B. E. FANNING.

ELEVATOR SIGNAL.

APPLICATION FILED SEPT. 11, 1907.

943,924.

Patented Dec. 21, 1909.

3 SHEETS—SHEET 1.

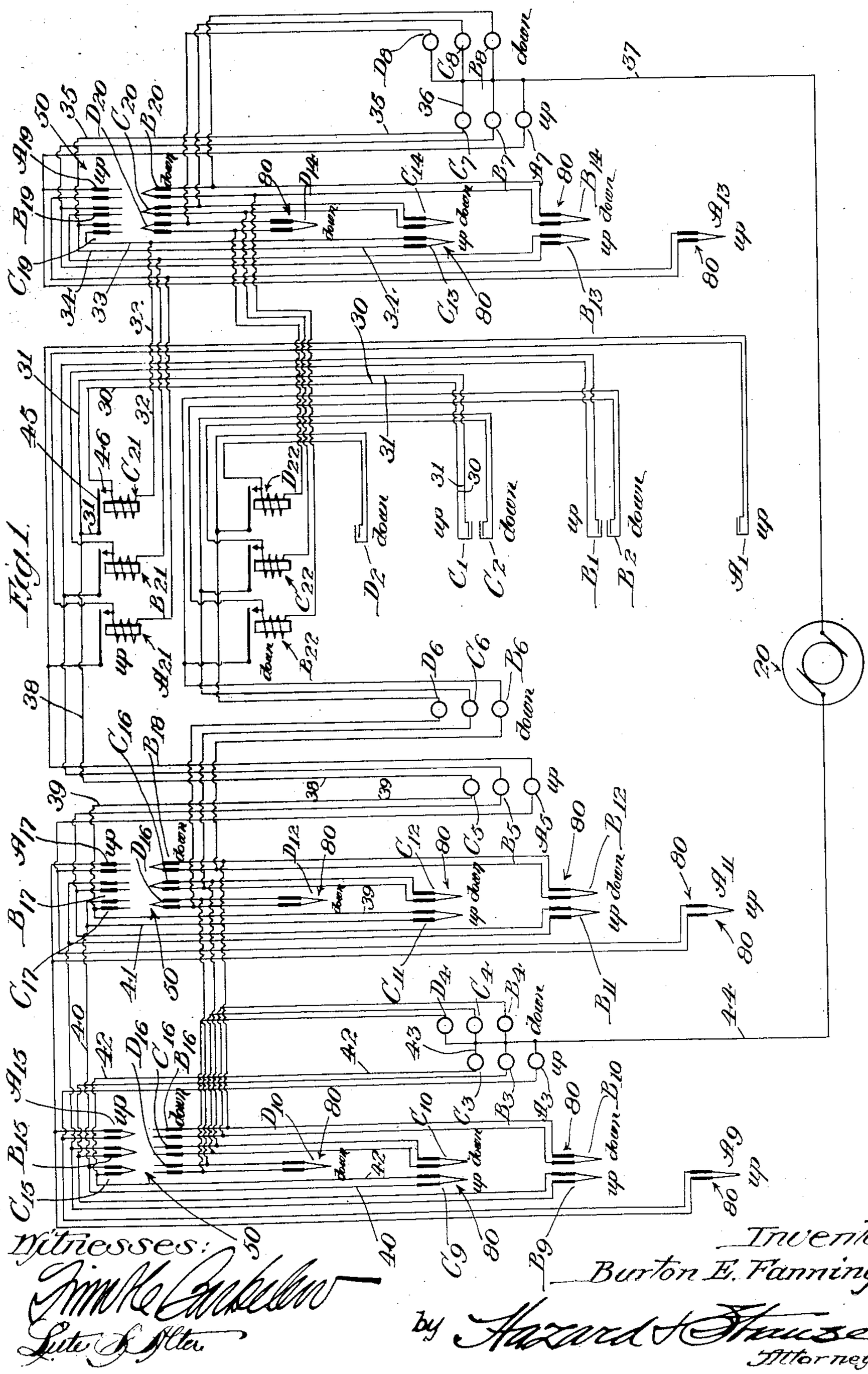


FIG. 1.

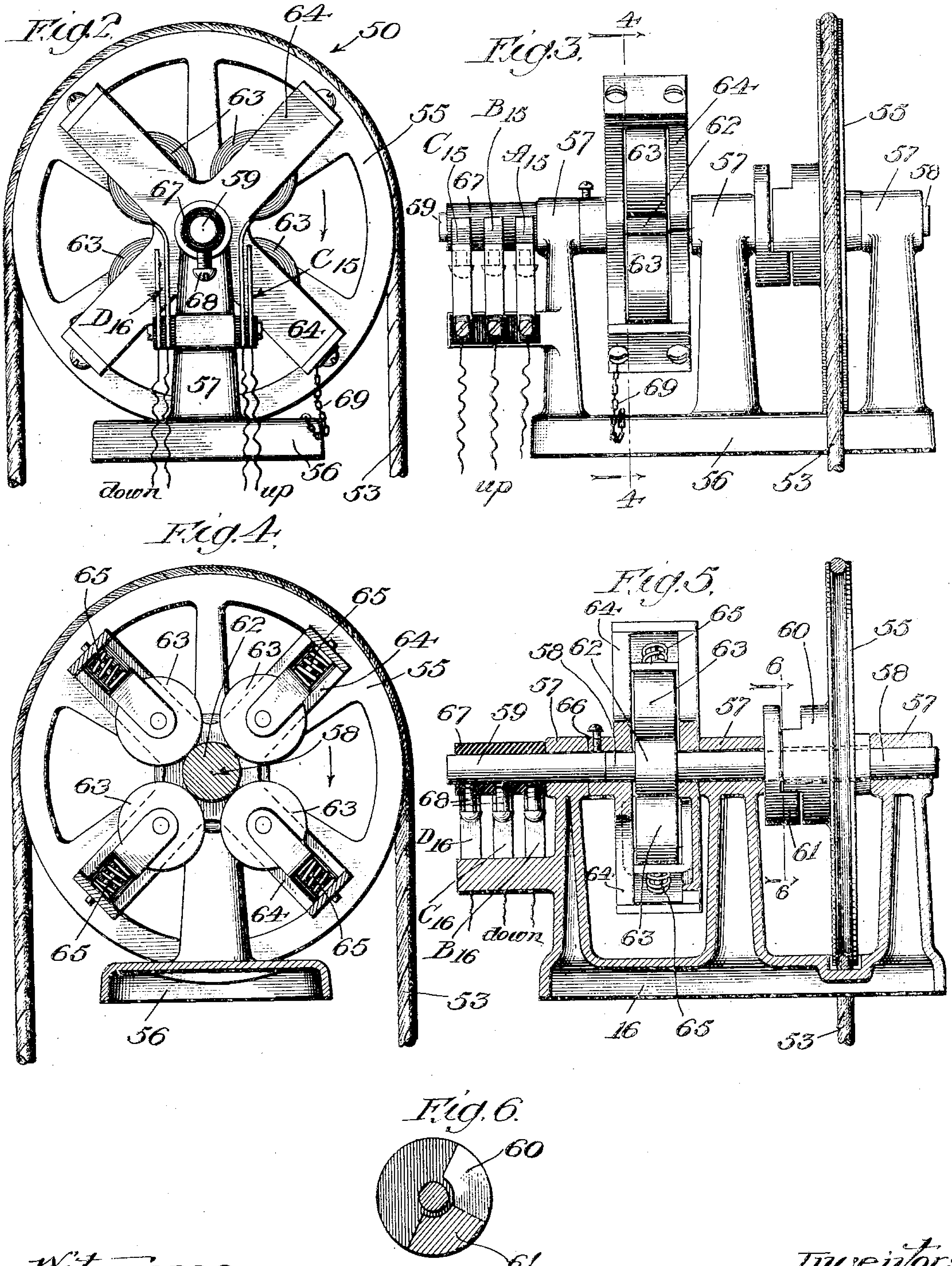
B. E. FANNING.

ELEVATOR SIGNAL.

APPLICATION FILED SEPT. 11, 1907.

943,924. Patented Dec. 21, 1909.

3 SHEETS—SHEET 2.



Witnesses:

Lute S. Alter,

Inventor:

Burton E. Fanning,

by Hazard & Strause,

Attorneys.

B. E. FANNING.

ELEVATOR SIGNAL.

APPLICATION FILED SEPT. 11, 1907.

943,924.

Patented Dec. 21, 1909.

3 SHEETS—SHEET 3.

Fig. 7.

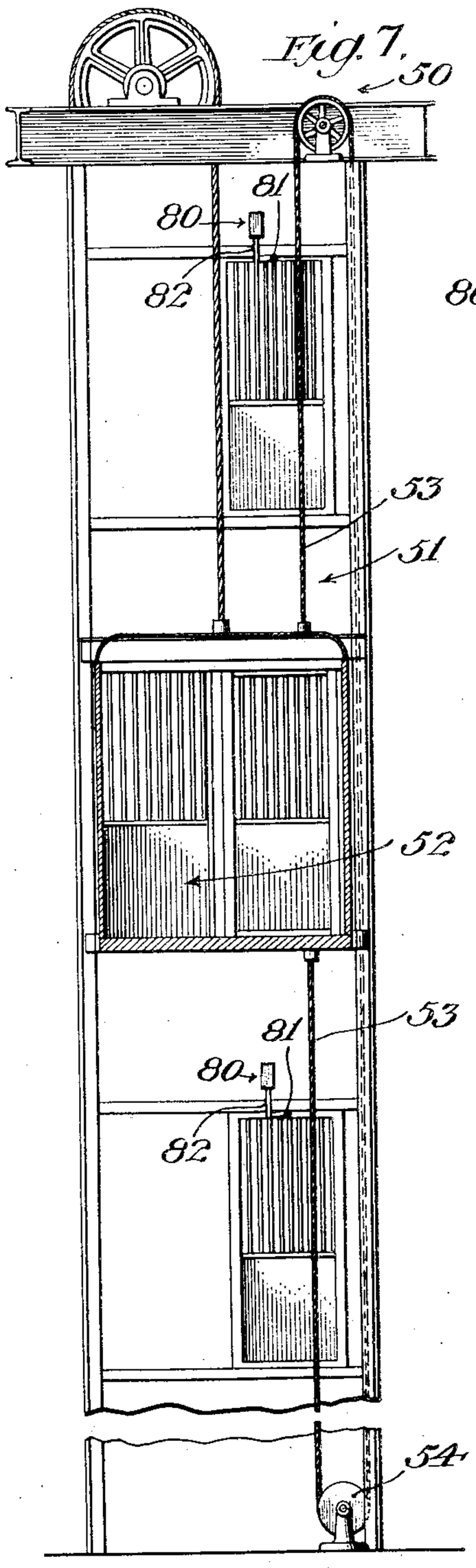


Fig. 8.

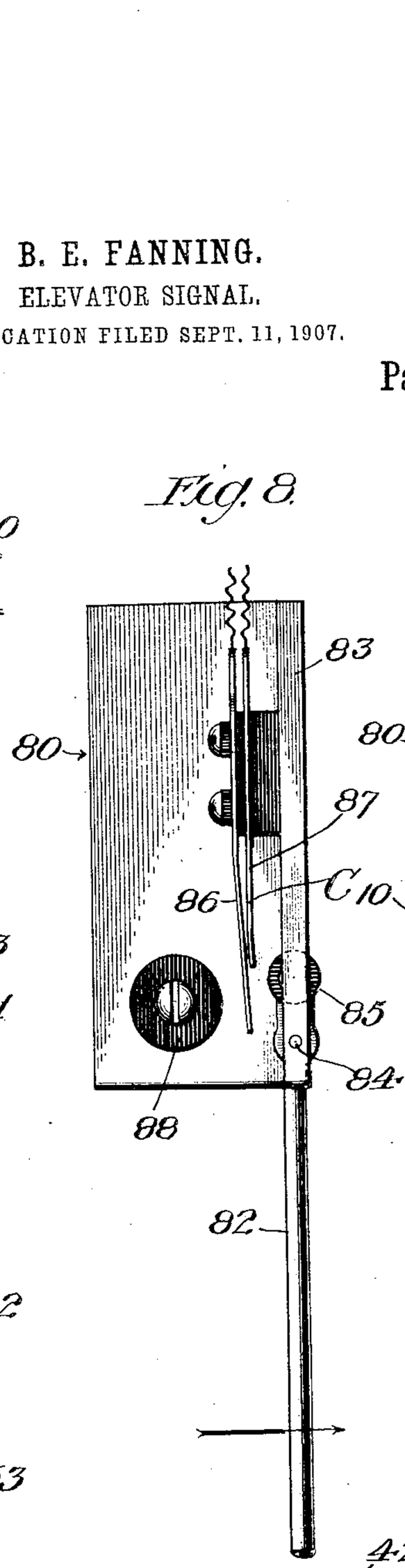


Fig. 9.

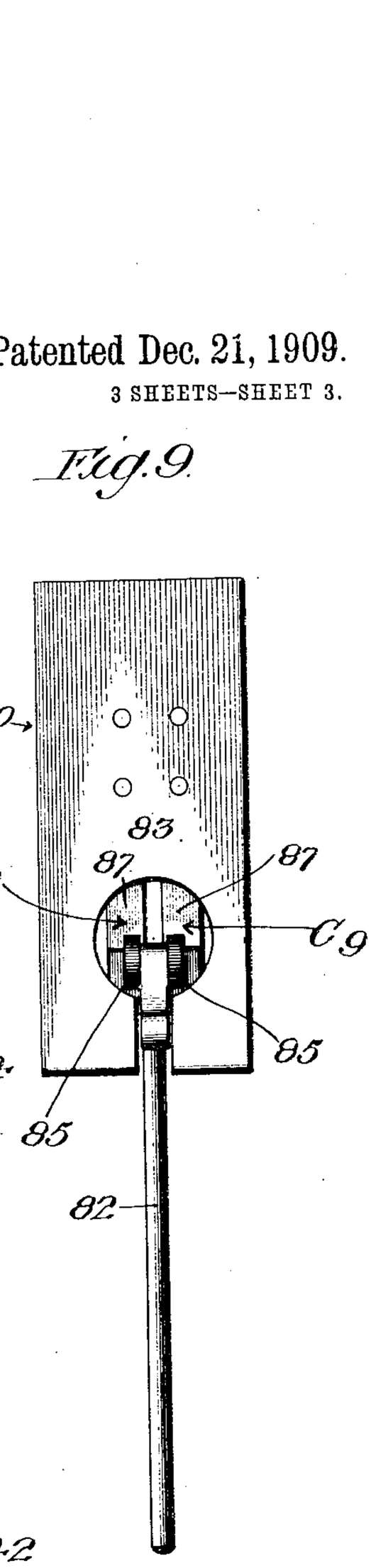
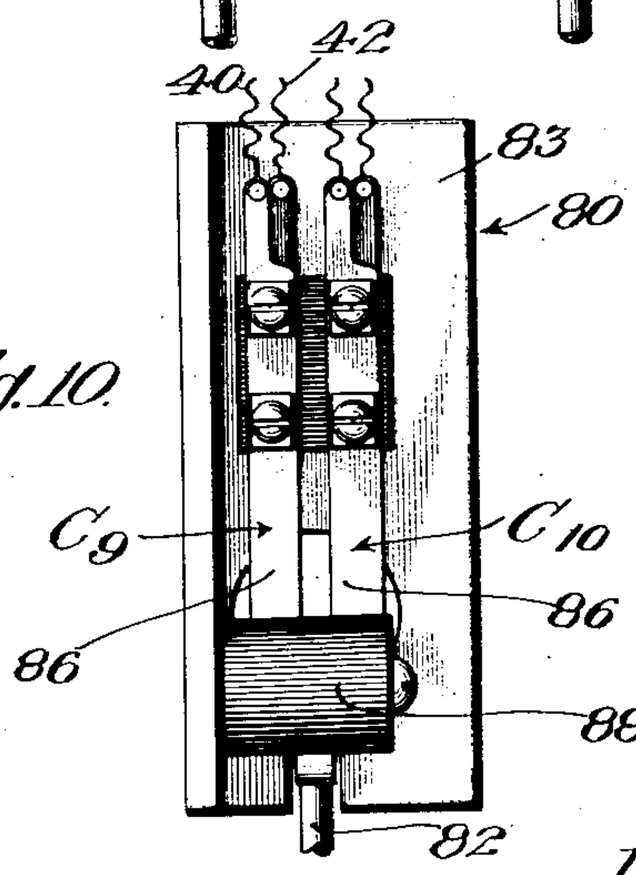


Fig. 10.



Witnesses:

Inventor:
Burton E. Fanning

by Hazard & Strause.

Attorneys

UNITED STATES PATENT OFFICE.

BURTON E. FANNING, OF LOS ANGELES, CALIFORNIA.

ELEVATOR-SIGNAL.

943,924. Specification of Letters Patent. **Patented Dec. 21, 1909.**

Application filed September 11, 1907. Serial No. 392,285.

To all whom it may concern:

Be it known that I, BURTON E. FANNING, a citizen of the United States, residing at Los Angeles, county of Los Angeles, State of California, have invented new and useful Improvements in Elevator-Signals, of which the following is a specification.

My invention relates to a signal system adapted for use on passenger elevators such as are used in office buildings and the like and the prime object thereof is to provide a system which will immediately notify the operators in all the elevator cages of any intending passenger, the floor he is waiting on and the direction in which he wishes to be taken.

A further object is to provide a system in which the signals given to the elevator operators by an intending passenger are immediately retracted when any one of the operators answers the call.

In furtherance of the last named object it is an object to provide mechanism whereby only an elevator going in the direction which the intending passenger has indicated as the direction in which he wishes to go can retract the signals given by such passenger; and it is also an object to provide mechanism whereby the intending passenger must be given ample opportunity to enter a car going in the direction which he has indicated before the signals can be removed.

A further object is to provide a series circuit for the different signals so that all the signals will be operated simultaneously in a system which is economical in operation and initial construction.

A further object is to provide such a system in a simple and economical form with a minimum of flexible cables leading to the cages and with a minimum of wiring connections to the different parts of the system.

A further object is to provide simple and efficient mechanism to accomplish the mechanical operations which are necessary to the operation of the system.

Lastly an object is to provide such a system which may be applied to any number of elevator cages operating in a building of any number of floors.

I accomplish these objects by means of the device described herein and illustrated in the accompanying drawings, in which:—

Figure 1.—is a diagrammatic view of my complete system for a building of four floors and three elevator cages. Fig. 2.—is an end elevation of the reversing device located at the top of each elevator shaft. Fig. 3.—is a side elevation of the same. Fig. 4.—is a cross section taken on line 4—4 of Fig. 3. Fig. 5.—is a longitudinal section of the reversing device. Fig. 6.—is a section taken on line 6—6 of Fig. 5 and showing the clutch mechanism of the reversing device. Fig. 7.—is a sectional view of one of the elevator shafts showing the disposition of the mechanism connected to the elevator cage and the shaft doors. Figs. 8, 9 and 10 are side elevations of one of the door switches with the casing removed.

Referring to the drawings 20 designates a dynamo or other source of electrical energy which is adapted to supply current to the system about to be described. Located on each floor at some convenient point are signal push buttons. A^1, B^1 and C^1; B^2, C^2, and D^2, the buttons designated by A^1, B^1 and C^1 being the "up" buttons and the buttons designated by B^2, C^2 and D^2 being the "down" buttons. This system of lettering will be carried out for those parts of the device which have to do with the different floors; the floors will be lettered A, B, C, D, the "up" devices will be numbered with an uneven suffix and the "down" devices will be numbered with even suffixes.

In each of the elevator cages are signals A^3, B^3, B^4, etc. The appropriate ones of which are designated in the cage as "up" and "down" and which connect to corresponding "up" and "down" push buttons for the different floors as will be hereinafter described. Attached to each of the shaft doors, as shown more clearly in Fig. 7, are switches A^8, A^{11}, A^{18}, etc., which are connected in the corresponding "up" and "down" circuits to the push buttons and signals for each floor. At the top of each shaft is mounted a series of switches A^{15}, A^{17}, A^{18}, etc., and B^{16}, B^{18}, B^{20}, etc. These are switches which control the "up" and "down" circuits and render it impossible for any but a car going in the proper direction to throw off a signal. Located at any convenient place are relays A^{21}, B^{21}, C^{21}, and B^{22}, C^{22} and D^{22}, which connect with the corresponding "up" and "down" buttons for the different floors.

As the connections and operations of all the signals are precisely similar to each other a detailed explanation of one signal and circuit will suffice for all. For the purposes of

explanation I will take button C^1 which is the "up" button on the third floor. Wires 30 and 31 lead from this button to the relays and connect with relay C^{21} which belongs to this particular push button. Wire 30 is connected directly to the winding of the relay, the other side of the winding leading off through wire 32 to connect to wire 33. Wire 33 passes through door switch C^{13} which is the "up" switch on the third floor door. Wire 34 leads from the other side of the switch and connects with wire 35 which leads to signal C^7 the "up" signal for the third floor in the elevator cage. I have shown this signal as a miniature electric light and such may be preferably used, but any approved form, such as an annunciator, may be used in its stead and be equally efficient. A wire 36 leading from signal C^7 connects with feed wire 37 which leads directly to dynamo 20. This completes the circuit on one side from push button C^1 to the source of energy. On the other side the circuit is as follows:—Wire 31 which leads to relay 21 before referred to, is connected by a branch wire 38 directly to signal C^5 which is the "up" signal for the third floor in another of the elevator cages. Wire 39 leading from the other side of signal C^5 leads to door switch C^{11} from which a wire 41 leads and connects directly to wire 40 leading directly to door switch C^9. These two door switches, C^9 and C^{11} are the "up" switches on the third floor doors of the other two elevator shafts. A wire 42 leads from the other side of switch C^9 directly to signal C^3 which is the "up" signal for the third floor in the remaining elevator cage. A wire 43 connects signal C^3 with feed wire 44 which passes back to dynamo 20.

Through the above described circuit it will be manifest that when push button C^1 is closed the "up" signals in all the cages for the third floor will be operated in series with each other. With the apparatus as so far described the signals would be immediately extinguished upon the release of push button C^1. To hold these signals on I have provided the relays above referred to and which operate in the following manner:—The winding of relay C^{21} is connected directly in series with the push button and the signals as before described. Upon the closure of this series circuit the relay is energized to attract its armature 45 to which wire 31 leading from push button C^1 is directly connected. A contact 46 is connected to wire 30 which also leads from the push button and with which contact armature 45 is adapted to engage upon the energization of the relay. Thus it will be seen that immediately after the depression of the push button the relay will be energized to form a shunt across the circuit leading to the push button and the current flowing through the signals will thereupon flow through this shunt, the relay still being in the circuit, the push button alone being cut out. The signals will then continue to be operated indefinitely or until the circuit through them is broken. To open this circuit is the function of the door switches, and in this particular case of switches C^9, C^{11} and C^{13}, which are connected all in series with the signals as above set forth. Upon the opening of any one of these particular switches it will be manifest that the circuit through the signals will be broken and relay C^{21} will resume its normal or open position and thus permanently open the circuit through the signals, when the door switch may again be closed. The normal position of these door switches is a closed one, as illustrated in Fig. 1, so that upon the closure of any push button and corresponding relay there will be a complete circuit to operate the corresponding signals. The door switches are mounted in the elevator shafts at the corresponding doors and are adapted to be opened the instant the door is opened sufficiently to take on a passenger. The mechanical explanation of one of the switches will follow later in this description, the electrical explanation of the same being sufficient for the present.

With the apparatus as so far described it will be manifest that a passenger may give to all the elevator operators a signal indicating the floor at which he is waiting and the direction in which he wishes to be taken. Any operator who opens the door at which the intending passenger is waiting would then extinguish the signal whether he were going in the direction in which the passenger wished to go, or in the other direction. To render it impossible for any but a car going in the intended direction to open the circuit I have provided a series of switches at the top of each elevator shaft which are operated according to the direction in which the respective cages are running. Taking the switches which apply to the particular supposition in hand, switch C^{19} will be noted to be connected directly across wires 33 and 34 which lead to door switch C^{13}. This connection places switches C^{19} and C^{13} in multiple in the series circuit leading through the before mentioned signals and it will be manifest that to open this circuit both of these switches must be open. Switch C^{17} is similarly connected in parallel with door switch C^{11} and switch C^{15} in parallel with door switch C^9.

As will be mechanically explained hereinafter, the "up" switches at the top of the shaft on the reversing device are open when the cage belonging to that shaft is traveling upwardly, the "down" switches being closed. Upon the downward movement of the cage the opposite conditions take place,

the "down" switches being open and the "up" switches being closed. In Fig. 1, I have shown the apparatus in a position indicating that the left hand cage is traveling downwardly and the two right hand cages traveling upwardly. Thus switch C^{15} is shown closed and switches C^{17} and C^{19} are shown open. It will be manifest that door switch C^{9} may be opened and have no effect on the signals which will continue in operation as the circuit is still closed through switch C^{15} which is connected in parallel with switch C^{9}. Upon the opening of either of switches C^{11} or C^{13} the circuit will be opened as switches C^{17} and C^{19} are both open, and relay C^{21} will consequently be deenergized. This operation will extinguish the signals which have been operated by the closure of push button C^{1} and will notify all the other operators that one of their number has answered the signal and taken on the passenger who was waiting on the floor to be taken upwardly.

From the foregoing description it will be observed that with the aid of mechanical devices to accomplish the operations set forth I am enabled to provide an elevator signal system which will accomplish the objects as set forth at the beginning of this specification.

The reversing device which operates at the upper end of each of the elevator shafts will first be described. Referring first to Fig. 7, 50 designates the reversing device which is mounted in any suitable manner preferably at the upper end of elevator shaft 51. Cage 52 which operates in shaft 51 has a cable 53 attached to its roof which passes over reversing device 50 and thence downwardly to a pulley 54 mounted in the bottom of the shaft and thence upwardly to be secured to the floor of the cage. Thus it will be manifest that wheel 55 of the device (see Fig. 2) will be rotated in one direction, say in the direction indicated by the arrows in Figs. 2 and 4, when the cage is passing upwardly and in the opposite direction when the cage is passing downwardly. This alternating movement of wheel 55 is utilized to open and close switches A^{15}, B^{15}, C^{15}, etc., and as each of the devices are identical with each other only one will be described say the left hand one in Fig. 1. Reversing device 50 consists preferably of a base 56 which is suitably constructed with bearings 57 for the journaling of shafts 58 and 59. Shaft 58 carries wheel 55 over which cable 53 passes and which is mounted so as to turn loosely on the shaft. Wheel 55 is provided with a clutch member 60 adapted to engage with a second clutch member 61 rigidly mounted on shaft 58. As shown in Fig. 6 each of these clutch members has three quarters of its engaging face cut away leaving lugs which are only ninety degrees in extent. Thus it will be manifest that wheel 55 must rotate through a complete half revolution after reversal before shaft 58 will be rotated. Shaft 58 is provided with an enlarged portion 62 against which friction rollers 63 mounted in frame 64 and held in position by coiled spring 65 are adapted to press. Frame 64 is loosely mounted on shaft 58 but rigidly secured to shaft 59 by means of a set screw 66.

By the means above described a frictional connection is set up between shafts 58 and 59 and shaft 59 will therefore be rotated with shaft 58 so long as no positive stop is offered to its rotation. On the outer end of shaft 59 is mounted an insulating sleeve 67 which carries a number of projecting screws 68. Mounted on bearing 57 are switches A^{15}, B^{15} and C^{15} on one side of sleeve 67 and B^{16}, C^{16}, and D^{16} on the other side of the sleeve. As shown in Figs. 3 and 5 these switches are mounted opposite screws 68 so that upon the rotation of shaft 59 the screws will come in contact with one set of switches and close the circuit through the same as will be obvious from Fig. 2. As shown in that figure the normal position of these switches is open so that if wheel 55 rotates in the direction shown by the arrow when the elevator cage is moving upwardly, the contacts on the right will be the "up" contacts as they are left open by such a rotation of the device, and the contacts on the left will be the "down" contacts. Thus if the device is rotating in the direction shown by the arrow screws 68 will be forced into engagement with switches B^{16}, C^{16} and D^{16} and close the same. To prevent any excessive movement of the screws which might injure the switches or cause the screws to pass completely by them a short chain 69 is secured to frame 64 and also to base 56 as shown in Figs. 2 and 3 which is of just sufficient length to permit the rotation of the device to close the switches on either side, depending on which direction the cage is traveling. The object of permitting wheel 55 to rotate through a half revolution before operating the switches is to allow sufficient latitude for the operators passing a floor and then returning to the same to accommodate a passenger. Wheel 55 is thus made of a proper diameter so that a distance equal to one half of its circumference is equal to or slightly greater than the latitude allowed the operators in running by a floor and returning. Thus on the upward passage of a cage the "up" switches are kept continually open even if that cage should run downwardly for a short distance, and an upwardly moving car is prevented from throwing off a "down" signal.

Referring again to Fig. 7, 80 designates the door switches, one of which is mounted in each elevator shaft above each door. The

elevator doors are each provided with pins 81 adapted to contact with pendent arms 82 and move those arms in the direction indicated by the arrow on Fig. 8 upon either the opening or the closing of the elevator door. One of the switches is shown in detail in Figs. 8, 9 and 10 and the connections will be described as for switch C^9, which has hereinbefore been completely described electrically, and for its companion switch C^{10}, which is the "down" switch on the third floor. These switches are mounted on a base plate 83, being insulated therefrom and from each other. Wires 40 and 42 as before set forth, lead away from switch C^9 to the other parts of the system, similar wires leading away from switch C^{10}, as shown. As illustrated in Fig. 8 both the switches are normally closed. Arm 82 pivoted at 84 to base plate 83 and hanging normally in the position shown is provided on its upper end with two contact rollers 85 of insulating material. Upon the movement of the lower end of rod 82 to the right in Fig. 8 contact rollers 85 are pressed into engagement with members 86 of the switches and the said members are forced away from members 87, thus opening the circuit. An insulating block 88 is provided behind members 86 to limit the movement of the same so that they may not become broken from excessive bending. The switch described is a typical one, being the equipment for one of the interior floors of the building. For the top or bottom floor it is obvious that only one switch is needed as there need be no "up" switch for the top floor and no "down" switch for the bottom floor. With this exception the door switches are all duplicates of one another.

From the foregoing description of one of the circuits in particular a general idea of the whole system may be grasped. The connections for each and every one of the signals and corresponding buttons are exactly similar to the one described in detail and the operations are exactly the same. As specifically described for one set of signals, the corresponding signals in all the cars are connected in series with each other and with an appropriate push button and the source of electrical energy. Also connected in series in this circuit are two sets of switches, one set on the shaft doors and normally closed, the other set being open or closed according to the direction of movement of the car, the two sets of switches being connected in parallel with each other but both in series with the main circuit.

It will be observed that I have provided a signal system for elevators which accomplishes all the purposes and objects of the usual signal system in that it notifies the operator of the floor on which an intending passenger is waiting and for the direction in which he wishes to be taken. Further it provides means whereby the signals may only be thrown off when such intending passenger has been given ample opportunity to take the car going in the direction which he wishes. Thus every operator is again immediately notified upon any call being answered and any double answering of a call is obviated. As a result of this second notification the operators are continually informed of the amount of business to be handled and thus only a sufficient number of elevators need be kept running to handle that amount of business. Thus a saving is made in the cost of elevator operation as the full elevator force need only be run during the busy hours of the day.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In an elevator signal system, a source of electrical energy, an elevator signal, a push button and a normally closed switch connected in series with each other and with said source of electrical energy; and means to automatically open said switch when said signal is answered.

2. In an elevator signal system, a source of electrical energy, a signal, a push button and a normally closed switch connected in series with each other; a relay adapted to form a shunt around said push button; and means to open said normally closed switch upon the opening of the elevator door at the floor indicated by said signal.

3. In an elevator signal system, a source of electrical energy, a signal, a push button and a normally closed switch connected in series with each other; a relay adapted to form a shunt around said push button upon the closure of the circuit therethrough; and a second switch connected in parallel with said normally closed switch, said second switch adapted to be opened and closed by the up and down operation of the elevator cage.

4. In an elevator signal system, a source of electrical energy, a signal, a push button and a normally closed switch connected in series with each other, said switch adapted to be opened when the elevator door corresponding to said signal is opened; a relay adapted to form a shunt around said push button upon the closure of the circuit therethrough; and a second switch connected in parallel with said normally closed switch, said last named switch adapted to be opened and closed by the vertical movements of an elevator cage.

5. In an elevator signal system, a source of electrical energy; an elevator signal, a push button, and a normally closed switch connected in series with each other and with said source of electrical energy; a relay adapted to form a shunt around said push

button; and means to automatically open said switch when the signal is answered.

6. In an elevator signal system, a source of electrical energy; an elevator signal, a normally open push button, and a normally closed switch connected in series with each other and with said source of electrical energy; a relay adapted to form a shunt around said push button; and means to automatically open said switch when the signal is answered.

7. In an elevator signal system, a source of electrical energy; an elevator signal, a manually operated normally open switch, and a normally closed switch connected in series with each other and with the source of electrical energy; and means to automatically open said closed switch when the signal is answered.

8. In an elevator signal system, a source of electrical energy; an elevator signal, a normally open circuit closing means, and a normally closed circuit opening means connected in series with each other and with said source of electrical energy; means to form a shunt around the normally open circuit closing means; and means to automatically open said closed switch when the signal is answered.

9. In an elevator signal system, a source of electrical energy; an elevator signal, a normally open circuit closing means, and a normally closed circuit opening means connected in series with each other and with said source of electrical energy; means actuated by the closure of said circuit to form a relay around said normally open circuit closing means; and means to automatically open said closed switch when the signal is answered.

In witness that I claim the foregoing I have hereunto subscribed my name this 31st day of August, 1907.

BURTON E. FANNING.

Witnesses:
EDMUND A. STRAUSE,
OLLIE PALMER.