

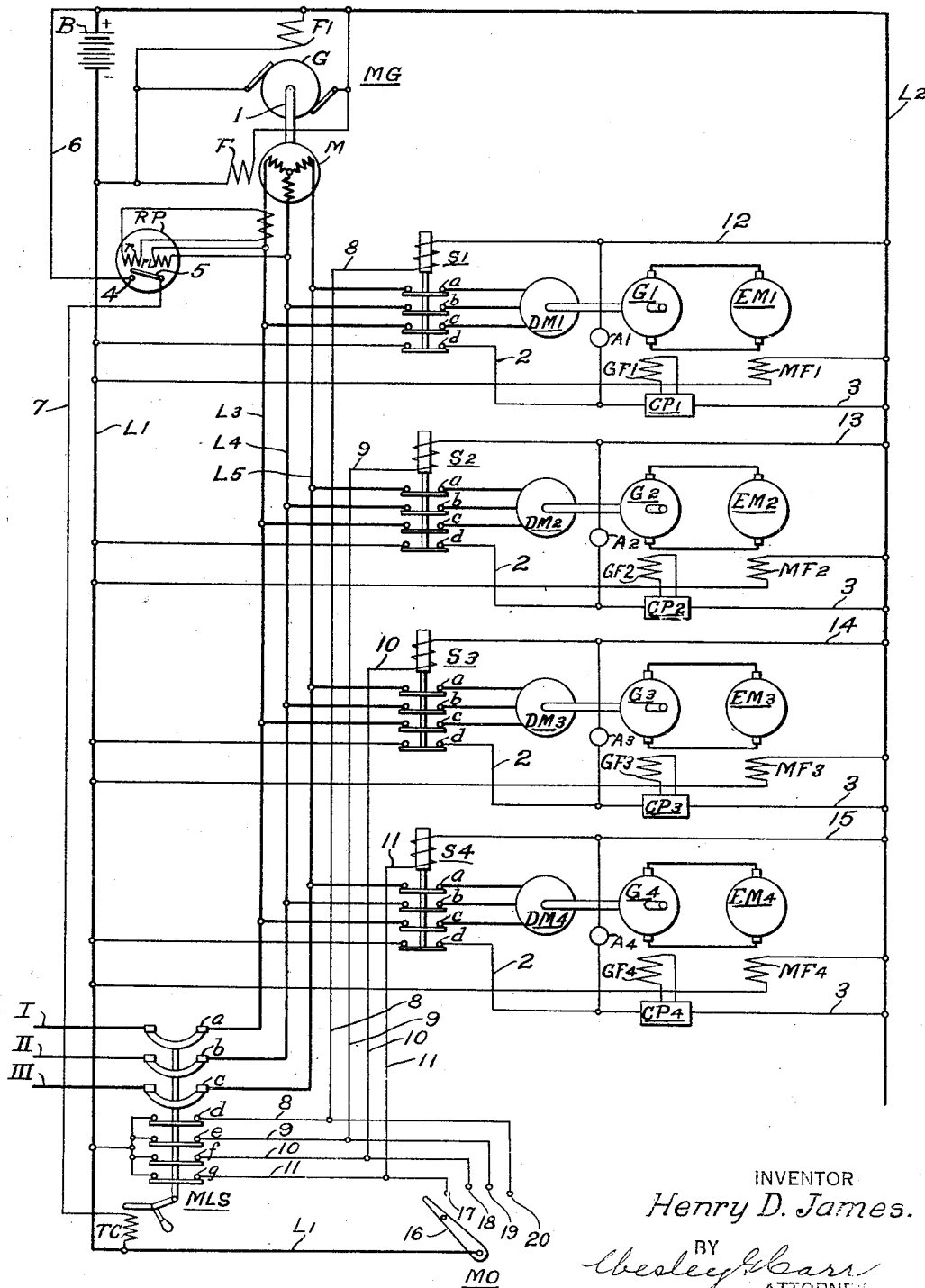
May 24, 1932.

H. D. JAMES

1,860,099

POWER SUPPLY SYSTEM

Filed Oct. 20, 1930



INVENTOR

Henry D. James.

BY

ATTORNEYS

UNITED STATES PATENT OFFICE

HENRY D. JAMES, OF EDGEWOOD, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

POWER SUPPLY SYSTEM

Application filed October 20, 1930. Serial No. 489,724.

My invention relates to power supply systems and it has particular relation to power supply systems for a bank of elevator units.

5 In conventional installations of a bank of elevator units, the power for operating all of the elevator units is usually supplied from a common source. Whenever this source of power fails, all of the elevator cars immediately stop in their respective hatchways, and the cars are left in darkness, to the discomfort of the passengers. Further inconvenience to the passengers results, unless the elevator cars stop level with the floor land-
10 ings, as the passengers cannot leave the cars without great difficulty, and must therefore, wait until the power is restored.

I am aware that various power supply systems have been devised in the prior art, in which an auxiliary power source, such as a storage battery, is positioned to supply power to the load upon failure of the main source. So far as I am aware, however, no such arrangement has been devised which is
20 applicable to elevator systems comprising a bank of elevator units, in which means are provided for connecting the auxiliary power source separately to the individual elevator units of the bank. If the auxiliary power source is made of sufficient capacity to supply the entire bank of elevator units, the size and cost of the auxiliary power source becomes prohibitive.

It is accordingly an object of my invention to provide a power supply system for a bank of elevator units in which an auxiliary source of power of approximately sufficient capacity to operate any one of the units is provided and in which a successive selection of the
40 elevator units to utilize the auxiliary source of power upon one unit at a time may be made upon failure of the main source.

Another object of my invention is to provide a power supply system of the character specified in which a preselection of the elevator units to utilize the auxiliary source of power upon one unit at a time may be made upon failure of the main source of power and the selection of the units may be changed as
50 desired.

Still further objects of my invention will become apparent to those skilled in the art by reference to the accompanying drawing in which:

The single figure is a diagrammatic representation of a power supply system for a bank of elevator units embodying my invention. 85

Referring to the drawing, the apparatus shown therein comprises a plurality of elevator units, each unit comprising a direct current elevator motor EM1, EM2, EM3 or EM4, the armature of which is connected in a loop circuit with the armature of a direct current generator G1, G2, G3 or G4. The motor field MF1, MF2, MF3 or MF4 is connected for constant voltage energization to suitable supply conductors L1 and L2 and the generator field GF1, GF2, GF3 or GF4 is also connected to the supply conductors L1 and L2, through the usual control panel CP1, CP2, CP3 or CP4 and the controllers of the elevator cars (not shown). 90

The generators G1, G2, etc., are disposed to be driven by a suitable driving motor, such as an alternating current induction motor DM1, DM2, DM3 or DM4. The driving motors are arranged to be connected for operation to a plurality of suitable bus bar conductors L3, L4 and L5, by means of suitable switches S1, S2, S3 and S4. A manually closeable automatic-trip main line switch MLS, having main contact members *a*, *b* and *c*, is provided for connecting the bus conductors L3, L4 and L5, to a suitable main source of power represented by a plurality of conductors I, II and III. The main line switch MLS is also provided with auxiliary contact members *d*, *e*, *f* and *g*, for a purpose to be hereinafter more fully stated. 95

In order that the system may be connected to an auxiliary source of power when the main source of power fails, it is provided with a storage battery B that is disposed to be charged by a motor generator set MG. The motor generator set comprises a synchronous motor M, having a field winding F, and a direct current generator G provided with a field winding F1, which are directly connected together by means, such as a shaft 100

1. The motor M, is connected for operation directly to the bus bar conductors L3, L4 and L5, and the generator G is connected across the terminals of the storage battery. The field winding F, of the motor M also receives

excitation current from the storage battery. Each of the elevator units is provided with a lamp for lighting the interior of the elevator car (not shown), the lamps being designated as A1, A2, A3 and A4. The control panels, the lamps and the generator field windings of each unit are supplied with energy from the storage battery B through conductors L1 and L2 and are controlled by the contact members *d* of the switches S1, S2, S3 and S4. The circuit for the control panel, lamp and generator field winding of each unit, for example, may be traced from the battery supply conductor L1 through the contact members *d* of the respective switches S1, S2, S3 and S4, conductor 2, thence in parallel through the lamps A1, A2, A3 and A4, the control panels CP1, CP2, CP3 and CP4, the field windings GF1, GF2, etc., and conductor 3, to the battery supply conductor L2.

A reverse power relay RP, having contact members 4 and 5, a current coil *r* and a voltage coil *r*¹ is provided for controlling the trip circuit of the main line switch MLS.

The current coil *r* and the voltage coil *r*¹ are connected in the usual manner to the alternating current bus bar conductors L3, L4 and L5. While for simplicity, and in view of the balanced inductor motor load illustrated, I have shown a single phase reverse power relay RP, it will be understood that in practise a polyphase relay may be employed if an unbalanced load is connected to the bus conductors L3, L4 and L5.

The contact member 4 of the reverse power relay is connected by means of a conductor 6 to the positive terminal of the battery B while the contact member 5 of the reverse power relay RP is connected by means of conductor 7, through the trip coil TC of the main line switch MLS, to the negative supply conductor L1 from the battery B.

The contact members *d*, *e*, *f* and *g*, of the main line switch MLS are arranged to complete a circuit to the coils of the switches of each unit S1, S2, S3 and S4, upon the closing of the main line switch, to permit these latter switches to close their respective contact members *a*, *b*, *c* and *d*, and connect the driving motors DM1, DM2, DM3 and DM4 to the bus conductors L3, L4 and L5, as well as complete the circuit to the panels, the generator fields and car lights as previously described. A circuit to the switch coils may be traced from the battery supply conductor L1, the contact members *d*, *e*, *f* and *g*, of the main switch MLS, through conductors 8, 9, 10 and 11 to the respective coils of the switches S1, S2, S3 and S4, thence to the positive battery

conductor L2 through the conductors 12, 13, 14 and 15, respectively.

A manually operated switch MO, comprising a switch arm 16 and contact terminals 17, 18, 19 and 20, is arranged to establish a connection to any selected conductor 8, 9, 10 and 11, independently of the contact members *d*, *e*, *f* and *g*, respectively, in order that the control system of any selected elevator unit may be energized separately while the main line switch MLS is open.

The operation of my power supply system is as follows: Assuming that the main line switch MLS is closed to start the elevator system, then the main contact members *a*, *b* and *c*, complete a circuit from an alternating current source I, II and III to the bus bar conductors L3, L4 and L5. The synchronous motor M, of the motor generator set MG, being directly connected to the bus conductors, will rotate and drive the generator G, through the medium of the shaft 1.

The armature terminals and the field winding F1 of the generator G are connected to the storage battery B and the direct current supplied by the generator is stored in the battery as long as the motor M receives a supply of circuit from the bus conductors.

The closing of the main line switch and its auxiliary contact members *d*, *e*, *f* and *g*, completes a circuit from the battery supply conductor L1, through the contact members *d*, *e*, *f* and *g*, of the switch MLS, the conductors 8, 9, 10 and 11, the coils of the switches S1, S2, S3 and S4, and the conductors 12, 13, 14, and 15 to the battery conductor L2.

The energization of the coils of the switches S1, S2, etc., causes the closing of their respective contact members *a*, *b*, *c*, *d*, allowing the driving motors DM1, DM2, DM3 and DM4 of each unit to rotate, and completing a circuit to the panels, the car lights and the generator fields as previously described. The motors being directly connected to the generators G1, G2, G3 and G4, the latter will rotate and the energy supplied thereby may be utilized for operating the elevator motors EM1, EM2, EM3 and EM4, in the usual manner of variable voltage systems.

Assuming now that the main source of alternating current supply fails, then the synchronous motor M will no longer be supplied with power from the bus conductors L3, L4 and L5, but direct current will be supplied from the battery B to the armature and field F1 of the generator G, which, in turn, will drive the motor M. The motor M, being thus driven by the generator G, operates as an alternator, supplying current to the bus conductors L3, L4 and L5 in an opposite direction.

This reversal of power in the bus conductors causes a like reversal in the coil *r* of the relay RP, thereby effecting the closing of the relay contact members 4 and 5. The closing

of these contact members completes a circuit for energizing the trip coil TC of the switch MLS, which circuit extends from direct current supply conductor L1, through the coil TC, conductor 7, the contact members 5 and 4, and conductor 6 to the positive battery terminal L2. The energization of the trip coil TC opens the main line switch MLS and all of its contact members *a, b, c, d, e, f* and *g*.

The opening of the main line switch MLS deenergizes the coils of the switches S1, S2, S3 and S4, causing the latter to open their respective contact members *a, b, c* and *d*. The opening of these latter contacts interrupts the circuit to the motors DM1, DM2, DM3 and DM4, the control panels CP1, CP2, CP3 and CP4, the generator fields GF1, GF2, GF3 and GF4 and the lights A1, A2, A3 and A4 in the elevator cars.

The opening of the control circuit immediately causes the brakes (not shown) on the respective elevator motors to be applied, thereby stopping the elevator cars. At this time the cars are in darkness and they are stopped wherever they happen to be, regardless of the floor landings.

The manually operated switch MO, which in practice is located at the lower terminal floor, may now be operated by a dispatcher to complete a circuit to any one of the coils of the switches S1, S2, S3 and S4, independently of the main line switch. Assuming that the dispatcher moves the arm 16 of the manually operated switch MO to the contact terminal 20, then the coil of the switch S1 will be energized by a circuit which extends from the battery supply conductor L1, through the arm 16, contact member 20, conductor 8 and the coil of switch S1 to battery supply conductor L2. The energization of the coil of the switch S1 causes the closing of its contact members *a, b, c* and *d*.

Inasmuch as bus conductors L3, L4 and L5, are now supplied with alternating current from the synchronous motor M the closing of the contact members of the switch S1 energizes the driving motor DM1, which again rotates and drives the generator G1, and energizes the light A1, panel CP1, and the generator field GF1.

The illuminating of the lamp A1 notifies the operator of that particular car that it has been selected for operation by the auxiliary source of power. The operator may then operate the car controller in the usual manner and bring the elevator car down to the lower terminal floor. The dispatcher may then move the arm 16 of the switch MO to any or all of the remaining contact terminals 17, 18 and 19 in succession, which will energize each succeeding elevator unit in the same manner as just described until all of the elevator cars have reached the lower terminal floor.

The dispatcher may now select any one

of the elevator units of the bank for operation from the auxiliary source which will permit operation of its respective elevator car throughout its hatchway as long as sufficient energy remains in the storage battery or until the main source of power is restored to the supply conductors I, II and III. Upon the restoration of the main power source, the dispatcher will open the manually operated switch MO, and close the main line switch MLS thereby connecting all of the units for operation in the manner previously described.

It can, therefore, readily be seen that I have provided a power supply system for a bank of elevator units, in which an auxiliary source of power is provided of sufficient capacity to operate any one of the elevator units, and in which a selection of the unit to utilize the auxiliary power may be made and changed as desired.

Although I have shown only one specific embodiment of my invention, I do not desire to be so limited, as various modifications of the same may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. In a power supply system for a plurality of elevator units, a separate dynamo electric machine for transmitting power for each of said elevator units, means for connecting all of said machines to a main source of power, an auxiliary source of power, means responsive to failure of said main source of power for disconnecting said machines from said main source of power, and means for connecting a selected one of said machines to said auxiliary source of power.

2. In a power supply system for a plurality of elevator units, a dynamo electric machine for each of said elevator units for transmitting power for said unit, means for connecting said dynamo electric machines to a main source of power, a separate controlling means for each of said elevator units, means responsive to failure of said main source of power for disconnecting said machines from said main source of power and for rendering the corresponding controlling means ineffective, an auxiliary source of power, and means for connecting a selected dynamo electric machine to said auxiliary source and for rendering the corresponding controlling means effective.

3. In a power supply system for a plurality of elevator units, a dynamo electric machine for each of said elevator units for transmitting power for said unit, means for connecting said dynamo electric machines to a main source of power, a separate controlling means for each of said elevator units, means responsive to failure of said main source of power for disconnecting said machines from said main source of power and for rendering the

corresponding controlling means ineffective,
an auxiliary source of power, means for con-
necting a selected dynamo electric machine
to said auxiliary source of power for render-
5 ing the corresponding controlling means ef-
fective and means for changing the selection
of the dynamo electric machines as desired.

In testimony whereof, I have hereunto sub-
scribed my name this 15th day of October,
10 1930.

HENRY D. JAMES.

15

20

25

30

35

40

45

50

55

60

65