No. 752,659.

PATENTED FEB. 23, 1904.

W. N. DICKINSON, Jr.

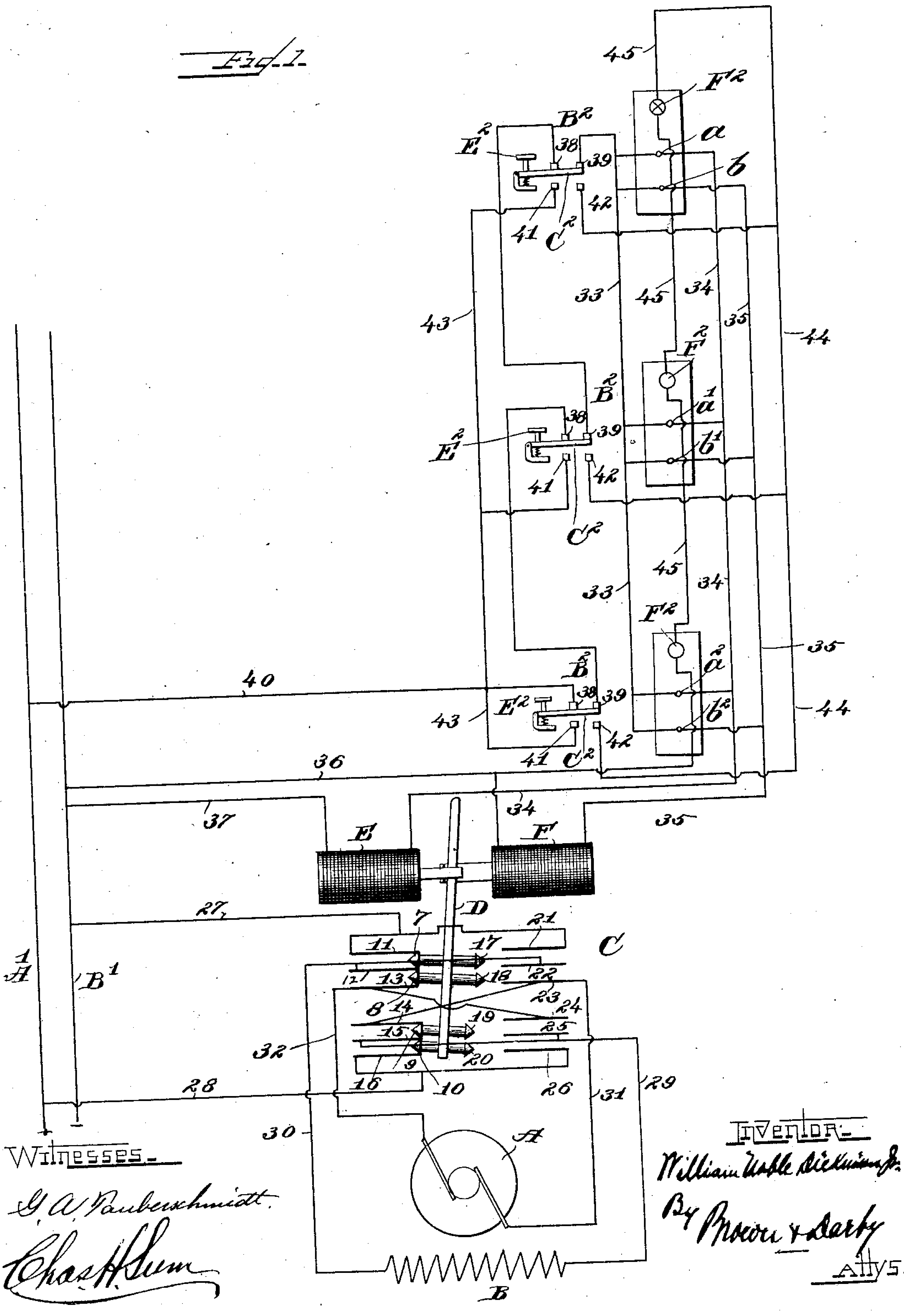
SAFETY AND SIGNALING DEVICE FOR HOISTING MECHANISMS.

APPLICATION FILED JAN. 4, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



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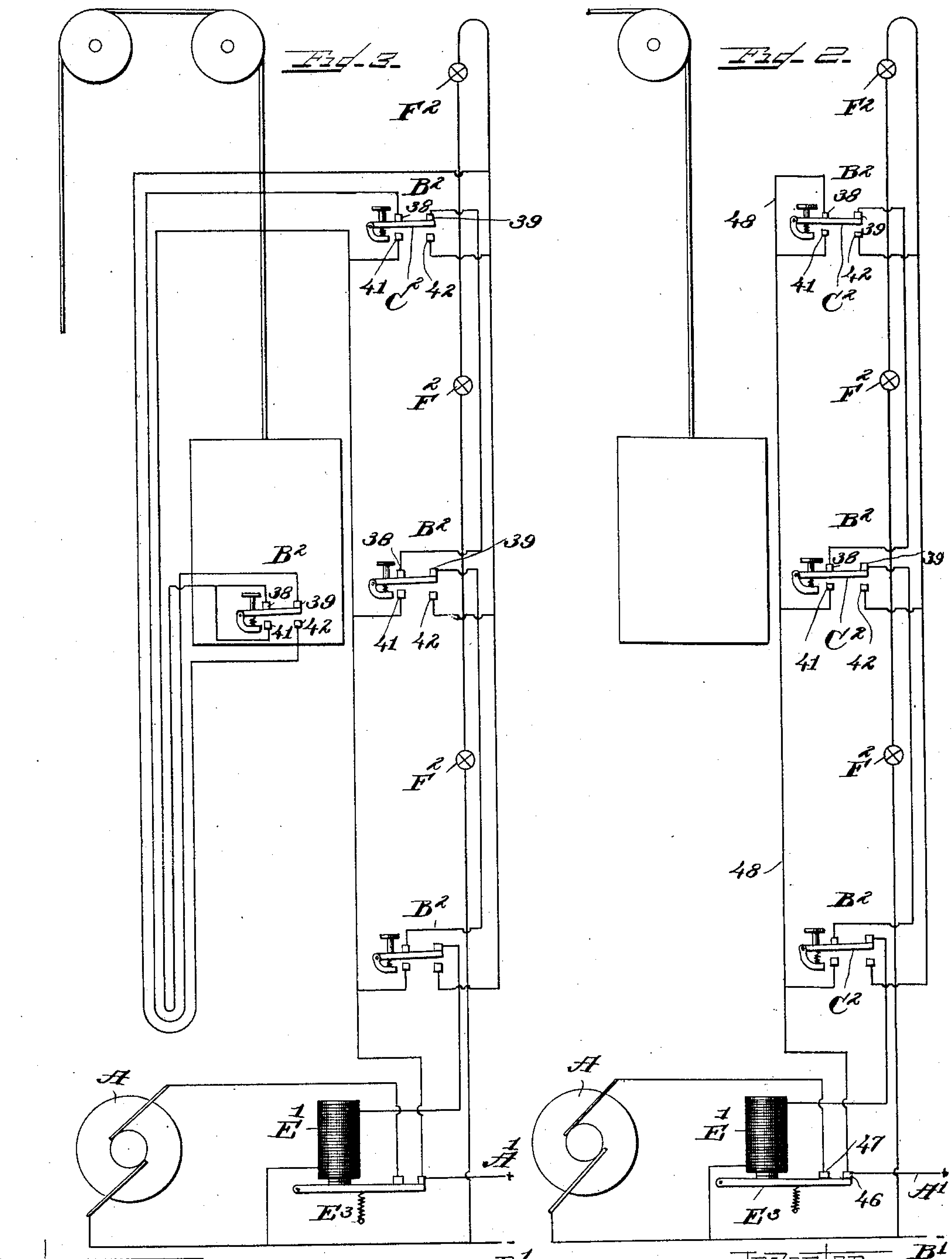
NO MODEL. 3 SHEETS—SHEET 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

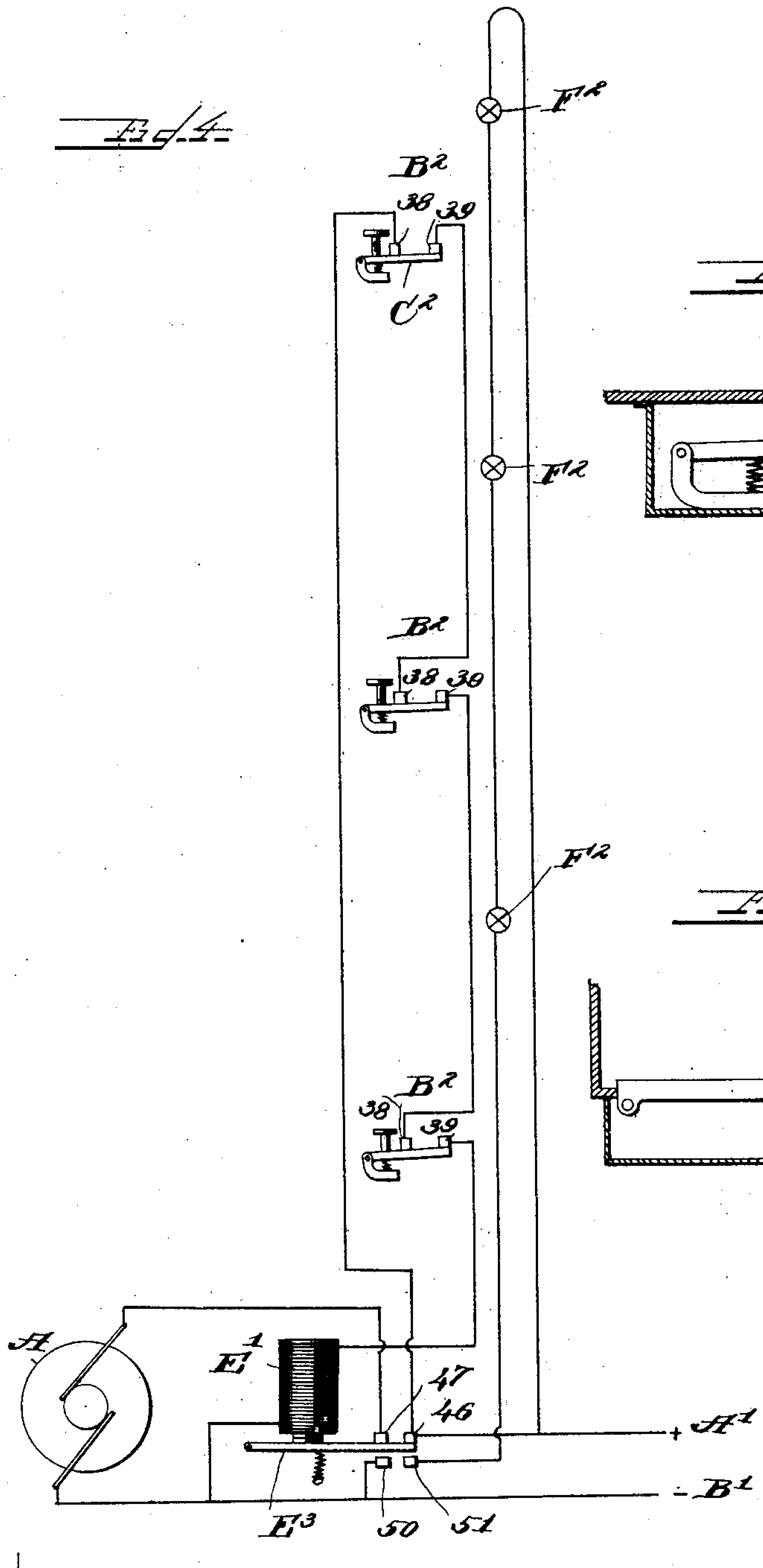


Fig. 5.

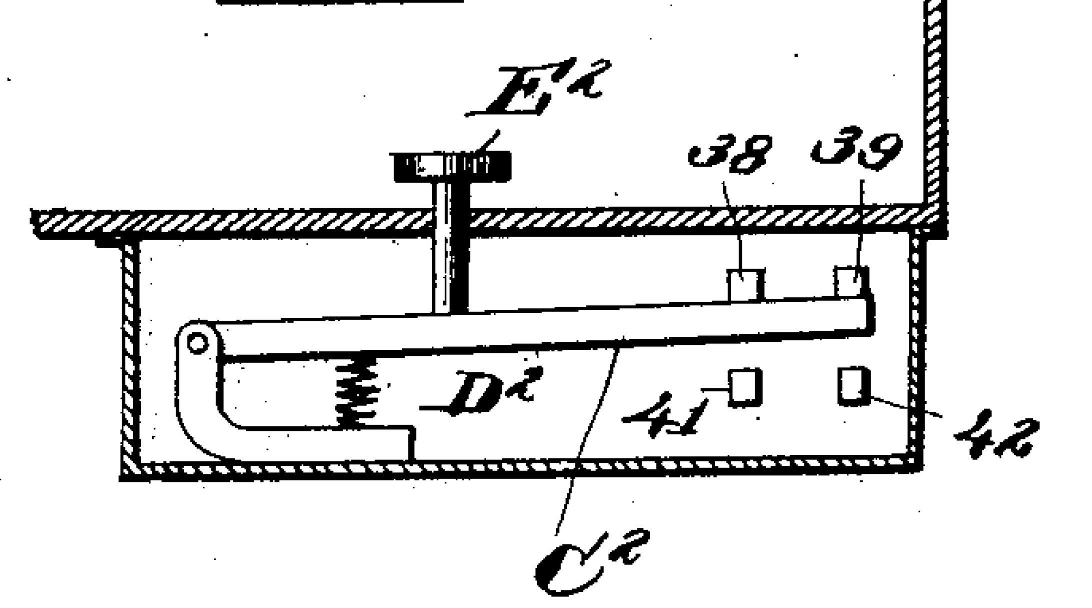
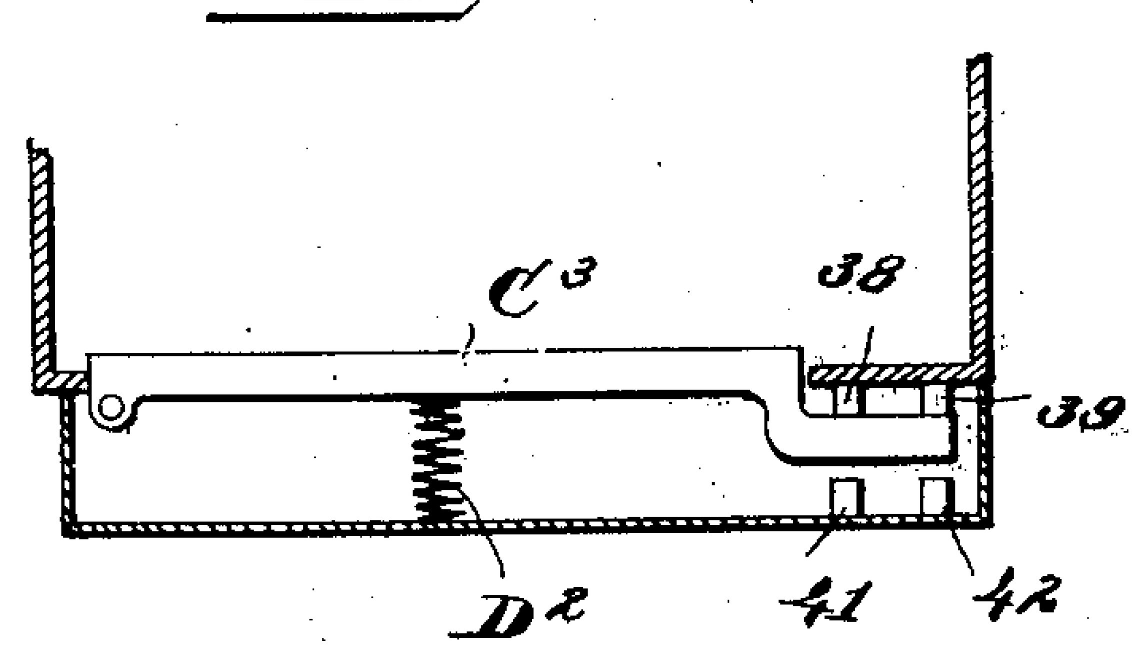


Fig. 6.



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No. 752,659. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM NOBLE DICKINSON, JR., OF CHICAGO, ILLINOIS, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SAFETY AND SIGNALING DEVICE FOR HOISTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 752,659, dated February 23, 1904.

Application filed January 4, 1902. Serial No. 88,381. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM NOBLE DICKINSON, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Safety and Signaling Device for Hoisting Mechanism, of which the following is a specification.

This invention relates to safety and signaling devices for hoisting mechanism.

The object of the invention is to provide means which are simple and efficient for rendering the hoisting-motor of elevating apparatus inoperative while the car or cage is standing at a floor and is being loaded or unloaded.

A further object of the invention is to provide means which are simple and efficient for signaling to each floor at which the car is to stop the fact that the car is busy at any particular floor being loaded or unloaded.

A further object of the invention is to provide means which are simple and efficient, whereby the safety and signaling apparatus may be actuated by the foot, knee, or other portion of the body, while the hands may be engaged in the work of loading or unloading the car or otherwise.

A further object of the invention is to provide a safety and signaling apparatus of simple and efficient construction and arrangement, which may be operated from any floor or from the car.

Other objects of the invention will appear more fully hereinafter.

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 diagram, showing an arrangement of safety and signaling apparatus and circuit connections therefor embodying the principles of my invention. Fig. 2 is a similar view showing a modified arrangement, the motor-control switch and its circuits being omitted. Fig. 3 is a view similar to Fig. 2, showing the application of the invention to the car or cage as well as to the various floors. Fig. 4 is a view similar to Figs. 2 and 3, showing another modified arrangement embodying the principles of the invention. Fig. 5 is a detail sectional view, on a larger scale, showing one form of means for operating the safety and signaling switches and embodying the principles of my invention. Fig. 6 is a view similar to Fig. 5, showing a modified means for operating the safety and signaling switches.

In the operation of hoisting mechanism, and particularly hoisting mechanism of the dumb-waiter type, it is desirable to provide safety and signaling devices whereby when a loaded car or cage arrives at a door or landing where it is to be unloaded and while being unloaded the hoisting-motor is rendered inoperative, thereby preventing the car or cage from being moved from the door or floor at which it has been arrested during the loading or unloading operation thereof. It is also desirable to provide means whereby the fact that a car is being loaded or unloaded at any particular floor or landing may be signaled to each other floor or landing from which the car is controllable, so as to avoid the danger of accident by starting the car before the loading or unloading operations are completed at the particular floor at which the car is in use. During the loading and unloading operations it frequently happens that the attendant is employing both hands, thereby rendering it difficult for the safety or signaling apparatus to be operated with the hands. Therefore it is desirable to provide safety and signaling apparatus which may be operated by the foot, knee, or other convenient portion of the body. It sometimes happens that an attendant after completing the loading or unloading of the cage or car at any particular floor and while the safety and signaling apparatus remains in condition for rendering the hoisting-motor inoperative negligently leaves the car without again releasing the safety and signaling mechanism, thereby rendering it impossible for the car to be moved through the operation of controlling means located at any other landing or floor controlling-point. It is desirable, therefore, to provide a safety and signaling mechanism which will remain set, so as to render the hoisting-motor inoperative and so as to signal such fact to all the controlling-points from which the movements of the car may be controlled only so long as the attendant remains adjacent to the car or cage and which will operate to be released automatically when the attendant leaves the car or cage or doorway at which the car has been arrested.

It is the special purpose of my present invention to provide a safety and signaling apparatus embodying these general principles and accomplishing these desirable objects.

I have shown and will now describe my invention as applied to hoisting mechanism of the dumb-waiter type, which is controlled through a system of push-buttons from any floor or landing; but I do not desire to be limited in the application of the principles of my invention to a hoisting mechanism of this type nor specifically to a push-button-control system, as it will be obvious that the principles of my invention may be applied to hoisting mechanism of other types and to other systems of control.

In Fig. 1 I have shown in diagram an application of the principles of my invention to an elevator hoisting and control mechanism employing a push-button system and which will now be described. Reference-sign A designates the hoisting-motor armature, and B the hoisting-motor field. C designates generally the hoisting-motor-control switch and which includes a switch-arm D, arranged to be moved or shifted in opposite directions by means of solenoids or magnets E F, so that when solenoid or magnet E is energized the switch-arm D is operated in one direction and when solenoid F is energized said switch-arm is operated in the opposite direction. The switch-arm carries circuit-making contacts 7, 8, 9, and 10, respectively coöperating with contact points or strips 11, 12, 13, 14, 15, and 16 when said switch-arm is moved in one direction, and said arm carries contacts 17, 18, 19, and 20, respectively coöperating with contact points or strips 21, 22, 23, 24, 25, and 26 when said switch-arm is moved in the opposite direction. A′ and B′ designate, respectively, the main positive and negative supply-wires. The contact-strips 11 and 21 are in electrical connection with each other and also with the main return or negative supply-wire B′ through wire connection 27. The contact-strips 16 and 26 are in electrical connection with each other and also with the main supply-wire A′ through connection 28. Contact-strips 15 and 25 are in electrical connection with each other and through wire 29 with one terminal of the motor field-coils B. Contact-strips 12 and 22 are in electrical connection with each other and also through wire 30 with the other terminal of the field-winding of the motor. Contact-strips 14 and 23 are in electrical connection with each other and also through wire 31 with one of the armature-brushes. Contact-strips 13 and 24 are in electrical connection with each other and also through wire 32 with the other brush of the motor. When the switch-arm D is operated in one direction, contacts 7 and 8 close circuit between contact-strips 11, 12, and 13 and contacts 9 and 10 close circuit between contacts 14 and 15 and 16. Similarly when the switch-arm is operated in the other direction contacts 17 and 18 close circuit between contact-strips 21, 22, and 23 and contacts 19 and 20 close circuit between strips 24, 25, and 26. Assuming the switch-arm D to be actuated in one direction, or to the left, for instance, as shown in Fig. 1, then the motor-circuits are completed as follows: from main supply-wire A′, through wire 28, contact-strip 16, contact 10, to strip 15, where the current divides, part proceeding through contact 9, strip 14, strip 23, wire 31, the motor-armature, wire 32, strip 13, contact 8, contact 7, contact 11, and wire 27, to the negative wire B′. The other part of the current proceeds from contact-strip 15, contact 25, through wire 29, motor-field B, wire 30, strip 12, contact 7, strip 11, wire 27, to the negative wire B′, thus operating the motor in one direction. When the switch-arm D is operated or moved in the other direction, the motor-circuits are completed as follows: from main supply-wire A′, wire 28, strip 26, contact 20, strip 25, where the current divides, part continuing through contact 19, strip 24, strip 13, wire 32, the motor-armature, wire 31, strip 23, contact 18, strip 22, contact 17, strip 21, wire 27, to the return-wire B′. The other part of the current continues from strip 25 through wire 29, motor field-winding B, wire 30, strip 12, strip 22, contact 17, strip 21, wire 27, to return-wire B′, thus operating the motor in the opposite direction. The motor-controller above described in the specific details of construction and arrangement thereof, however, forms no part of my present invention and may be varied as desired and in any well-known manner without affecting the scope of my invention, which relates only to the safety and signaling apparatus, presently to be described. I have shown and described a motor-controller, however, in connection with Fig. 1, which answers the purpose. In Figs. 2, 3, and 4 I have omitted illustrations of the motor-controller and have only shown the application of my safety and signaling device. At each floor or landing or point from which the hoisting mechanism may be controlled in the arrangement shown in Fig. 1 I place contacts, through which the circuits of solenoids or magnets E F are controlled. In the case of a push-button-control system I arrange at each landing two or more push-buttons—for instance, one push-button controlling the circuit of solenoid or magnet E and another push-button controlling the circuit of solenoid or magnet F. These push-buttons are designated by reference-sign $a\ a'\ a^2$ and $b\ b'\ b^2$, a pair of such push-buttons being arranged at each landing. Each push-button $a\ a'\ a^2$ controls the circuit of solenoid or magnet E, and consequently controls the movement of the car in one direction, and each of the push-buttons $b\ b'\ b^2$ controls the circuit of magnet or solenoid F, and hence controls the movement of the car in the other direction. I have not shown a complete push-button system of control wherein the hoisting-motor is so controlled and governed from each floor or landing as to be capable of automatically arresting the car when it reaches any predetermined floor, as the push-button system or its particular arrangement does not in itself constitute my invention, and my invention may be equally well applied to any other form or arrangement of push-button-control system. All of the sets of push-buttons, however, are designed to be coupled up in multiple or in parallel between wires 33 and 34 and 35. For instance, in the particular form shown all the push-buttons $a\ a'\ a^2$ are in multiple with wires 33 and 34 and all the push-buttons $b\ b'\ b^2$ are in multiple with wires 33 and 35. The wire 35 is in circuit with the windings of magnet or solenoid F and thence through wire 36 to the return-wire B′. The wire 34 is in circuit with the windings of magnet or solenoid E and wire 37 to the return-wire B′. Arranged at each landing or floor is an auxiliary switch, designated generally by reference-sign B^2, and each comprising a movable part or member C^2, arranged to normally complete circuit between two contacts 38 and 39, but which may be moved or shifted in any suitable manner to break circuit between said contacts 38 and 39. The several auxiliary switches B^2, which I will call "floor-switches," are included in circuit with each other and with wire 33. Therefore when any one of the push-buttons $a\ a'\ a^2$ or $b\ b'\ b^2$ is manipulated circuit is completed as follows: from main supply-wire A′, through wire 40, contact 38, movable member C^2 to contact 39 of the lowermost or other convenient auxiliary switch B^2, thence through each succeeding auxiliary switch in series to wire 33, thence (supposing push-button a' to have been manipulated) from wire 33, push-button a', wire 34, windings of magnet or solenoid E, wire 37, to return-wire B′, thus effecting an actuation of the motor-switch arm D in a direction to operate the motor in one direction or the other, according to the circuit connections controlled by the switch-arm.

From the foregoing description it will be seen that if any one of the auxiliary switches B^2 is opened the circuits of all the push-buttons, and hence of the motor-controller, are broken, and the motor will be out of commission. Therefore in accordance with the principles of my invention I purpose to arrange an auxiliary or floor switch B^2 at each floor and in convenient position to be manipulated by the foot, knee, or other part of the body of an attendant, so that when a car is standing at a landing and is being loaded or unloaded an attendant may manipulate such auxiliary switch with his foot, knee, or the like or without using his hands, so as to render the motor inoperative to move the car until the auxiliary switch is returned or restored to its normal position, thus enabling the attendant to continue his work of loading or unloading the car or cage without danger of having the car start away while he is so engaged. Any simple or convenient arrangement may be provided for maintaining the auxiliary switches normally closed—such, for instance, as a spring D^2, (see Figs. 5 and 6,)—and the movable member of the auxiliary switch may be actuated in any suitable or convenient manner—as, for instance, by means of a push-button, (indicated at E^2.) The auxiliary switches may be conveniently located in a box or casing underneath the floor or in the wall adjacent to a doorway or landing of an elevator shaft or well, as clearly illustrated in Fig. 5, with the button E^2 projecting above the floor or outside of the wall or casing, so as to be depressed with the foot, knee, or other convenient part of the body of the attendant. It is obvious that the movable part of the safety or floor switch E^2 may be actuated in any other suitable or convenient manner. For instance, as shown in Fig. 6, the movable part C^2 of the safety or floor switch may be arranged as a part of the floor, as in the form of a hinged plate C^3, which will be depressed by the attendant standing thereon. Many other specific forms would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited in respect of the construction or the particular location or arrangement of the floor-switches. The several floor-switches being in series with each other and also in the circuits of magnets or solenoids E and F and which are controlled by the push-buttons, as above explained, it will be readily seen that when any one of the floor or safety switches is operated the push-button circuit is rendered inoperative, and hence also the motor is arrested, and this condition continues so long as the floor-switch remains open. It will also be seen that the floor-switch is so arranged as to be actuated by the foot, knee, or other convenient part of the body of the attendant, thus leaving him free to use his hands in the work of loading or unloading the car. It will also be seen that when the attendant leaves his position the floor or safety switch which he had before actuated is restored to its normal or closed position, thereby again completing the motor magnet or solenoid circuits to the push-buttons.

It may sometimes be desirable to combine with a system of foot safety arrangement, such as above described, a signaling apparatus by which when the floor or safety switch is actuated at any floor the fact will be signaled to all or any of the floors or landings or other points from which the movements of the car may be controlled, so as to indicate at each floor or controlling-point whether or not the car is in use or is being held at any particular floor purposely. My invention includes such a signaling device and comprises a series of signal devices F^2, which may be in the form of lamps, bells, drops, or other suitable form of signal device, one arranged at each floor or landing or controlling-point, and, if desired, in series with each other, as clearly shown. Any suitable arrangement may be employed for maintaining the signal-circuit normally broken and for closing said signaling-circuit upon the breaking of the safety-device circuit above described. This result may be accomplished in many specifically different ways. For instance, in Fig. 1 I have shown a pair of contacts 41 42 arranged at each floor or landing in position to be abridged whenever the movable part C^2 of the safety-switch is actuated to break circuit between the contact-points 38 39 of the safety-switch circuit, thereby completing the circuit from the main supply-wire A', through wire 40, wire 43, and the particular pair of contacts 41 42, which may be bridged by the opening of the safety-device circuit, as above explained, to wire 44 and which in the particular form shown is arranged to extend throughout the length of the elevator shaft or well and which includes through wire 45 the various signal devices F^2 in series to wire 36 and return supply-wire B'. Thus whenever any one of the safety or floor switches is actuated to break the safety-device circuit the lamp or signal circuit is completed and the signal or alarm given at each or any floor or controlling-point, said signal being maintained so long as the safety-device circuit remains open, and hence notifying all or any of the floors or landings or other controlling-points that the car is in commission and control thereof from any point should not be attempted. It will also be seen that at the moment the safety-switch is released to complete the safety-circuit the signal-circuit will be broken, thereby extinguishing the lights in the case of lamps or otherwise arresting or restoring the signal.

In Fig. 2 I have shown a slightly-modified arrangement wherein the circuit of a magnet E' is controlled, made, or broken by the safety-switches B^2, said circuit being normally closed, thereby normally holding the armature E^3 of said magnet in position to close circuit between contact-points 46 47. The contact-point 46 is included in circuit with the main supply-wire A', the construction of the safety-switch B^2, with its movable part C^2, and contacts 38, 39, 41, and 42 remaining the same as above described. The motor-circuit is closed from main supply-wire A' through contacts 46 47 to the return-wire B'. The construction and arrangement, however, of the motor-controller switch as disclosed in this figure of the drawings is merely illustrative of a means for controlling the circuit of the motor and in the specific arrangement and details thereof forms no part of my present invention. All the floor-switches B^2 are in series with each other and with the main supply-wire A' through wire 48 and also in series with the windings of magnet E' to the return-wire B'. In the same manner all the signal devices F^2 are in series with each other, the circuit of said signaling devices being connected on one side to the negative wire B' and on the other side through the contacts 41 42 and wire 48 with the main supply-wire A'. For convenience of illustration I have not shown the push-button circuits, nor have I shown in this figure the motor-controller circuits for securing the desired reversals.

In Fig. 3 I have shown the arrangement of Fig. 2 as applied to safety devices arranged at each floor and also on the car, the specific construction of safety-device switches and safety and signaling circuits remaining the same as above described, the only difference being that the circuits extend to the car and through the safety-switch located thereon in identically the same manner as through the associated floor-switches.

In Fig. 4 I have shown a slight modification wherein instead of arranging the signaling-device circuit to be opened or closed by the safety-switches at each floor said circuit is arranged to be broken or closed by the armature E^3 of magnet E', auxiliary contacts 50 and 51 being provided and arranged in position to be bridged whenever the circuit of magnet E' is broken—that is, whenever armature E^3 is retracted—one of said contacts, as 50, being connected to the return-wire B' and the other of said contacts, 51, being connected, through the signal devices F^2, to the main supply-wire A'. This affords a simple arrangement for completing the signal-circuit whenever the safety-circuit is broken, for the breaking of the safety-circuit at any of the safety-switches B^2 will result in the armature E^3 of magnet E' being retracted into closed or bridging relation with respect to contacts 50 and 51. In this figure and also in Fig. 3, as in Fig. 2, I have omitted for the sake of clearness of illustration the push-button circuits and the motor-controller.

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

1. In a system of control for elevators, a plurality of movable members respectively located at the different floors or landings, and normally pressed into an operative position, said members being so disposed with relation to the door of the shaft as to be operated by contact with a portion of the person of the operator which is usually unadaptable to the purpose of unloading the car, and electrical connections made by said movable members, and including the motor-controlling mechanism, whereby when any one of said movable members is operated the car is prevented from moving until the member is restored to its normal condition, as and for the purpose set forth.

2. In a system of control for elevators, motor-controlling means, in combination with safety-switches arranged in proper relation with respect to each other and said motor-controlling means, and operating, when actuated, to prevent the starting of the car, said safety-switches including a movable part arranged and adapted to be operated by imposing thereon the weight of the attendant, as and for the purpose set forth.

3. In a system of control for electric elevators, a hoisting-motor, controlling means therefor, circuits for said controlling means, safety-switches arranged in said circuits and including a movable part operating, when actuated, to render said motor inoperative, said safety-switches being normally closed and the movable part thereof arranged to be operated by imposing thereon the weight of the foot, knee or other convenient portion of the body of an attendant and while the hands are otherwise employed, as and for purpose set forth.

4. In a system of control for electric elevators, a hoisting-motor, controlling means therefor, circuits for said controlling means, devices arranged at various controlling-points for controlling said circuits, and safety-switches arranged in said circuits and in series with respect to each other at the various controlling-points and to be operated by the weight of the attendant to open the same, whereby when any one of said safety-switches is actuated said circuits are broken, and means normally operating to maintain said safety-switches closed, as and for the purpose set forth.

5. In a system of control for electric elevators, a hoisting-motor, controlling mechanism therefor, circuits for said controlling mechanism, a floor or safety switch arranged at each landing, said floor or safety switches being in series with each other and included in said circuit and arranged to be operated by the weight of the attendant to open the same, whereby when any one of said switches is operated said circuit is broken, and means for normally closing said safety-switches, as and for the purpose set forth.

6. In a system of control for electric elevators, a hoisting-motor, controlling mechanism therefor, circuits for said controlling mechanism, a safety-switch arranged on the car and in series with said circuit, whereby when said safety-switch is actuated said circuit is broken, said safety-switch arranged to be opened by imposing thereon the weight of the attendant normally maintaining said switch in closed relation with respect to said circuit, as and for the purpose set forth.

7. In a system of control for electric elevators, a hoisting-motor, controlling mechanism therefor, circuits for said controlling mechanism, safety-switches arranged on each floor or landing and also on the car and in series with each other, said switches arranged to control the circuits of said motor-controlling mechanism, whereby when any one of said switches is actuated said motor-controlling circuits are broken, said switches arranged to be operated by a portion of the person of the operator which is usually unadaptable to the purpose of unloading the car, and means normally operating to maintain said switches closed, as and for the purpose set forth.

8. In a system of control for electric elevators, a hoisting-motor, controlling mechanism therefor, circuits for said controlling mechanism, push-buttons for controlling said circuits, and a normally closed safety-switch also controlling said motor-controlling circuits, said safety-switch being arranged to be operated by the weight of the attendant and arranged as and for the purpose set forth.

9. In a system of control for electric elevators, a hoisting-motor, controlling mechanism therefor, circuits for said controlling mechanism, push-buttons arranged at each floor or landing for controlling said circuits, and a normally closed safety-switch also arranged at each floor or landing and adapted to be opened by imposing thereon the weight of the foot, knee or other convenient portion of the body, said switches also controlling said circuits, as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 31st day of December, 1901, in the presence of the subscribing witnesses.

WILLIAM NOBLE DICKINSON, Jr.

Witnesses:
C. H. Seem,
S. E. Darby.