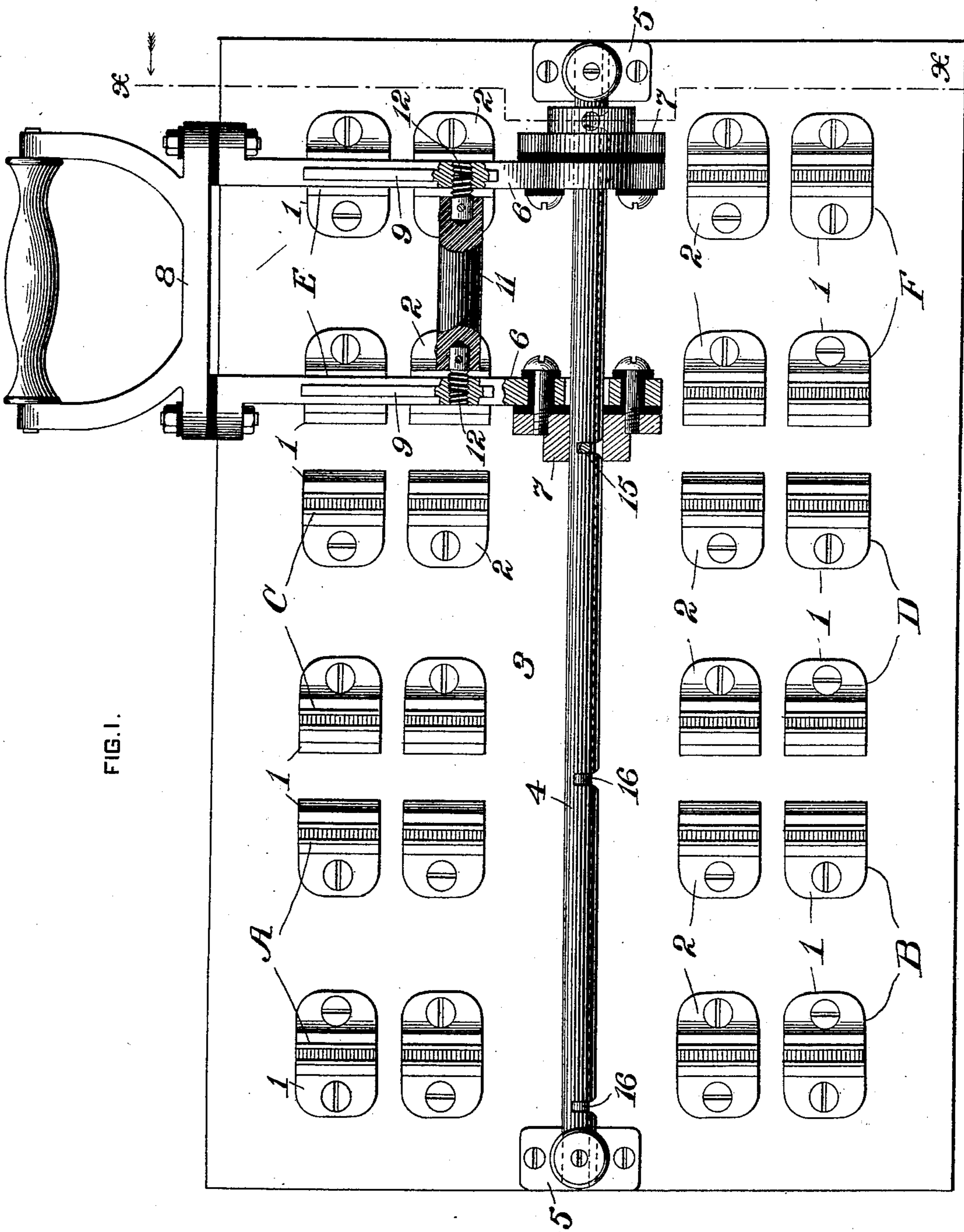


FIG. 1.

WITNESSES:

Chas F. Miller.
J. E. Gaither.

INVENTOR,

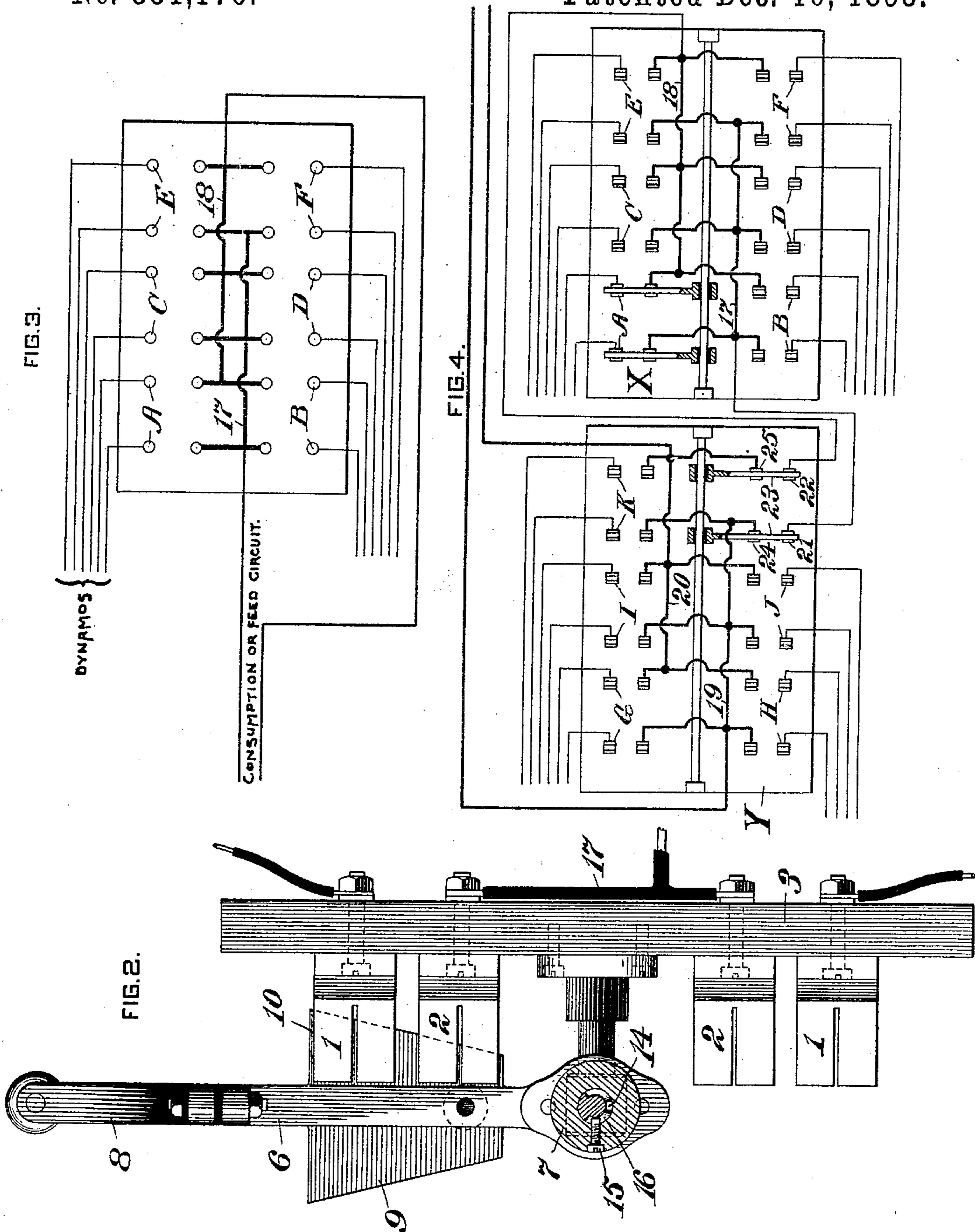
Austin H. Lucas
by Darnin B. Wolcott

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UNITED STATES PATENT OFFICE.

AUSTIN H. LUCAS, OF PITTSBURG, PENNSYLVANIA.

SWITCH FOR ELECTRIC PLANTS.

SPECIFICATION forming part of Letters Patent No. 551,170, dated December 10, 1895.

Application filed January 4, 1895. Serial No. 533,806. (No model.)

To all whom it may concern:

Be it known that I, AUSTIN H. LUCAS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Switches for Electric Plants, of which improvements the following is a specification.

The invention described herein relates to certain improvements in switches for connecting any one of a series of two or more generators to any one of a series of two or more supply-circuits.

It will sometimes happen that by reason of the disabling of one or more of the generators a redistribution of those capable of operation among the supply-circuits must be made in order to prevent a stoppage of supply on one or more of the circuits. In such redistribution account must be taken of the capacity of the generators and the requirements of the several supply-circuits in order to insure a full amount of current for each circuit and prevent an overloading of any of the generators. With the arrangement and construction of switches now in use in large stations, such redistribution is very difficult and complicated, and there is always great liability of connecting two non-synchronous generators to the same circuit, which results in the burning out of one or both of the generators.

The object of the present invention is to provide for the connection of any generator of a plant with any supply-circuit or feeder extending from the plant in such manner as to avoid all liability of connecting two non-synchronizing generators to the same circuit.

In general terms, the invention consists in the construction and combination substantially as hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a front elevation of my improved switch and board, certain portions being shown in section. Fig. 2 is a sectional elevation, the plane of section being indicated by the line *xx*, Fig. 1. Fig. 3 is a rear view of the board, showing the manner of connecting the generators and supply or feeding circuits to the board. Fig.

4 is a diagrammatic view illustrating the manner of connecting two switchboards.

In the practice of my invention four rows of spring contact-jaws 1 and 2 are arranged in pairs on a suitable supporting-slab 3, of insulating material, preferably marble, one pair of rows being preferably located on one side of the median line of the slab and the other pair on the opposite side thereof, as shown in Fig. 1. A shaft 4 is supported by standards 5, midway between the two pairs of rows, and on this shaft is mounted the movable member of the switch. This movable member consists of two arms 6, provided with eyes at their inner ends for the passage of the shaft and attached to, but insulated from, collars 7, fitting the shaft in such manner as to permit of their movement along and around the same. The outer ends of the arms 6 are attached to, but insulated from, an operating-handle 8, whereby the arms may be shifted along and around the shaft, so as to cause one or the other of the wings 9 or 10, on opposite sides of the arms, to pass into the spring contact-jaws. In order to insure the easy movement of the arms along the shaft, a brace or cross bar 11 is arranged between the arms with which it engages by oppositely-threaded screws 12 at its ends. By turning the cross-bars the inner ends of the arms are moved toward or from each other, thereby bringing the inner walls of the collars into parallelism with the shaft, and so facilitating their movements along the shaft.

The spring contact-jaws 1 in the outer rows are arranged in pairs, one jaw being connected to one pole of a generator and the other jaw to the opposite pole of the same generator. The jaws 2 in the inner rows are arranged in line with the jaws of the outer or generator rows, and form terminals for the supply or feeder circuit. By reference to Fig. 3 it will be seen that the corresponding jaws in the inner rows are electrically connected together, and that alternate pairs of the connected jaws form one terminal 17 of the supply or feeder circuit, and the intermediate jaws form the other terminal 18 thereof. By reference to Fig. 2 it will be seen that the jaws 1 are arranged such a distance

from the jaws 2 that the wings 9 or 10 on the arms 6 will simultaneously connect both jaws.

It is customary in stations to designate the generators by letters A B C, &c., and, for convenience of description, the pairs of jaws in the outer rows, forming the terminals of the circuits from the generators, are similarly designated.

By reference to Figs. 1 and 2 it will be seen that by sliding the arms along the shaft into proper position and then turning them either up or down the two terminals of one of the generators will be connected to jaws 2, forming the terminals of the supply or feeder circuit. In order to facilitate the adjustment of the arms into line with the jaws, a longitudinal groove 14 is formed in the shaft for the reception of pins 15, passing through the collars 7, and at suitable intervals transverse grooves 16 are formed, so as to permit the rotation of arms up or down. This construction requires the arms to project at right angles to the supporting-base, when shifted longitudinally of the shaft, so that the engineer can tell by a glance at the board whether any of the generators have been connected with the supply-circuit of that board.

As shown in Fig. 4, additions can be made to the plant, with consequent additions of one or more switches to the board, without disturbing switches and connections previously made. In making such additions the wires forming the supply or feeder circuit are disconnected from the terminals 17 and 18 of the board X, and are connected to similar terminals 19 and 20 of the second board Y, which is similar in construction to the board X. The terminals 17 and 18 of the board X are electrically connected to spring contact-jaws 21 and 22 of the second board, and when it is desired to turn one of the generators connected to the board X onto the feeder-circuit the movable member 23 of the board Y is shifted so as to electrically connect the jaws 21 and 22 with the jaws 24 and 25, which are electrically connected with the terminals 19 and 20, as shown in Fig. 4. As there is only one movable member 23 on the board X, it will be necessary to break connection between the two boards before any of the generators connected to the pairs of spring-jaws G H I, &c., can be turned onto the feeder-circuit.

As hereinbefore stated, only one supply or feeder circuit is connected to each board, and each board has a connection to all the generators, so that any generator can be connected to any supply or feeder circuit of the plant; but by reason of the employment of

only one movable member on each board it is impossible to connect two generators to a supply or feeder circuit at the same time. It will be readily understood by those skilled in the art that two or more supply or feeder circuits, whose combined requirements as to current are not greater than the capacity of one or more of the generators of the plant, may be connected to the same board.

It is characteristic of my improvement that the requirements of the various circuits and the capacities of the generators may be easily and quickly balanced. It frequently happens that where the capacity of a plant equals, say, a thousand amperes it is a matter of great difficulty, and in some cases it is impossible, to so connect up the generators and supply or feeder circuits as to utilize more than eight or nine hundred amperes, whereas the use of my improvement in plants renders it possible to so balance generators and circuits that practically the full capacity of the generators may be employed.

I claim herein as my invention—

1. A switch board having in combination, a series of pairs of contacts arranged in line and adapted to be connected to a like series of generators, a second series of pairs of contacts arranged parallel with the first series, a shaft or rod arranged parallel with said series of contacts, and provided with a longitudinal groove and with a series of transverse grooves, a pair of arms having one end mounted on said shaft or rod, and each having a pin or key adapted to fit said grooves, the transverse grooves being so arranged as to permit of a rotation of the arms on the shaft only when the arms are in line with a pair of contacts, substantially as set forth.

2. A switch board having in combination, a series of pairs of contacts arranged in line and adapted to be connected to a like series of generators, a second series of pairs of contacts arranged parallel with the first series, a shaft or rod arranged parallel with said series of contacts and provided with a longitudinal groove and with a series of transverse grooves, a pair of arms having their inner ends movably mounted on the rod or shaft, and their outer ends adjustably connected together, the inner ends of the arms being provided with a pin or peg engaging the said grooves, substantially as set forth.

In testimony whereof I have hereunto set my hand.

AUSTIN H. LUCAS.

Witnesses:

DARWIN S. WOLCOTT,
F. E. GAITHER.