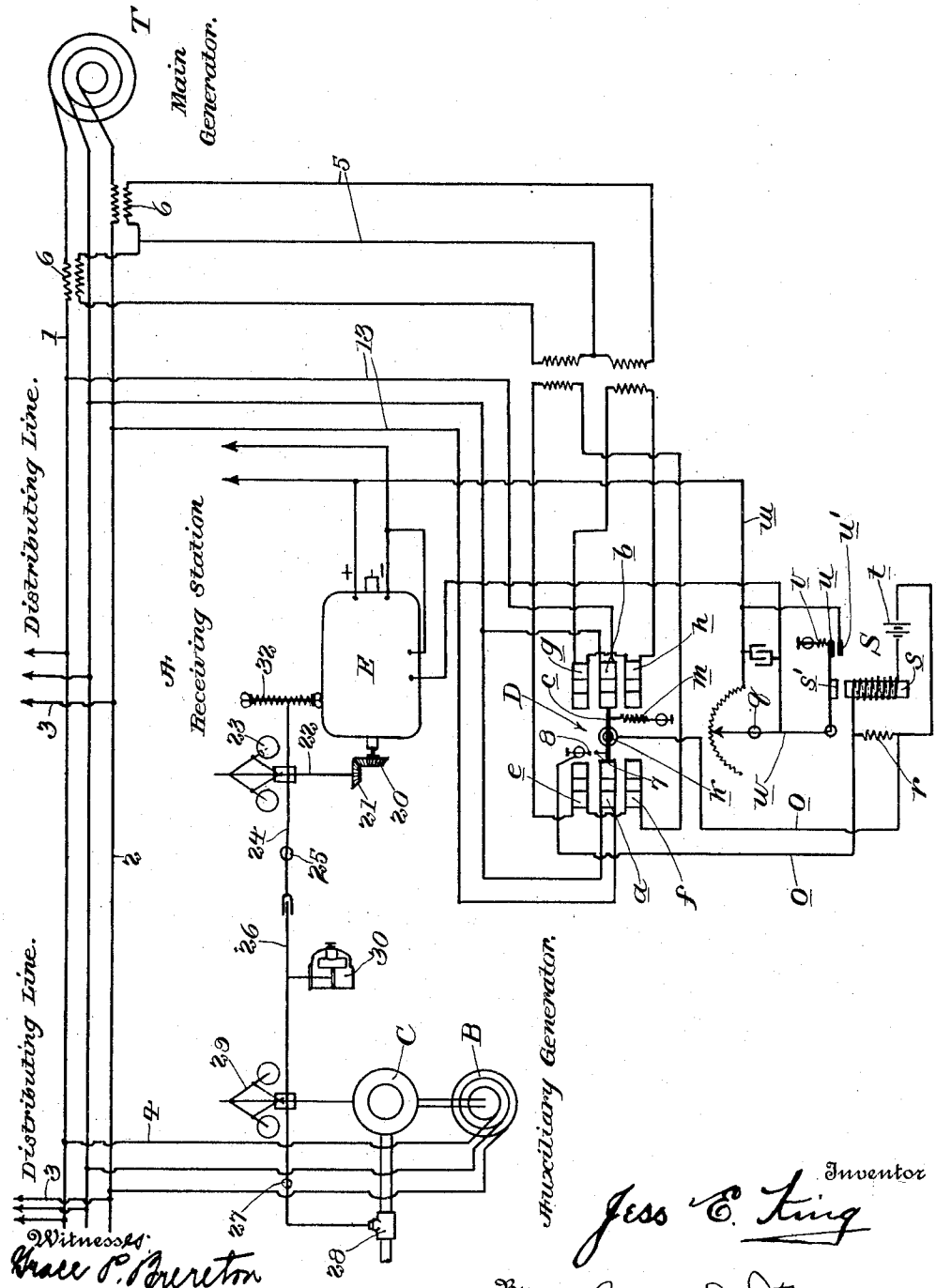
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ELECTRIC LOAD DISTRIBUTER.

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**1,226,534.**

Patented May 15, 1917.




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# UNITED STATES PATENT OFFICE.

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## ELECTRIC LOAD-DISTRIBUTER.

1,226,534. Specification of Letters Patent. Patented May 15, 1917.

Application filed April 29, 1916. Serial No. 94,499.

*To all whom it may concern:*

Be it known that I, JESS E. KING, a citizen of the United States, residing at Syracuse, in the county of Onondaga, State of New York, have invented certain new and useful Improvements in Electric Load-Distributers, of which the following is a description, reference being had to the accompanying drawing, and to the figures of reference marked thereon.

The invention relates to new and useful improvements in electric load distributers, as applied more particularly to separate sources of current supply merging into a common system of electrical distribution, in which widely varying loads are carried by the system.

In my prior Patent No. 1,199,571, granted Sept. 26, 1916, I have shown and described such an electric load distributer, and the present application is an improvement on the same.

An object of the present invention is to provide a load distributer which is responsive to small variations in the load required and capable of very close regulation so that the power taken from the primary source of supply may be kept practically constant, while the power demanded by the system in excess of that desired to be taken from the primary source of supply may be drawn from or furnished by the auxiliary or emergency source of supply.

In the drawing, the figure is a diagrammatic view of an electrical distributing system and a load distributer connected therein embodying my invention.

The invention, as illustrated diagrammatically in the figure of the drawing, is applied to a distributing system which comprises a receiving station A adapted to receive current from a main source of supply herein indicated as an electric generator T. The current is received from one or more circuits 1 and delivered to transmission lines 2, and from the transmission lines to any number of similar or different translators or electric distributing systems 3. Also connected to the transmission lines 2 is an auxiliary or emergency current generator B. For the sake of convenience, the generator T will be referred to as the main or original source of supply, while the generator B will be referred to as the auxiliary or emergency source of supply. The auxiliary generator B is operated by a prime mover, indicated at C, which may be of the usual steam turbine engine type. The generator B is connected through the lines 4 with the main transmission lines 2 and, of course, suitable switches and other necessary apparatus will be used.

It will be apparent, therefore, that both sources of current supply are connected to the common distributing system. The current in the distributing system is taken principally from the main generator T, and it is desired that all current above a pre-determined amount shall be taken from the auxiliary generator B so that the load on the main generator T shall be constant or at least shall never rise above a certain predetermined load. This is accomplished automatically through the controlling mechanism shown in the drawing which consists of a Kelvin balance D which is electrically connected by a system of wires 5 and 13 to transformers, indicated at 6, in the transmission line adjacent the point of distribution.

The Kelvin balance employed in connection with this embodiment of my invention consists of four stationary current coils *e*, *f*, *g* and *h*, and two movable potential coils *a* and *b*. The potential coils are mounted on opposite ends of an arm *c*. This arm *c* is mounted on a bearing *k* at its center and is free to move between the stationary current coils *e*, *f* and *g*, *h*. A contact finger 7 is fastened to the movable arm *c* at a point between the bearing *k*, or the pivotal point of the arm *c*, and the potential coil *a*. There is a fixed contact point 8 which may be adjusted, and the contact point 7 is normally held in engagement with the contact point 8 by a spring *m*. The tension of this spring *m* may be adjusted at will by well known means. Leading from the two contacts 7 and 8 are two wires *o*. These wires *o*, *o*, are connected to an electrically operated short-circuiting switch indicated at S. The short-circuiting switch S is provided with a magnet *s* which is energized from an external source, such as a battery *t*. One of the wires *o* encircles the magnet *s* and is connected to one terminal of the battery, while the other wire is connected to the other terminal of the battery. Connected across the wires is a resistance *r*, said resistance being short-circuited when the two contacts 7 and 8 are in engagement.

The switch magnet $s$ is provided with an armature $s'$ which carries a contact $u$ coöperating with a relatively stationary contact $u'$. These contacts $u$ and $u'$ are held out of engagement by a tension spring $v$ which is attached to the armature and serves to overcome the pull of the electro-magnet $s$, while the current is flowing through the resistance $r$ to said magnet. When, however, the resistance is short-circuited, then the pull of the magnet $s$ overcomes the pull of the spring $v$ and the contact $u$ engages the contact $u'$. The contacts $u$ and $u'$ are connected to wires $w$ which lead to a rheostat $q$ of the direct current motor E.

The spring $m$ of the Kelvin balance is adjusted so as to balance the movable element for any predetermined load on the main generator T, that is, the contacts respond to any change of load on the main generator in such a manner as to actuate the electrically operated short-circuiting switch S which, in turn, intermittently short circuits the field rheostat $q$ and intermittently causes the current in the field of the motor E to be increased or decreased, thereby tending to increase or decrease the speed of the motor. In other words, an increase in the power demanded of the generator T above a predetermined amount will open the contacts 7 and 8, and this will insert the resistance $r$ in circuit which will decrease the pull of the magnet $s$, opening the contacts $u$ and $u'$ so as to cut in the resistance of the rheostat and this will speed up the motor E; while a decrease in the load on the main generator operates through the Kelvin balance to close the contacts 7 and 8, thus cutting out the resistance $r$ which increases the pull of the magnet $s$ and closes the contacts $u$ and $u'$, cutting the rheostat resistance out of the field of the motor, and this will decrease the speed of the motor.

The shaft of the motor carries a beveled gear 20, which meshes with a beveled gear 21 on a shaft 22. The shaft 22 carries the governor 23 which is in the form of weighted arms, and this governor is connected to a lever 24 fulcrumed at 25. The lever 24 in turn is connected to a lever 26 which is fulcrumed at 27. Said lever 26 is connected to the steam valve 28 of the prime mover and is also connected to a governor 29. An oil dash pot 30 may be connected to the lever. The lever 24 is connected to a shock absorber and compensating springs 32.

It will be understood that as the motor shaft increases its speed, the governor arms 23 will be thrown out, thus raising the right hand end of the lever 24, forcing the right hand end of the lever 26 downwardly and increasing the amount of the steam supplied to the prime mover C. When the speed of the armature shaft of the motor E decreases, then the governor arms will drop and the reverse movements will turn off a portion of steam. This controlling of the steam supplied to the prime mover for operating the auxiliary generator enables the auxiliary generator to respond very quickly to very slight changes in the demand on the system and throws all of the excess load above a predetermined amount onto the auxiliary generator.

The governor 29 could be eliminated from the system when the governor 23 is in operation. There may be times, however, when it is desired to operate the generator B independent of the purchased power supplied, or at least independent of the automatic system of control. In such case, the mechanical connection between the two governors would be uncoupled. The governor 23 is actually a load governor, while the governor 29, when the machine is operating independent of other sources of supply, is a speed governor and tends to maintain the prime mover C at a constant speed under all conditions of load.

From the above, it will be apparent that I have a main source of current supply and a generator coöperating in conjunction therewith for supplying power to the system. The generator is operated by a prime mover, and the power furnished the prime mover is controlled by a motor through the speed of the armature shaft of the motor. Means is also provided through the Kelvin balance and the short-circuiting switch which is responsive to the power delivered by the main source of supply for controlling the speed of the armature shaft of said motor.

Having thus described the invention, what is claimed as new is:—

1. The combination of a main source of supply, a generator operating in conjunction with said main source of supply for supplying power to the system, a prime mover for actuating said generator, a motor, devices operated by the armature shaft of said motor for controlling the power supply to the prime mover, and means responsive to the power delivered by the main source of supply for controlling the speed of the armature shaft of said motor.

2. The combination of a main source of supply, a generator operating in conjunction with said main source of supply for supplying power to the system, a prime mover for actuating said generator, a motor, devices operated by the armature shaft for controlling the power supplied to the prime mover, devices for varying the resistance in the field circuit of the motor, and means responsive to the power delivered by the main source of supply for controlling said resistance varying means.

3. The combination of a main source of supply, a generator operating in conjunc-

tion with said main source of supply for supplying power to the system, a prime mover for actuating said generator, a motor, a load control rotated by said motor, devices whereby the load control operates upon the governor of the prime mover so that the power delivered to the prime mover is varied according to the speed of the armature shaft of the motor, and means responsive to the power delivered by said main source of supply for controlling the speed of the armature shaft of the motor.

4. The combination of a main source of supply, a generator operating in conjunction with said main source of supply for supplying power to the system, a prime mover for actuating said generator, a motor, a load control rotated by said motor, devices whereby the load control operates upon the governor of the prime mover so that the power delivered to the prime mover is varied according to the speed of the armature shaft of the motor, devices for varying the resistance in the field circuit of the motor, and means responsive to the power delivered by said main source of supply for controlling said resistance varying means.

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

JESS E. KING.

Witnesses:
JAS. C. DE LONG,
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**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."**