No. 666,699. Patented Jan. 29, 1901.

H. ROWNTREE.

ELECTRIC ELEVATOR.

(Application filed Feb. 17, 1900.)

(No Model.) 3 Sheets—Sheet 1.

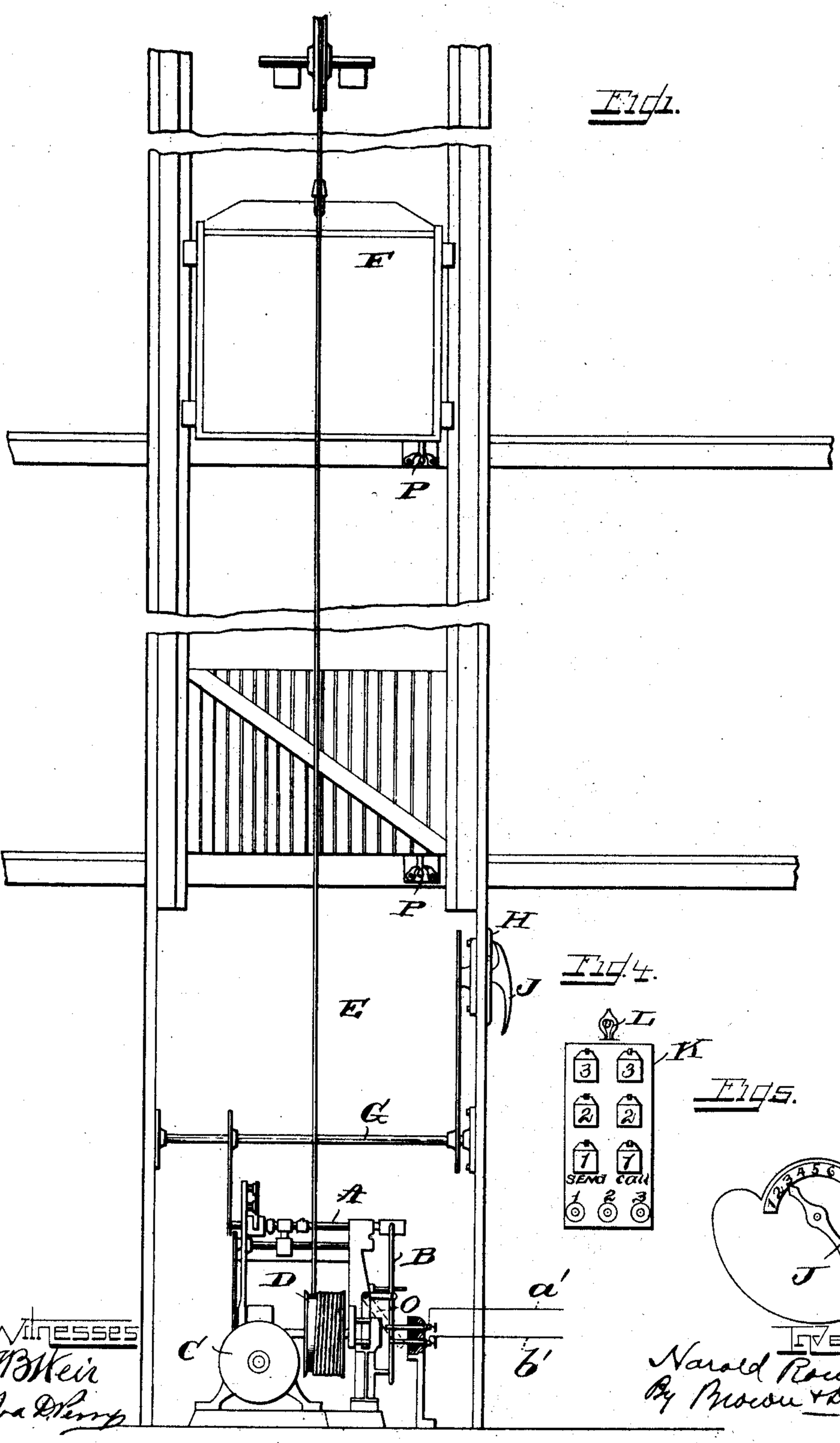

Fig. 1.

Fig. 4.

Fig. 5.

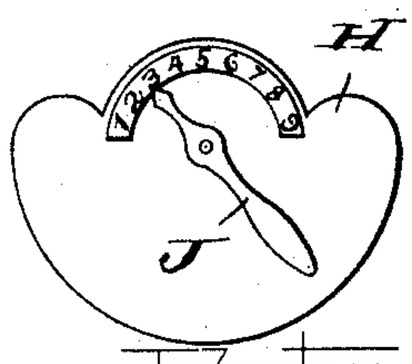

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Fig. 2.

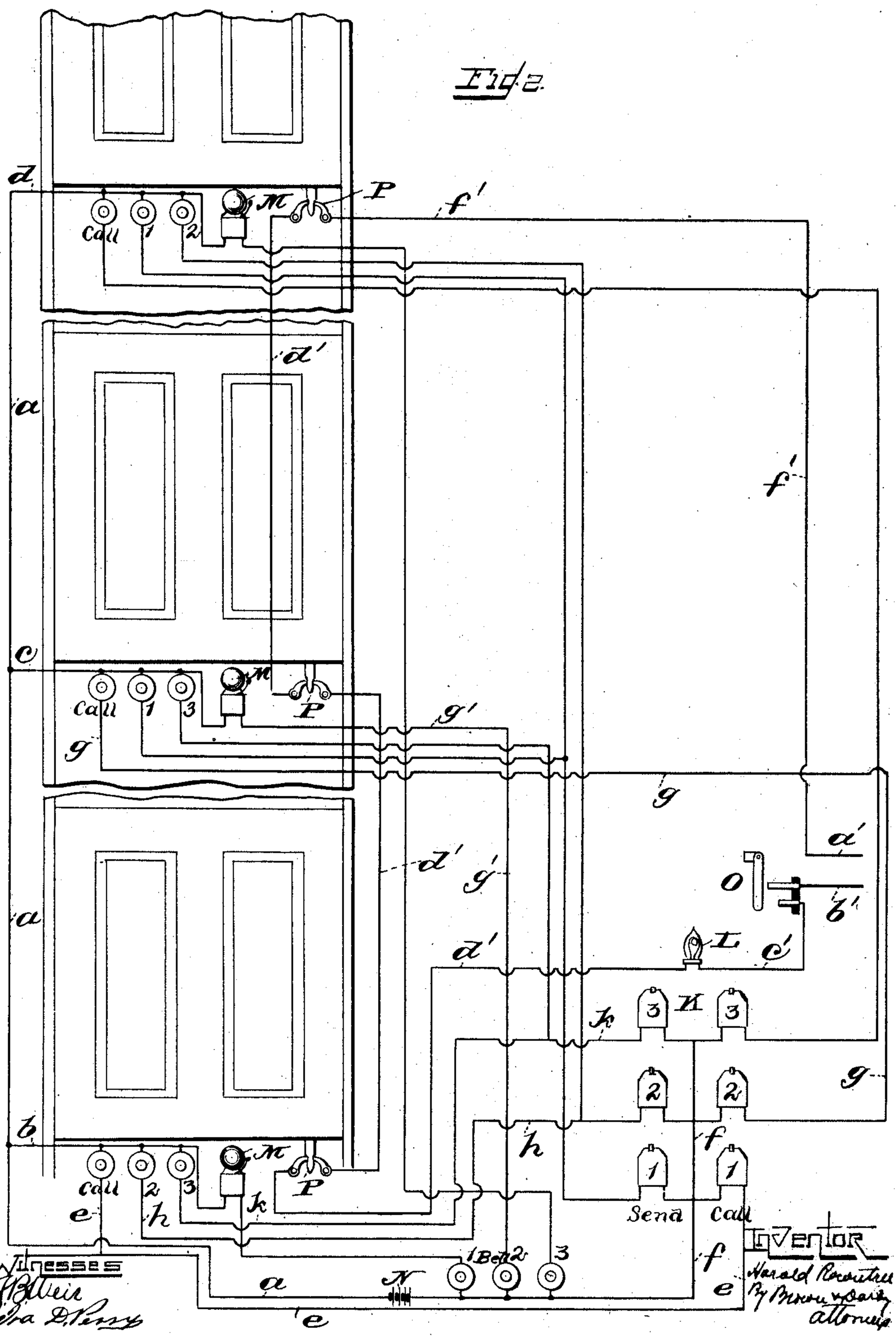

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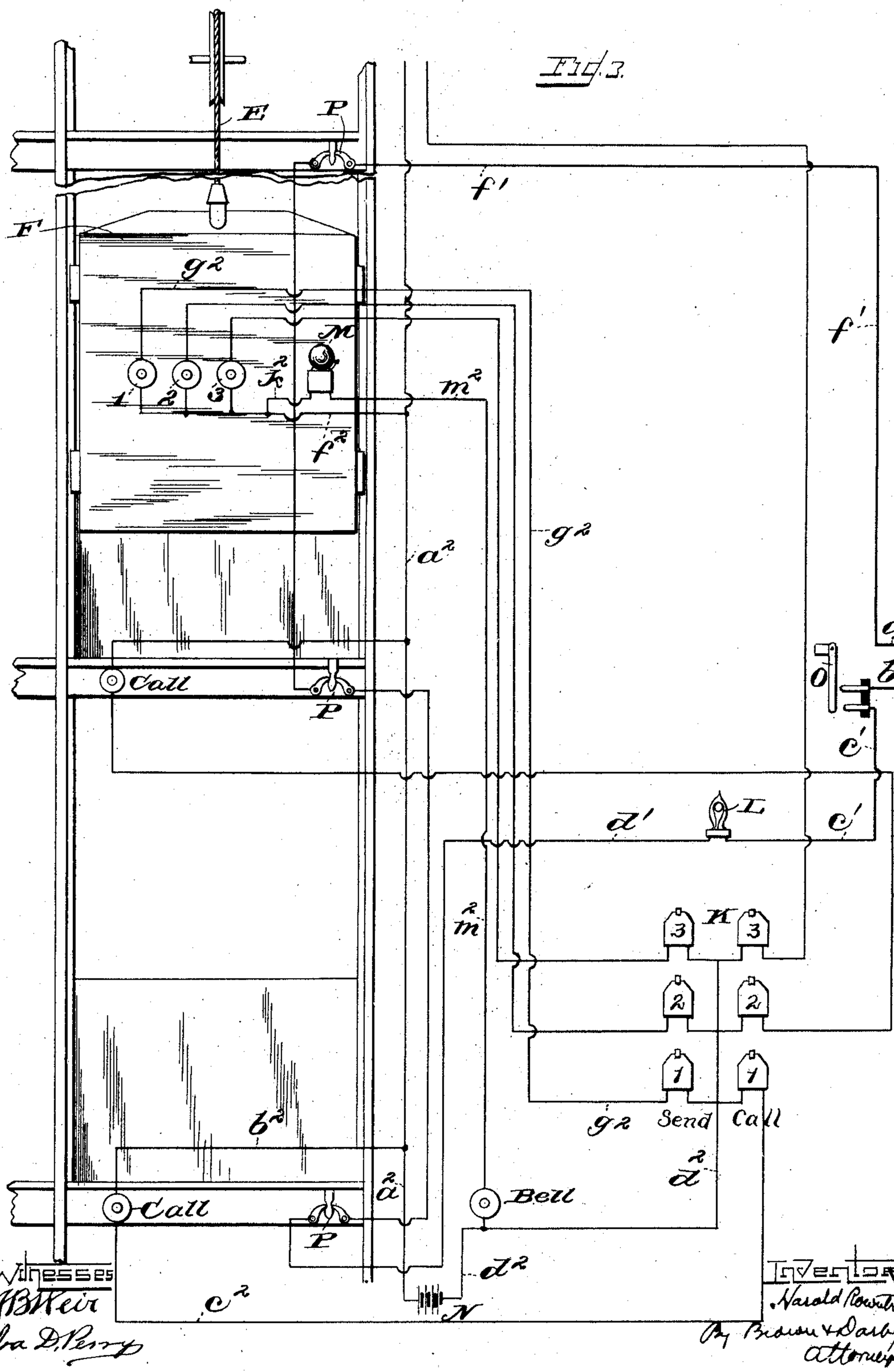
Fig 3.



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UNITED STATES PATENT OFFICE.

HAROLD ROWNTREE, OF CHICAGO, ILLINOIS.

ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 666,699, dated January 29, 1901.

Application filed February 17, 1900. Serial No. 5,658. (No model.)

To all whom it may concern:

Be it known that I, HAROLD ROWNTREE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric Elevators, of which the following is a specification.

This invention relates to electric elevators, and particularly to signaling systems for such elevators.

The invention is designed as an improvement upon the constructions and arrangements set forth, described, and claimed in my Patents Nos. 638,281 and 638,282, granted December 5, 1899.

The object of the invention is to provide a signaling system for electric elevators of the type wherein when the elevator-hoisting motor is set in operation it will be automatically arrested when the car reaches a predetermined stopping-point or landing and by which signaling system a motorman or attendant at the hoisting-motor may be signaled to set the motor to stop the car at the particular landing or stopping-place previously determined upon.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a view in elevation of an electric elevator-hoisting motor, showing the controlling means therefor and the arrangement thereof with respect to the elevator shaft or well. Fig. 2 is a view in diagram illustrating the wiring and arrangement for the signaling system. Fig. 3 is a similar view showing a modified arrangement of the wiring embraced within the principle and scope of my invention. Fig. 4 is a detached detail view of a signal apparatus or annunciator designed to be arranged adjacent to the motor-starting means for the guidance of the motorman or engineer in attending to the motor. Fig. 5 is a detached detail view of the dial-plate and pointer employed by the motorman or engineer in setting the motor in operation and arranging the controlling devices so that the motor will stop at the predetermined point.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In my patents above referred to are set forth, described, and claimed constructions of hoisting-motors for electric elevators and controlling mechanisms therefor whereby the motor may be set in operation from any floor or landing of the elevator shaft or well, so as to start the motor, and also the provision of means whereby when the car arrives at the particular predetermined floor or landing-place the motor will be automatically arrested. The present invention is designed for use in connection with hoisting-motors of this general type.

I have shown in the accompanying drawings a form of motor similar to that shown in my Patent No. 638,282, wherein a main or control shaft (indicated at A) effects the control of the motor, the motor-circuits being made or broken through the rocking of a lever, (indicated at B,) which lever is rocked by the longitudinal movement of said shaft or rod A, and, as described in said prior patent, the shaft or rod A has associated with it nuts or projections arranged to be set with respect to each floor or landing at which the car is to stop, so that when the car reaches some predetermined landing the lever B will be actuated to arrest the motor, and it is described in said patent that the rod or shaft A may be controlled from each landing at which the car is to stop. The present invention employs a motor of the same general construction and having the same general arrangement of controlling lever and rod or shaft, whereby the motor may be started up or set so as to be started up and to automatically stop when the car reaches its particular predetermined landing; but instead of the system whereby the control of the motor is directly effected from each floor or landing the present invention contemplates a signaling system whereby a motorman or engineer in attendance at the motor may effect the desired control of the motor upon receiving suitable signals from any floor or landing or from the car. I also contemplate embodying with the signal system an arrangement whereby the

engineer or motor attendant may be notified whether or not when he receives a signal to send the car to any particular landing all the doors of the elevator shaft or well are closed, so as to avoid danger of accident in starting the car from any point prematurely. I also embody as a feature of my signaling system an arrangement whereby if the elevator shaft or well door at any landing is opened or if for other reasons the motor attendant does not receive a clear signal that everything is in proper condition to send the car from one point to another he may signal each floor, or any one of the floors, or the particular floor at which the car may be located, so that the door may be closed at that point or elsewhere or so that the cause for rendering it improper to start the car may be removed.

Reference-sign C designates generally the motor; D, the hoisting-drum; E, the hoisting-cable, and F the car.

G designates a shaft through which the main shifting or control shaft or rod A may be set. Associated with shaft G is a dial-plate H and pointer J, by which shaft G may be operated to set shaft A to correspond to any particular or predetermined landing or stopping-point for the car. Thus by turning the pointer J of the dial-plate to any one of the designations "1," "2," "3," "4," "5," "6," "7," "8," "9" appearing on said dial-plate (see Fig. 5) shaft G will be operated to set the main controlling-shaft A to cause the motor to start up and to automatically arrest or stop when the car reaches the particular floor corresponding to the designation with which the pointer J registers. In the particular arrangement shown pointer J coincides with the designation "3" on the dial-plate, and hence the car F is shown at the third floor.

In convenient relation to the dial-plate, so as to be under the observation of the engineer or motorman, is arranged a suitable signal device or annunciator, (indicated generally at K.) This annunciator or signal device comprises two sets of signals, each set including signals corresponding to each floor or landing at which the car is to stop, these signals being marked, respectively, "1," "2," and "3" in each view of the drawings. One of these sets of signals I designate the "sending-signals." (Marked "Send" on the drawings.) The other set of signals I designate the "calling-signals" and marked "Call" in the drawings, and the arrangement is such (as will presently appear more fully) that when a "Send" signal is received the motor attendant will understand that the signal proceeds from one floor and directs him to start the motor so as to stop the car at some other floor—that is to say, the motor-attendant is directed to send the car to some other predetermined floor—and if a signal is received in the "Call" set the motor attendant is to understand that he is to send the car to the particular floor from which the signal is sent. Thus the motor attendant is enabled to determine whether or not he is to send the car to the particular floor from which the signal proceeds or is to send the car to some other floor than that from which the signal proceeds. Associated with the annunciator or signal device K is an auxiliary-signal device, which may be of any suitable form—such, for instance, as an electric lamp (indicated at L)—the circuit of which includes contacts arranged at each landing and adapted to be closed by the door at each landing, so that if any door in the elevator-shaft is open the circuit of the signal device L is broken and the motor attendant is notified that it is dangerous to start the car or to set the motor in operation until such door is closed. The auxiliary-signal device L is included in an auxiliary circuit, which is adapted to be made or broken by the motor, as will be more fully described hereinafter.

I have also embodied in my signaling system a signal arranged at each floor or landing and which, if desired, may be of any simple or suitable construction—such, for instance as a bell (indicated at M)—the circuit of each bell being controlled by the motor attendant at any suitable or convenient point adjacent to the motor, push-buttons (indicated by the word "Bell") being employed for this purpose.

I have shown my signaling system arranged to be operated from any floor or landing, as indicated in Fig. 2, and also as adapted to be operated from the car, as indicated in Fig. 3.

I will first describe the arrangement and adaptation of the system as shown in Fig. 2, wherein reference-sign N designates a battery or other suitable source of current, to one pole of which is connected a wire or conductor *a*, arranged to extend throughout the length of the elevator shaft or well. Leading from this wire or conductor at each landing or floor is a branch *b c d*. At each floor or landing is arranged a series of push-buttons corresponding in number to the number of landings at which the car is to stop. One push-button at each landing is designated "Call" and is designed to complete a circuit when the circuit through such push-button is closed from the branch wire or conductor at that landing to and through the corresponding "Call" signal at the annunciator K and thence to the other pole of battery N. Suppose, for instance, the "Call" button at the first floor is pushed. Then the following circuit will be established: from battery N, wire *a*, branch *b*, the "Call" push-button at the first floor, wire *e*, to signal 1 of the "Call" set at the annunciator, wire *f*, to battery N. This will operate the "Call" signal 1 of the annunciator and will indicate to the motor attendant that the car has been called from and should be sent to the first floor. Similarly, suppose the "Call" button is operated at any other landing—as, for instance, the second landing. Then a circuit will be completed as follows: from battery N, through wire *a*, branch *e*, to "Call" button at the sec-

ond landing, wire *g*, to "Call" signal marked "2" at the annunciator, to wire *f* and back to battery, thus indicating to the motor attendant that he should send the car to the second floor in response to the call proceeding from such floor, and so on throughout the system.

I have stated above that I employ at each floor a series of push-buttons corresponding in number to the number of floors or landings. I have also described that one of the push-buttons at each landing is a "Call" button and I have explained the operation and function of such "Call" button. Each of the other push-buttons at each landing is designed to control a signal-circuit of the "Send" signal at the annunciator corresponding, respectively, with the other floors or landings of the system. For instance, at the first floor are sending push-buttons corresponding to the second, third, &c., floors; at the second floor the sending push-buttons correspond to the first, third, &c., floors; at the third floor the sending push-buttons correspond to the first, second, &c., floors, and so on throughout the system. Suppose the push-button marked "2" at the first floor be operated. Then a circuit will be completed from battery N, through wire *a*, branch *b*, push-button 2, wire *h*, to signal marked "2" of the "Send" series at the annunciator, wire *f*, back to battery. The operation of this signal of the annunciator will indicate to the motor attendant that the car has completed its stay at the first floor and should proceed to the second floor. It will also indicate to the motor attendant that the signal comes not from the floor to which the car is to proceed, but from some other floor—as, for instance, that from which the car is to proceed. Similarly, if the car is to be sent from the first to the third floor, the push-button marked "3" at the first floor will be operated, thereby closing the circuit from battery N, through wire *a*, branch *b*, button marked "3" at the first floor, wire *k*, signal "3" in the "Send" series at the annunciator, thence to wire *f*, back to battery. This will indicate to the motor attendant that in response to that signal, proceeding from the first floor, he is to send the car to the third floor. In the same manner the push-button circuits at each of the other floors may be similarly traced; and, as will be readily understood from the foregoing description, when the motor attendant receives a signal, whether it is a "Call" or a "Send" signal, he will correspondingly actuate the pointer J of the control-dial so that such pointer will register with the corresponding landing or floor on the dial, thereby setting the motor in operation, so that the motor will stop when the car arrives at the particular landing or floor indicated by the pointer on the dial. In case, however, the auxiliary-signal device L is not in operation when the motor attendant receives a signal at the annunciator it will be known that by reason of a door of the elevator shaft at some point being open or from some other cause it will be dangerous to start up the motor. For instance, if a car is standing at any particular floor and its loading or unloading at that floor has been completed without closing the door of the shaft or well then the motor attendant when he receives a signal to send the car to some other floor or landing will know or have his attention attracted to the fact that such door is open.

The signal device L is included in an auxiliary circuit the feed-wires of which are designated by the reference-signs *a' b'*. A switch device O controls this circuit and when closed completes the circuit—for instance, from wire *b'*, through wire *c'*, signal device L, wire *d'*, switch device P at each of the landings, thence through wire *f'* to wire *a'*. From this it will be seen that when any door of the elevator-shaft is open the circuit of the signal device L is broken. The door-switches P may be of any suitable or convenient construction adapted to be closed by the closing of the door and opened by the opening of the door. The switch O, which controls the auxiliary circuit including the signal device L, is adapted to be opened and closed automatically by the actuation of the main-switch device which controls the hoisting-motor, as indicated in Fig. 1.

In case the auxiliary circuit which controls the signal device L is broken the motor attendant can call attention to that fact at any floor or each floor by means of the push-buttons marked "Bell," and which control the circuits of the signal-bells M. For instance, suppose the door at the second floor should be left open, thereby breaking the circuit of the signal device L at that floor. Then before the motorman or engineer starts in motion the hoisting-motor after receiving a signal he will press the "Bell" button marked "2," thereupon completing the following circuit: from battery N, through wire *a*, branch *c*, signal M at the second floor, wire *g'*, "Bell" button "2" to battery. The completion of this circuit will cause the signal M at the second floor to sound, thereby calling the attention of any person or employee on that floor to the fact that the elevator shaft or well door is open.

In the construction and arrangement shown in Fig. 3 the signal device L, its controlling-switch O, the switches P, and circuits are identical with the similar construction and arrangement shown in Fig. 2 and above described. In the arrangement shown in this figure, however, instead of employing a series of push-buttons at each floor corresponding in number to the number of floors or landings I employ only one push-button at each floor, which is marked "Call," and I mount on the car a series of push-buttons corresponding to the various landings or floors. From this arrangement, it will be seen, a signal may be sent from any floor calling the car to that floor. For instance, if the car is

desired at the first floor the "Call" button at that floor is manipulated, thereby completing circuit from battery N, through wire a^2, wire b^2, to said push-button, wire c^2, to corresponding signal device marked "1" in the "Call" set of annunciator K, and thence by wire d^2 to battery. Similarly, the circuit of each of the other "Call" push-buttons may be traced. Arranged on the car are a series of push-buttons marked "1," "2," and "3," corresponding to the various landings at which the car is to stop. Suppose the push-button "1" on the car to be actuated. Thereupon circuit will be completed from battery N, through wire a^2, wire f^2, button "1" on the car, wire g^2, to signal device marked "1" in the "Send" set at the annunciator, and thence through wire d^2 to battery. The completion of this circuit announces to the engineer or motor attendant that the car-conductor desires to have the car go to the first floor. Thereupon the motor attendant will suitably manipulate the pointer J so as to set the necessary apparatus in position to start the motor and to automatically arrest it when the car reaches the first floor. Similarly, the circuit of any other one of the push-buttons on the car may be traced, each push-button on the car completing a circuit which includes a signal device at the annunciator corresponding to the particular floor to which it is desired to send the car.

In case the auxiliary-signal circuit, which includes the signal device L, should be broken, as by leaving a door open at any landing at which the car is located, then the motor-attendant will signal to the car-conductor through a circuit which includes a push-button marked "Bell," located in convenient position adjacent to the station of the motor attendant. Thereupon circuit will be completed as follows: from battery N, through wire a^2, wire f^2, wire k^2, bell or other signal device M on the car, wire m^2, through the push-button marked "Bell," wire d^2, to battery. The completion of this circuit will cause the signal device M on the car to call the attention of the car-conductor to the fact that the motor attendant will not start the motor until the door is closed.

From the foregoing description it will be seen that instead of controlling the hoisting-motor from each floor or landing or from the car the motor is controlled by a motor attendant, to whom and from whom the desired signaling is effected. By such arrangement I avoid the danger of accident due to the controlling apparatus getting out of order, and I secure the direct attention of a motor attendant in starting the motor.

Having now set forth the object and nature of my invention and constructions and arrangements embodying the same, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In an automatic elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a push-button for each floor at which the car is to stop, a circuit for each push-button, and a signal, actuated by the operation of each push-button, for signifying in advance of the starting of the car the floor at which the car is desired to stop, as and for the purpose set forth.

2. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined stopping-point, a signal corresponding to each floor or landing at which the car is to stop, and arranged to indicate to the hoisting-mechanism attendant in advance of the starting of the car the floor at which the car is to stop, a circuit for each signal, and a push-button arranged in each signal-circuit, as and for the purpose set forth.

3. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined stopping-point, signals arranged adjacent to the said controlling means to indicate to the attendant the manner of control of the hoisting mechanism to cause the car to proceed to any particular floor or landing, a circuit for each signal, and a push-button arranged at each floor or landing, each push-button controlling a signal-circuit, as and for the purpose set forth.

4. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a signal corresponding to each floor or landing at which the car is to stop, said signals arranged in convenient relation to said controlling means to indicate to the attendant before said controlling means are operated the proper manner of control of the motor, and a corresponding series of push-buttons arranged at each landing for controlling the circuits of said signals, as and for the purpose set forth.

5. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a signal corresponding to each landing at which the car is to stop, a push-button arranged at each floor, each push-button controlling the circuit of its corresponding signal, whereby the hoisting-mechanism attendant may be notified in advance of the operation of said controlling means to send the car to any floor, as and for the purpose set forth.

6. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined stopping-point, a series of signals,

a circuit for each signal, a series of push-buttons arranged at each floor, said push-buttons controlling the circuits of their corresponding signals, as and for the purpose set forth.

7. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined stopping-point, a series of "Send" signals and a series of "Call" signals, said "Send" and "Call" signals being arranged in proximity to the controlling means, a circuit for each signal, a push-button arranged at each landing for controlling the circuit of the "Call" signal corresponding to that floor, and push-buttons arranged to control the circuits of said "Send" signals, as and for the purpose set forth.

8. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined stopping-point, a series of "Send" signals and a series of "Call" signals arranged in convenient relation to said controlling means, a series of push-buttons arranged at each landing to control the circuits of said signals, one push-button at each floor controlling the circuit of the "Call" signal corresponding to such floor, and each of the other push-buttons at each floor controlling the "Send" signal corresponding to the other floors of the system, as and for the purpose set forth.

9. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a signal arranged at each floor, said signals operating, respectively to indicate that the car requires attention at the particular floor at which it is located, a push-button for controlling said signal, said push-button being arranged in convenient relation to the controlling means, as and for the purpose set forth.

10. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a signal arranged at each floor or landing, circuits for said signals, and a push-button arranged in convenient relation to the controlling means for controlling the circuit of each signal, as and for the purpose set forth.

11. In an automatic electric elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a series of signals arranged in convenient relation to the controlling means, means arranged at each landing for controlling the circuits of said signals, in combination with a signal arranged at each landing, circuits for said landing-signals, and means, also arranged in convenient relation to the controlling means, for controlling the circuits of said landing-signals, as and for the purpose set forth.

12. In an elevator, a hoisting mechanism, means for controlling the same, said means operating to start the car and to arrest it automatically at any predetermined stopping-point, a signal device arranged in convenient relation to said controlling means, a circuit for said signal device, a switch arranged at each landing of the elevator-shaft, each switch adapted to be closed when the elevator shaft or well door is closed, and to be opened when such door is opened, as and for the purpose set forth.

13. In an elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest the same automatically at any predetermined stopping-point, a door at each floor at which the car is to stop, a switch operated by each door, a signal device arranged in convenient relation to said controlling means, said signal device controlled by the door-switches for signaling the motor attendant in advance of the actuation of said controlling means whether the doors are open or closed, as and for the purpose set forth.

14. In an automatic elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a signal arranged adjacent to the controlling means, a circuit for said signal, a switch arranged at each floor or landing, said switches arranged in said signal-circuit, and each switch adapted to be opened or closed according as the elevator shaft or well door is opened or closed, in combination with a signal for calling attention to the door being open in advance of the operation of the controlling means, and means arranged adjacent to the controlling means for closing the circuit of such signal, as and for the purpose set forth.

15. In an automatic elevator, a hoisting mechanism, means for controlling the same said means operating to start the car and to arrest it automatically at any predetermined landing, a signal arranged in convenient relation to the controlling means, a circuit therefor, a switch arranged at each landing and included in said signal-circuit, each switch adapted to be controlled by the door at such landing, in combination with a signal arranged at each landing, a circuit for each signal, and a push-button arranged in convenient relation to the controlling means for controlling the circuit of each landing-signal, as and for the purpose set forth.

16. In an automatic elevator, a hoisting mechanism, means for controlling the same whereby the car will stop at any predetermined landing, a series of "Send" signals and a series of "Call" signals arranged in convenient relation to the controlling means, circuits for said signals, a series of push-but-

tons arranged at each landing for controlling the circuits of said signals, in combination with an auxiliary signal arranged in convenient relation to said hoisting mechanism, a circuit for said auxiliary signal, a switch arranged at each floor or landing and included in said auxiliary-signal circuit, each switch adapted to be controlled by the elevator shaft or well door at such landing, as and for the purpose set forth.

17. In an elevator, a hoisting mechanism, means for controlling the same, said means operating to start the car and to arrest it automatically at any predetermined stopping-point, an auxiliary switch actuated coincidently with the setting in operation of the hoisting mechanism, a signal arranged in convenient relation to the controlling means, a circuit for said signal, said circuit arranged to be controlled by said auxiliary switch, whereby when the car is in motion the fact will be indicated, as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 6th day of February, 1900, in presence of the subscribing witnesses.

HAROLD ROWNTREE.

Witnesses:
E. C. SEMPLE,
S. E. DARBY.