947,733.

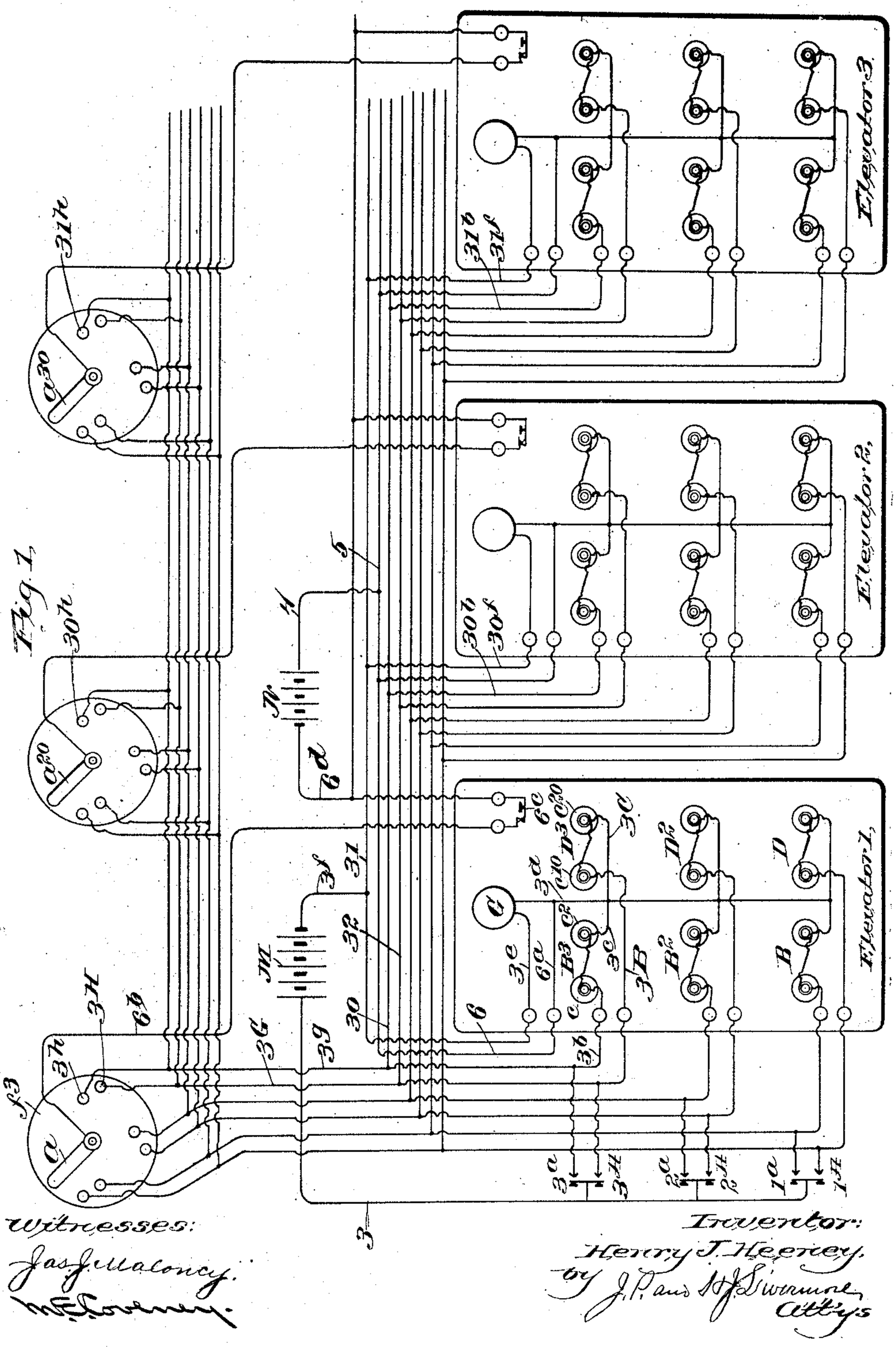
H. J. HEENEY.

ELEVATOR SIGNAL SYSTEM.

APPLICATION FILED OCT. 26, 1907.

Patented Jan. 25, 1910.

4 SHEETS—SHEET 1.



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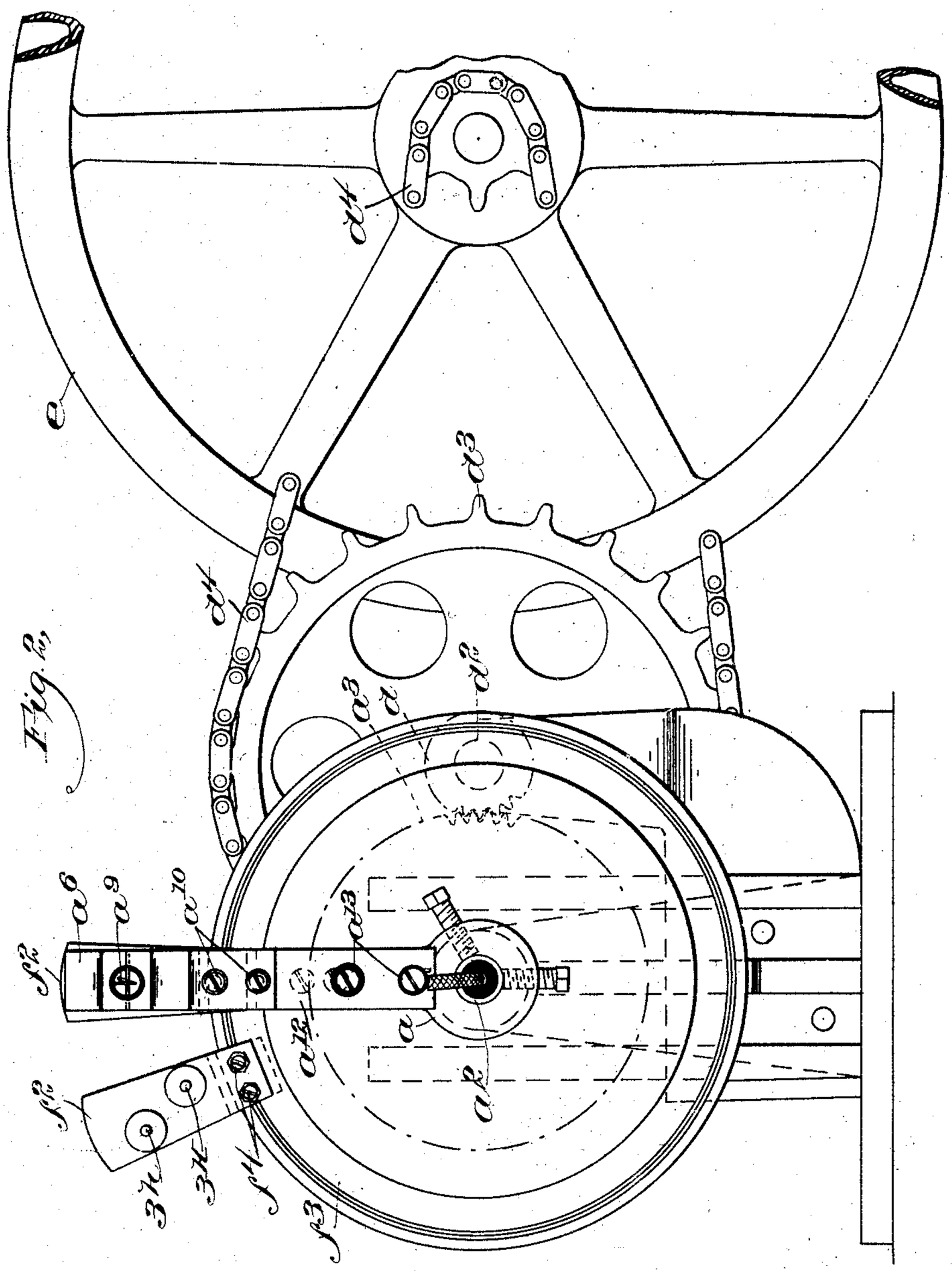

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4 SHEETS—SHEET 3.

Fig. 3.

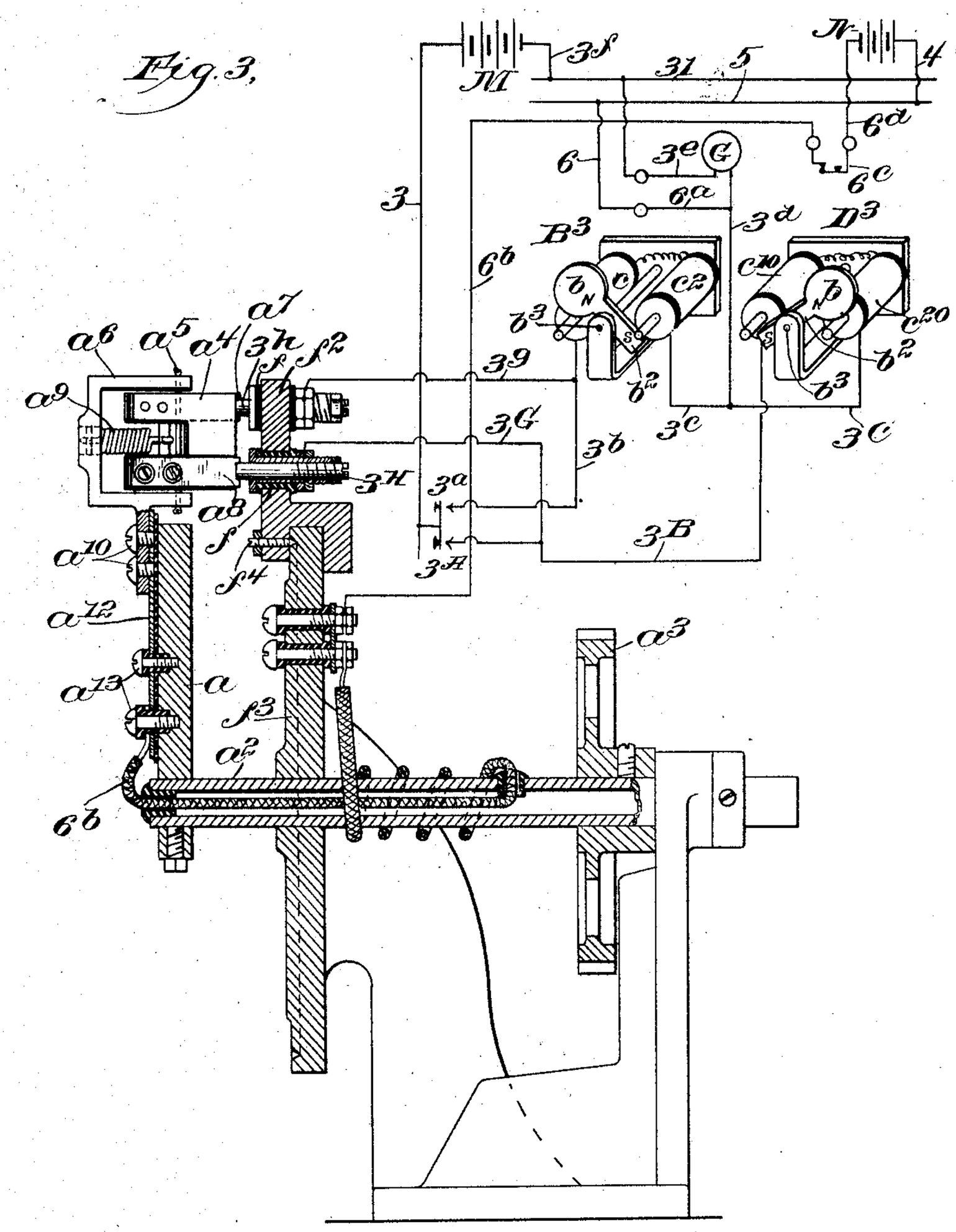


Fig. 4.

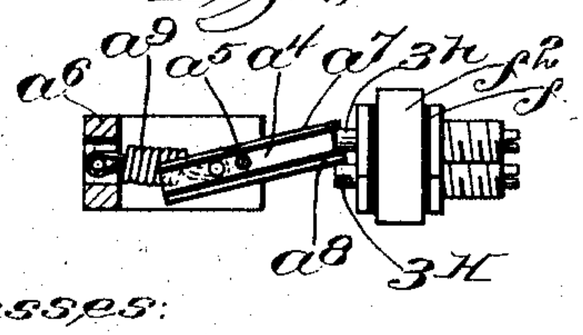
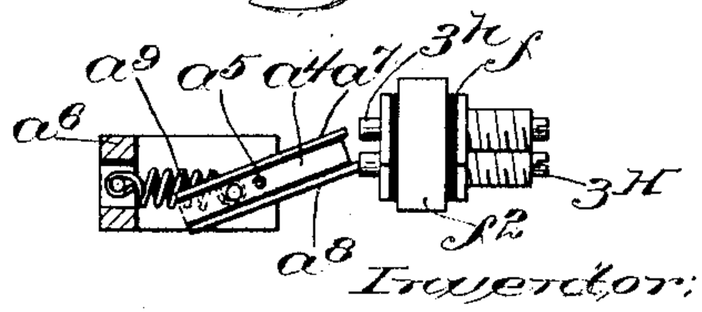


Fig. 5.



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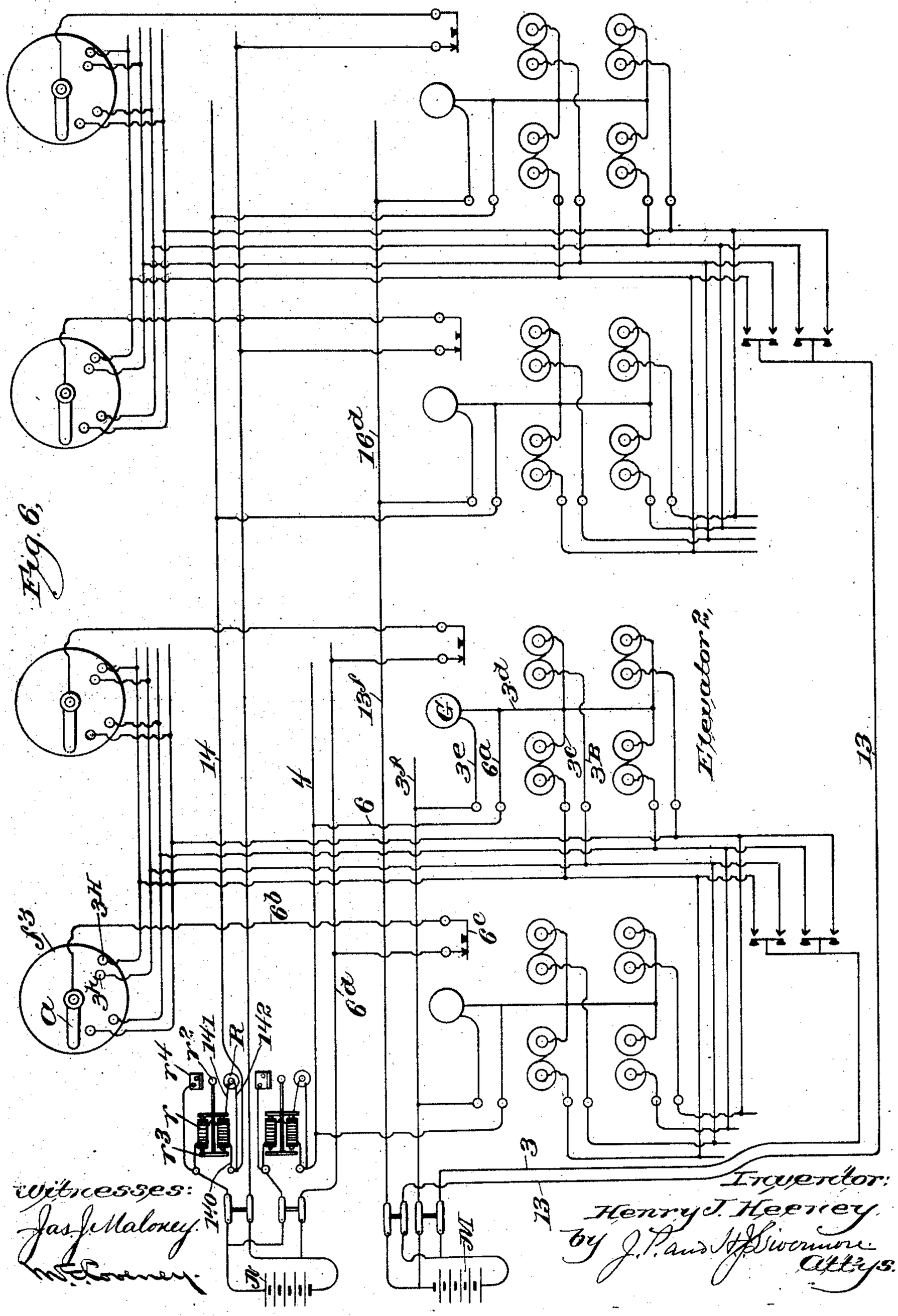
4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

HENRY J. HEENEY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HOLTZER-CABOT ELECTRIC COMPANY, A CORPORATION OF MASSACHUSETTS.

ELEVATOR SIGNAL SYSTEM.

947,733. Specification of Letters Patent. Patented Jan. 25, 1910.

Application filed October 26, 1907. Serial No. 399,296.

To all whom it may concern:

Be it known that I, HENRY J. HEENEY, a citizen of the United States, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Elevator Signal Systems, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The present invention relates to an elevator signal system of that class in which each floor is provided with a single annunciator-set for a plurality of elevators, said set having an "up" push button and a "down" push button, there being corresponding up and down signals which are displayed in all the cars. In a system of this kind, the signals, whether up or down, are automatically re-set when any car passes a landing and takes the passengers waiting, so that the other elevators subsequently passing the said landing will not have any stop signal displayed at the time of passing.

The present invention relates mainly to a novel system of distribution whereby the wiring is greatly simplified, a further feature of the invention consisting in the combination with such a system, of a resetting circuit controller operated by each elevator, the said controller being of novel construction.

In the system embodying the invention, each of the cars is provided with an up and down signal corresponding to each floor. Each signal consists of a polarized drop arranged between two electro magnets so as to move in one direction and to be thus displayed in response to an impulse of current in one direction, and to be moved out of sight in response to an impulse of current in the other direction. The circuits are so arranged that the operation of the push button marked "up" at any floor sets the up signals corresponding to that floor in all of the cars, the pushing of the button marked "down" correspondingly setting all of the down signals for that floor. Each signaling circuit, however, is further controlled by a circuit closer operated by each car so that the resetting circuit becomes closed automatically when any car of the series reaches a certain floor.

Figure 1 is a diagram of circuits illustrating the system applied to three elevators, the signals for three floors being shown; Fig. 2 is a side elevation on a larger scale of the resetting circuit-controller operated by each car; Fig. 3 is a vertical longitudinal section of the same with the circuits through one set of signaling devices illustrated in diagram; Figs. 4 and 5 are top plan views, partly in section, of the circuit controlling arm illustrating the operation of the contact piece in the up and down movement of the elevator; and Fig. 6 is a diagram showing a modification for use when two or more separate sets of elevator signals are to be operated from a single source of current.

In Fig. 1, the three elevator cars are illustrated in diagram and indicated by the legends "Elevator 1", "Elevator 2", and "Elevator 3". Each car is shown as equipped with an up and down signal for each of three floors, the diagram indicating how the circuits through all of the signals are connected together. For descriptive purposes, however, it is necessary only to refer mainly to the signaling devices in one elevator, and the set of signaling devices in elevator 1, supposed to represent the signals for the third floor, will be specifically described. The up and down signals for the first, second and third floors, however, are indicated, respectively, by the reference letters B, D, B^2, D^2, and B^3, D^3. Each signaling device consists, as best shown in Fig. 3, of a disk b mounted on an arm b^2 which is pivoted at b^3 between two oppositely wound electro-magnets c and c^2. The arm b^2 is permanently polarized so that one end is of north polarity and the other end of south polarity, as indicated by the reference letters n and s, the polarity of the electro magnets c and c^2 changing, of course, with the direction of the current. Assuming, for example, that the arm b^2 is in the position shown at the left in Fig. 3, and that the current is passed through the electro magnets c and c^2 in such a direction as to polarize the electro magnet c north, and the electro magnet c^2 south, the lower end of the arm b^2 will be repelled, thus starting the signal disk b toward the right, the electro magnet c^2 at the same time tending to attract the upper end of the arm b^2, while the lower end, as it approaches the electro magnet c, will be attracted. Assuming, therefore, that, in the position shown, in signal B^3, the member b is visible, while it is invisible in the opposite

position, it will be seen that the signal is set and restored through the agency of currents flowing in opposite directions through the electro magnets.

In Fig. 1, the up and down signal buttons are indicated respectively for the different floors by the letters 1^a and 1^A for the first floor; 2^a and 2^A for the second floor; 3^a and 3^A for the third floor. In tracing the circuits, the third floor may, for convenience, be referred to, and assuming that some one on the third floor wishes to display an up signal in all the cars, the button 3^a is pushed, thus closing a circuit which starts from a battery M and passes through conductor 3 and push button 3^a to the conductor 3^b, magnetic coils c and c^2, conductor 3^c, conductor 3^d, signal bell G, and conductors 3^e and 3^f to the other terminal of the battery M. The momentary closure of this circuit energizes the coils c, c^2 in the manner necessary to display the signal which indicates a passenger waiting to go up on the third floor.

The conductor 3^b is connected by means of a connecting wire 30 with conductors 30^b and 31^b which lead to the corresponding up signals in elevator 2 and elevator 3, each of which is provided with a signal bell and with conductors 30^f and 31^f which connect, through connecting wire 31, with the conductor 3^f to complete the circuits throughout the series. The circuit for the down signal passes from the battery M through the conductor 3, the push button 3^A, the conductor 3^B to the down signal device D^3, and thence through the conductor 3^C to the conductor 3^d, the remainder of the circuit being as previously traced with relation to the up signal. This circuit is completed through all the elevators by means of the connecting conductor 32. The signals having thus been set in all the cars, it is necessary to restore the signals after any one car has stopped to take the waiting passengers. For this purpose, each car is arranged to operate a circuit controlling device which consists of a traveling member arranged to pass contacts corresponding to each floor, the contacts being arranged in sets to take care of the up and down signals.

Referring again to elevator 1, the stationary up and down contacts for the third floor are indicated by the reference letters 3^h and 3^H, the traveling arm a being arranged to reach these contracts when the elevator is at the third floor and close the circuit through one when the car is traveling upward, and through the other when the car is traveling downward. The construction by which this selection of the circuit to be closed is provided for will be hereinafter described, it being sufficient, for the present, to assume that the arm a reaches a position to close a circuit in coöperation with the contact member 3^h when the elevator 1 has reached the third floor in its upward travel. The circuit thus closed is supplied by a separate battery N which may be referred to as the resetting battery, and said circuit may be traced as follows: battery N, conductor 4, conductor 5, which connects with all the cars, conductor 6, conductor 6^a, conductor 3^d, conductor 3^c, coils c^2 and c, conductors 3^b and 3^g, to the contact member 3^h, arm a, and thence through the conductor 6^b, cut-out switch 6^c, and conductor 6^d, to the opposite terminal of the battery N. This causes current to flow through the signaling device B^5 in the opposite direction to that employed for displaying the signal, and results in resetting the signal, the connections being such that the signals are reset in all the cars when any one car passes the proper floor. Without tracing the circuits, it may be noted that each elevator is provided with a circuit controller like the one described, the arms a^{20} and a^{30} corresponding to the elevators 2 and 3 and coöperating with the terminals 30^h and 31^h when their respective elevators reach the third floor. The same is true of the down re-setting signal, the circuit of which will now be traced relating to the third floor signal in elevator 1, it being deemed unnecessary to describe further the multiple connections, which are plainly shown in the diagram.

The circuit for the down resetting signal is through the conductors 4, 5, 6, 6^a and 3^d, and thence through the down signal D^3, coils c^{20} and c^{10} the conductors 3^B, 3^G to the terminal 3^H and thence, as before, through arm a, conductor 6^b, cut out switch 6^c, conductor 6^d, to the battery N. The cut-out switch 6^c is provided for the purpose of breaking the resetting circuit in case an elevator in passing a floor for which a signal is set may be crowded, so that it is desirable not to stop for more passengers, but to leave the signals set in the other elevators until one with better accommodations reaches the floor. If, therefore, for any reason, the operator of the elevator desires to pass a floor without stopping, he can operate the cut-out switch 6^c while his car is passing the floor, and thus prevent the closure of the resetting signal circuit.

The mechanical details of the re-setting circuit controller are best shown in Figs. 2, 3, 4 and 5, it being understood, as shown in the diagram Fig. 1, that each car is provided with controlling mechanism independent of the others.

As best shown in Fig. 3, the arm a is mounted radially upon a shaft a^2 provided with a gear wheel a^3 adapted to be driven, as shown in Fig. 2, by a small gear d on the shaft d^2 driven by a sprocket d^3 and a chain d^4 from a wheel or drum e which is rotated by one of the elevator cables in the up and down movement of the elevator. The sta-

tionary contacts 3^h and 3^H, which have been previously described, consist of pins provided with bushings of insulating material, indicated by the reference letter *f*, which pins and bushings are supported in metallic lugs f^2 arranged to be clamped upon a stationary disk f^3. As best shown in Figs. 2 and 3, the members f^2 are adjustable along the periphery of the disk f^3, and are held in place by means of set screws f^4. The number of members f^2 corresponds to the number of floors served by the elevators, and the spacing corresponds to the travel of the arm *a* which is produced by the travel of the elevator car from floor to floor.

In order that the circuit may be closed through one set of contacts, and not through the other when the elevator is going in one direction, the contact portion of the arm *a* consists of a member a^4 pivotally mounted at a^5 in a member a^6, and having separate engaging portions a^7 and a^8 which, as best shown in Fig. 3, are in line respectively with the contact members 3^h and 3^H. These engaging members consist of plates secured to the opposite sides of the pivoted member a^4 and insulated therefrom, the said plates projecting beyond the edge of said member which is adapted to make contact with one pin or the other, in acordance with the direction of movement of the arm *a*. As indicated in Fig. 4, which is a sectional plan view, the body of the pivoted member a^4 is in electrical contact with the pin 3^h, the insulated projecting member a^8 at this time just coming into contact with the pin 3^H. This closes the circuit controlled by the pin 3^h without, however, closing the circuit through the pin 3^H, on account of the insulation betwen the body of the member a^4 and the projecting plate a^8. In the further movement of the arm *a*, as indicated in Fig. 5, the pivoted member a^4 is thrown completely out of contact and turned far enough to clear when it moves back to its normal position through the agency of the spring a^9 after the arm has traveled completely past the said contacts.

The contact carrying member a^6, as best shown in Figs. 2 and 3, is secured by screws a^{10} to one end of a spring plate a^{12}, the other end of said plate being fastened, as by screws a^{13}, to the *a*. This construction allows the contact carrying member a^6 to yield, thus preventing the binding of the contacts and the breaking of the parts.

It is desirable, in some cases where two separate banks of elevators are located in different parts of a building, so that the signaling systems for the two banks must be independent of each other, to utilize a single source of current to supply both systems. This can be done by using separate circuits leading to the different sets of signals; but there is a possibility of a conflict in current through the signaling circuits, since there is a path of current common to both sets opened through the re-setting circuits. Such interference can be obviated by placing a suitable resistance in the two corresponding conductors of one of the multiple circuits, such an expedient being illustrated in Fig. 6. In the diagram, Fig. 6, two separate banks of elevators are shown, there being, for convenience, but two elevators shown in each bank, and these banks of elevators are supposed to be located in different parts of the building so that the signaling devices in one bank must be entirely independent of those in the other. For this purpose, the calling battery M and the resetting battery N are each shown as provided with separate pairs of conductors leading respectively to the separate banks of elevators. The signaling circuits are the same as those already described, and, for convenience, the same reference characters are employed to indicate the conductors of one set. The circuits through the other set are identical and do not require detailed description, it being sufficient to state that the signaling conductor 13 leading to the separate bank of elevators corresponds to the conductor 3 which is the same as that previously described in connection with Fig. 1. The same is true of the re-setting circuit, the conductor 14 corresponding to the conductor 4. It will be seen that by tracing the connections when an impulse of calling current is sent through the signaling devices of one bank of elevators there is a path of current established through the resetting circuit and the other bank of elevators which may interfere with the proper independent operation of the signals in the two banks. Assuming, for example, that a signal has been set in elevator 2, the circuit being through conductor 3, the signal, conductor 3^d, bell G, conductor 3^e and conductor 3^f, there is also a path of current through conductor 6^a, conductor 4, conductor 14 and conductor 16^d, so that it is possible to influene the signaling devices in the wrong set of elevators. In order to prevent current from flowing through this branch, the conductors 4 and 14 of the resetting circuits are provided with resistance coils *r* of sufficient strength to prevent the flow of current from the calling battery. In order that these resistance coils may not interfere with the proper operation of the current from the resetting battery, they are arranged to operate means for short-circuiting the coils when the resetting battery circuit is closed. For this purpose, the coils are wound on cores so as to constitute electro-magnets, and contact members r^2 having polarized armatures r^3 are pivotally supported in such a position that the said armatures are in the magnetic field of the coils *r*. When the resetting circuit is closed, the cur-

rent flowing through the coils and the conductor 140 to the conductor 14 energizes the said coils so that the armature r^3 is rocked on its pivot bringing the contact member r^2 into electrical engagement with a contact piece r^4, thus closing a circuit of comparatively low resistance through the member r^2, the frame of the magnet, the conductor 141, low resistance coil R and conductor 142 to the conductor 14. By this expedient a low resistance path is afforded for the resetting current when in use, while the signaling current is effectually prevented from connecting across from one bank of elevators to the other by the resistance of the coils r.

It is obvious that the current from the signaling circuit must traverse one set of the said coils in the direction opposite to that of the normal flow of current in the resetting circuit, so that the tendency of such current is to move the armature into such a position as to open the shunt circuit.

Claims.

1. In an elevator signaling system for a gang of elevators, the combination with up and down signals in each car consisting of drops provided with polarized armatures; of a manually operated circuit controller adapted to close a circuit through said signaling devices to cause current to flow in the right direction to set the same; and an automatic circuit-controller operated by an elevator car to close a circuit and cause current to flow in an opposite direction to said signaling devices to restore the same when the elevator passes a given floor.

2. In an elevator signaling system the combination with multiple signals corresponding to the different floors, said signals being operated by current flowing in one direction and reset by current flowing in the opposite direction; a circuit common to the up-signals in all the elevators for a given floor; a circuit common to the down-signals for all the elevators for a given floor; manually operated circuit controllers for said circuits; and means operated by the elevator in its travel for closing a circuit to send an impulse of current in the opposite direction through said signaling devices, substantially as described.

3. In an elevator signaling system the combination with the signals, of a source of current for setting the said signals; circuit controllers corresponding to the different floors for selectively closing circuits from said source of current through the up or down signals, respectively; a second source of current; and an automatic switch carried by each elevator car for closing a circuit from said second source of current through the signaling devices in the opposite direction to re-set the same, substantially as described.

4. The combination with up and down signals of circuits controlling said signals and having separate manually operated circuit controllers; a source of current to energize said circuit, an automatic circuit controller; a second circuit controlled thereby for sending an impulse of current through the signals for re-setting the same; and a manually operated cut-out switch for said second circuit located in the elevator car.

5. In an elevator signaling system the combination with up and down signals located in each car and each adapted to be re-set by an impulse of current; of circuits to supply current for said signals respectively; a traveling controlling member operated by the elevator car; separate contacts projecting into the path of said members to be engaged thereby; and insulated projections on said traveling member, whereby said member is prevented from closing the circuit through one contact when it is traveling in one direction and from closing the circuit through the other contact when it is traveling in the opposite direction.

6. The combination with a multiple set of signals, of an automatic circuit controlling device comprising stationary contacts corresponding to the up and down signals at each floor; and a traveling contact member operated by the elevator car comprising an arm adapted to travel past and to engage said contacts, said arm having a pivotally supported member with insulated engaging portions at opposite sides to permit said arm to swing past the contacts making electrical connection with one when traveling in one direction and with the other when traveling in the opposite direction, substantially as described.

7. In an elevator signaling system, an automatic circuit controlling device having a traveling switch member operated by the elevator car; a stationary switch member having two contacts corresponding to each floor; a contact member pivotally supported on said traveling switch member and adapted to engage both contacts of the stationary switch member in passing; a yielding connecting member connecting said pivotally supported contact member with said traveling switch member; and insulated engaging portions on said pivotally supported contact member, whereby the closure of the circuit through one or the other of the stationary contacts is prevented according to the direction of the movement of the traveling switch member.

8. An elevator signaling system having two separate sets of signals for separate groups of elevators; a source of current common to both sets; independent circuit conductors leading from said source of current to the separate sets of signals, respectively; electro-magnetic resistance coils in series with a conductor of each independent cir-

cuit; armatures in the magnetic field of said coils; and means controlled by said armatures for short-circuiting said coils.

9. In an elevator signaling system, the combination with up and down signals for each floor located in each car; of a source of current; a circuit through which current is caused to flow in one direction through said signals to set the same; a manually operated circuit controller adapted to close said circuit; a second circuit through which current is caused to flow in the opposite direction through said signals to restore the same; and an automatic circuit controller operated by the elevator car to close said second circuit.

10. The combination with up and down signals located in an elevator car; of circuits controlling said signals and having separately operated circuit controllers; a source of current to energize said circuits; a second set of circuits for sending an impulse of current through the signals to reset the same; and an automatic circuit controller for said second circuits.

11. In a circuit controller for operating elevator signals, the combination with a traveling contact member consisting of a radial arm mounted on a shaft adapted to be rotated in unison with the movement of the elevator car, of two contact members pivotally supported on said arm and both connected with the same terminal; a stationary contact carrying member consisting of a supporting disk; and means for adjustably securing stationary contact pieces upon the periphery of said disk whereby the number and spacing of said contact pieces may be varied.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY J. HEENEY.

Witnesses:

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JAS. J. MALONEY.