

No. 850,618.

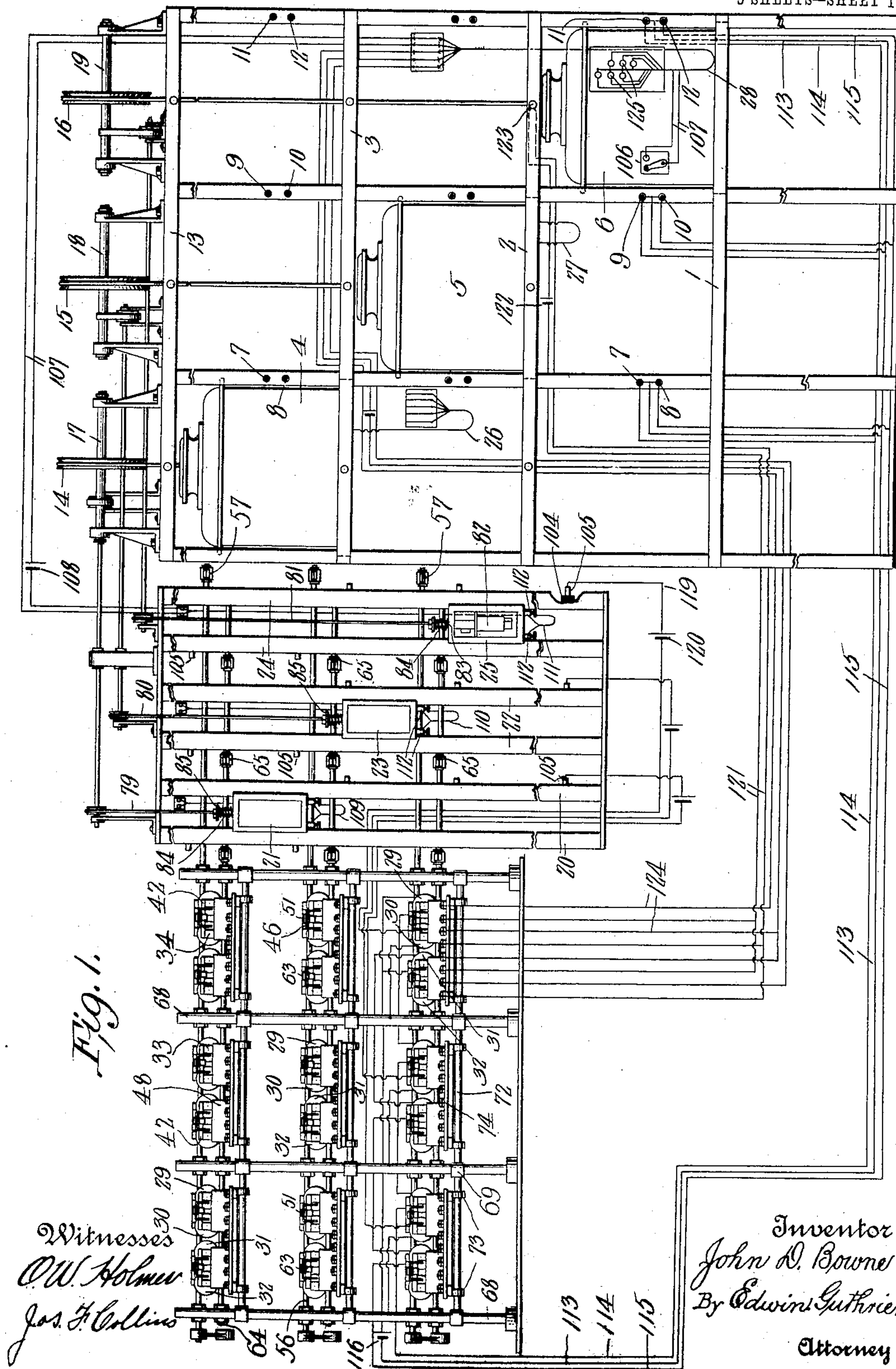
PATENTED APR. 16, 1907.

J. D. BOWNE.

ELEVATOR SIGNALING APPARATUS.

APPLICATION FILED JUNE 30, 1906.

5 SHEETS—SHEET 1.



Witnesses
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5 SHEETS—SHEET 2:

Fig. 3.

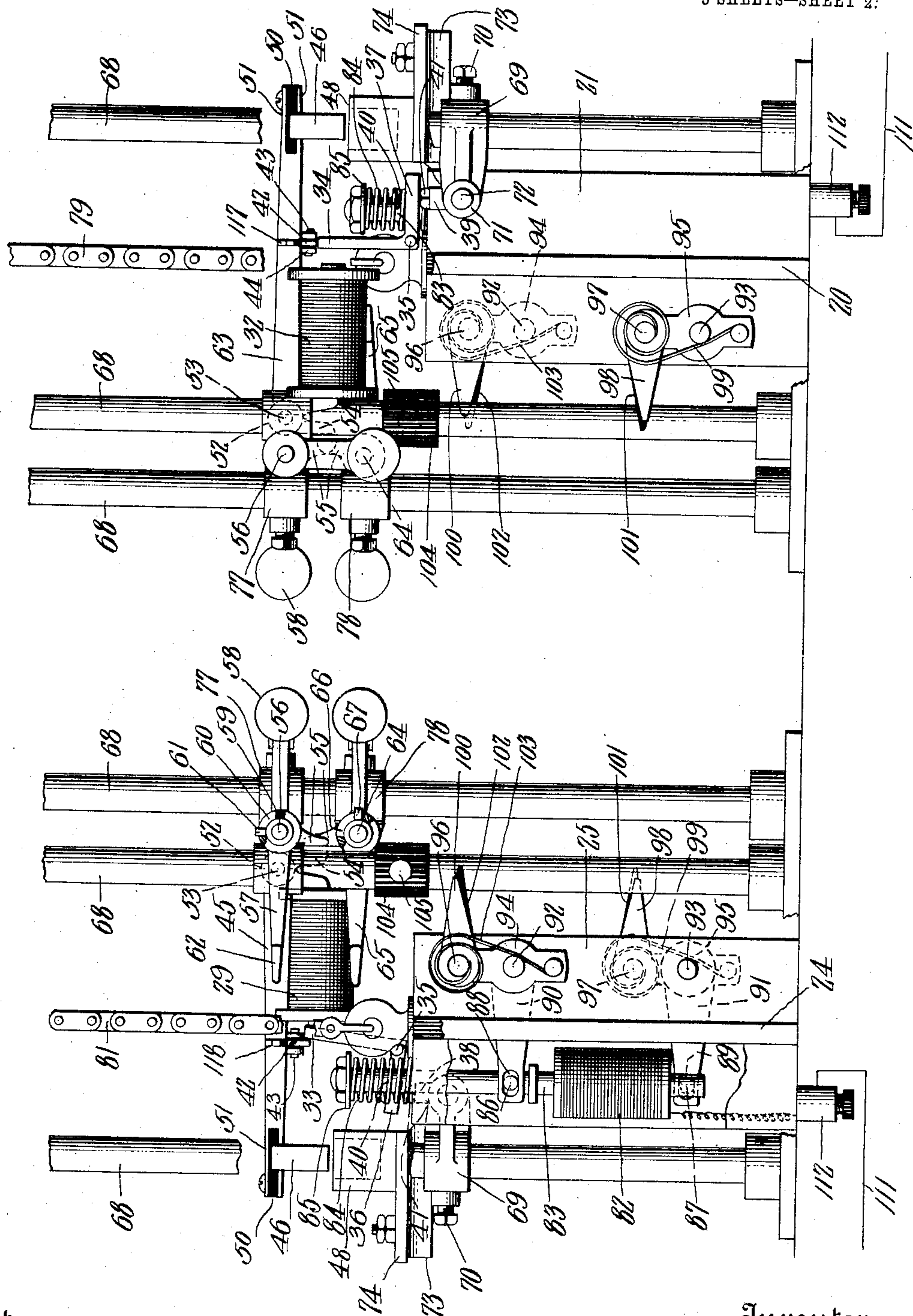


Fig. 2.

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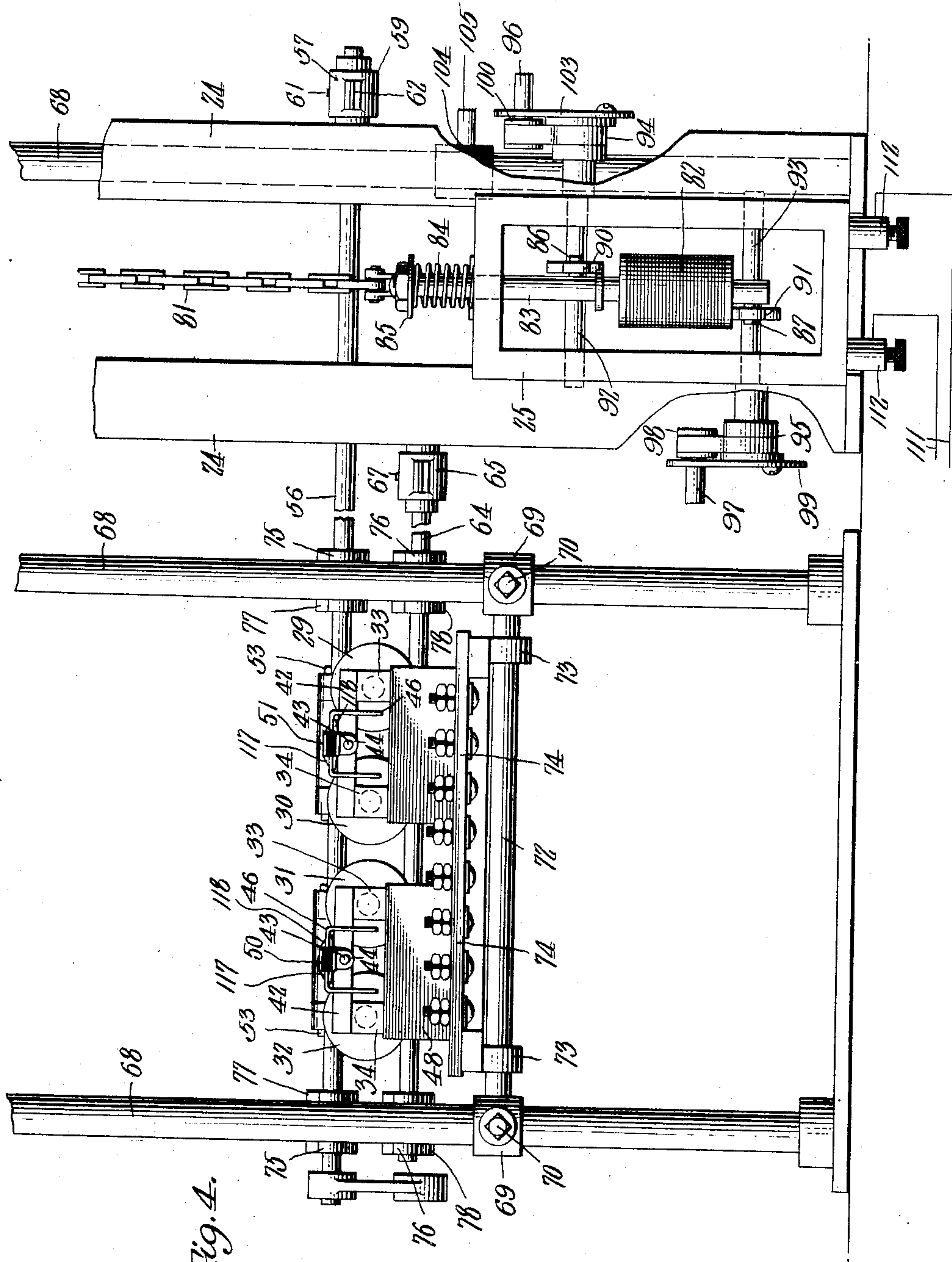


Fig. 4.

Witnesses

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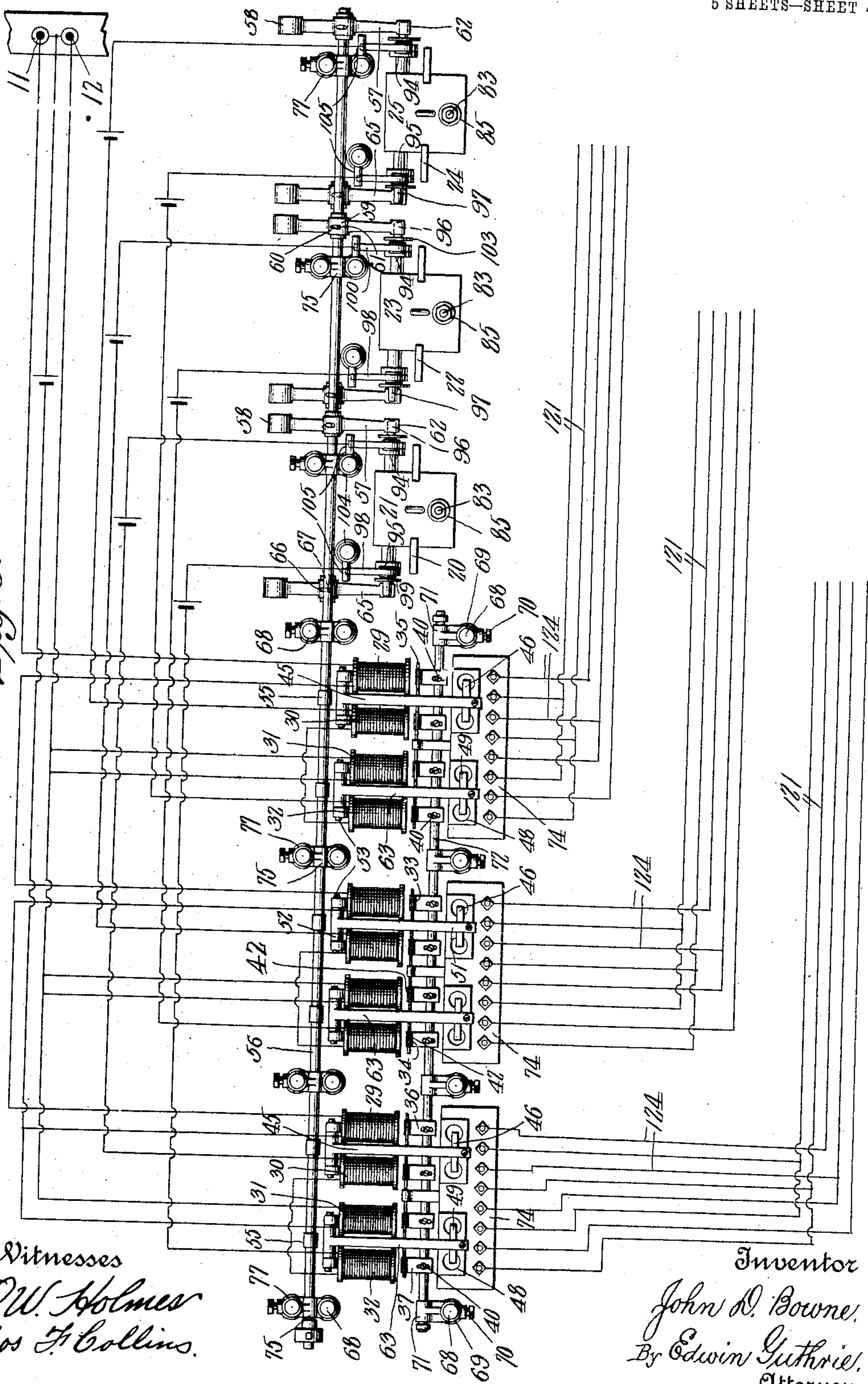
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5 SHEETS—SHEET 4.

Fig. 5.



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5 SHEETS—SHEET 5.

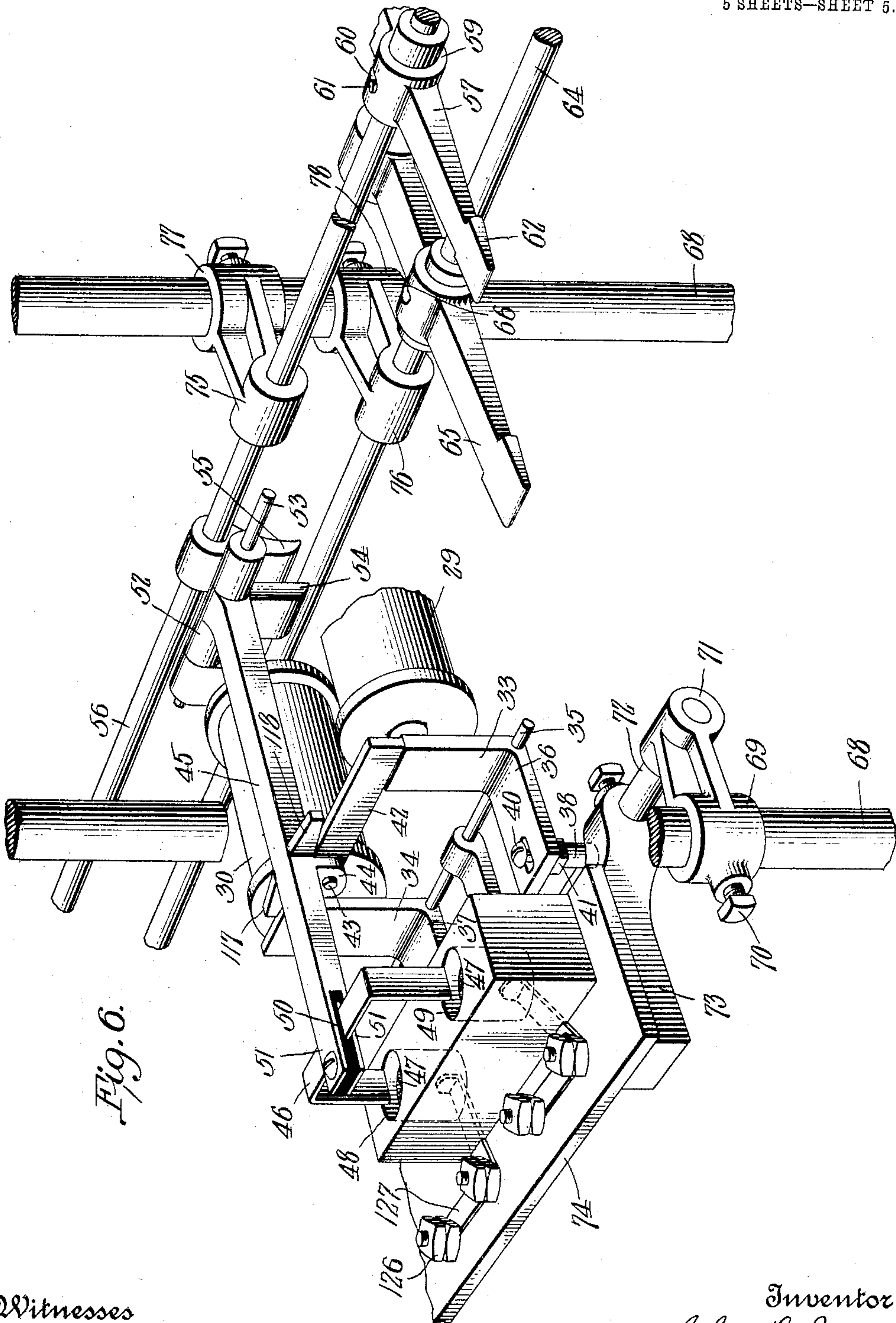


Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN D. BOWNE, OF NEW YORK, N. Y., ASSIGNOR TO SLAWSON-GRAHAM COMPANY, OF NEW YORK, N. Y.

ELEVATOR SIGNALING APPARATUS.

No. 850,618.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed June 30, 1906. Serial No. 324,209.

To all whom it may concern:

Be it known that I, JOHN D. BOWNE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Elevator Signaling Apparatus, of which the following is a specification.

My invention relates to elevator signaling apparatus, and it belongs to that class of electromechanical contrivances which are designed for use in connection with a plurality of elevators operating usually in shafts arranged side by side or near each other.

My invention is comprehended also in that class provided with up and down signaling means, whereby an intending passenger may from any floor at either shaft-door on such floor cause to be given a suitable signal in that elevator-car nearest the certain floor at the time and proceeding in the direction desired.

The object of my invention is the production of electrically-operated signaling machinery possessing the functions stated and embodying details of special construction and particular arrangement for carrying out those functions and in addition thereto for enabling any elevator-car to be cut out or freed for the time being of its operative relations with the signaling system in order that it may be run "express"—that is to say, the car may travel from a low to a high floor without being signaled intermediately.

I accomplish the objects mentioned by fashioning and associating parts as illustrated in the accompanying drawings, of which—

Figure 1 represents a front view of an installation comprising three elevators and shafts, with those portions of the mechanism constituting my invention somewhat exaggerated in size to show them more clearly. Fig. 2 is a side view of one set of magnets pertaining to one elevator and relating, for example, to the up-signal for one floor and one elevator. Fig. 3 is a side view of the same set of magnets appearing in Fig. 2, but the view is taken from the opposite side to show the magnets relating to a down-signal from the same floor. Fig. 4 is a front view of one of the miniature elevators with its front wall removed to exhibit the cut-out

solenoid carried within it. Fig. 5 is a top plan view of all of the miniature elevators and the signal-resetting devices located in position to be actuated by their movements. Fig. 6 is an explanatory and fragmentary perspective view of one of the circuit-making forks and shows the magnets, which when successively energized permit the fall of the fork and the making of the signaling-circuit. In all figures after Fig. 1 the scale of drawing has been increased.

Like numbers are used to refer to the same parts throughout the description and drawings.

In Fig. 1 there are shown any three floors of a building above the lowest floor. One floor is designated by numeral 1, the second higher floor by 2, and the third floor by numeral 3. Three elevator-cars (marked 4, 5, and 6) serve those floors in suitable shafts arranged side by side. Upon each floor the door of each elevator-shaft is provided with two signaling devices—for example, push-buttons, conveniently placed. At each door one of such push-buttons is to be operated by an intending passenger desiring to go up and the other push-button by a person seeking to go to a lower floor. On all the floors for elevator 4 the up-signal push-buttons are referred to by numbers 7 and the down-signal push-button by number 8. For the middle elevator 5 on all floors the up push-buttons are marked 9 and the down push-buttons 10. For the right-hand elevator 6 on all floors the up push-buttons are designated 11 and the down push-buttons 12. The various push-buttons will be again referred to.

On the staging 13 above the top floor—in this instance the third floor 3—are supported the customary sheaves 14, 15, and 16, with their individual shafts 17 18 19. On the top floor 3 or upon a suitable adjacent platform are erected vertical ways or rails in pairs for the guidance of the miniature or auxiliary elevator-cars forming a part of my invention. There are as many miniature elevators as there are full-size elevators, and they are related to each other as explained below. The ways of the miniature elevator corresponding with car 4 are designated by number 20, and the miniature car therein is referred to by number 21. Similarly the ways of the miniature elevator related to middle car 5 are

marked 22, and the miniature car in them is designated 23. Again, the ways of the miniature elevator actuated with right-hand car 6 are denoted by numbers 24, and the miniature car adapted to run in them bears the reference-number 25. In addition to the usual cables by which it is raised and lowered each large elevator is connected with one end of one of three conducting-cables 26, 27, and 28, by which the electric current is transmitted to operate the different magnets and solenoids.

At one side of the ways for the miniature elevators are arranged the electromechanical and electromagnetic contrivances by which the signals are operated. Such contrivances are employed in sets or units. For a complete equipment there are as many miniature elevators as there are regular cars and as many full units upon each floor as there are elevators—that is to say, the installation herein described by me would require three full units for each of the three floors, making in all nine units, as illustrated in Fig. 1. The unit of mechanism mentioned is best exhibited by Figs. 2, 3, 5, and 6. Each unit comprises a passenger-operated magnet 29—in other words, a magnet energized when a passenger presses the corresponding push-button—and a car-operated magnet 30—that is to say, the magnet 30 is energized by a current in an independent circuit made by devices borne by and moving with a miniature car. Those two magnets constitute the portion of one unit which is engaged, let it be assumed for purposes of this description, when the person signaling desires to go up. To complete the unit of mechanism, two more magnets (designated 31 and 32) of like structure and function are introduced to effect the signal sought to be given by a person intending to go downward. As the operation and results of the operation of the up-signal magnets 29 and 30 and their accessories are in all respects substantially identical with those of the down-signal magnets 31 and 32, it is believed to be sufficient to limit this explanation to the up-signal magnets and related elements. The armatures of the magnets 29 and 30 are the tilting angle-pieces 33 and 34, individually movable upon the rod 35. The horizontally-projecting portions 36 and 37 of the armatures are counter-balances, and when the magnets are dead the two armatures rest in their normal attitudes off from the cores, as delineated in Fig. 6. To positively limit the play of the armatures 33 and 34, posts 38 and 39 are adjacently disposed, and headed screws 40 pass through jam-nuts 41 into the posts. The horizontal portions 36 and 37 of the armatures strike the head and nut, and their tilting movements are thereby adjustably limited.

In Fig. 6 it will be observed that a rocking bar 42 rests with its opposite ends on the

tops of the armatures 33 and 34 and that the rocking bar is pivotally secured at its middle point by pin 43 between the ears 44, which project downwardly from the shank 45 of a pivotal electric switch-arm that I have termed in this description the "fork." By reason of its stated support upon the upper edges of armatures 33 and 34 the rocking bar 42 bears the weight of the fork, and were it not so supported the fork would fall and dip its prongs 46 into the mercury 47 contained in the cups 48 and 49, to be again mentioned. The prongs 46 are the end portions of a U-shaped piece of copper held between strips of insulation 50 in the jaws 51 with which the outermost end of the fork 45 is provided. The butt of the fork is formed into a transverse cylindrical end 52, bored to fit and movably carried on the fork's rod 53. It is believed to be clear that if the prong-bearing end of the fork falls the finger 54, projecting downwardly from the cylindrical end 52 of the fork, will be turned correspondingly—that is to say, finger 54 turns toward the cam 55 on the long rocking shaft 56. Long rocking shaft 56 carries the counterweighted arm 57. The counterweight of the arm is marked 58, and the hub through which shaft 56 passes movably is designated by number 59.

In Fig. 2 it is shown that the hub of arm 57 has a slot 60, and a pin 61 passes through the slot into the shaft. The engagement of the pin and slot is such that when the arm 57 is normally held horizontal by counterweight 58 its inner end 62 may be forced downwardly without turning the shaft. If, however, the end 62 of the arm is raised, the pin meets the end of the slot and shaft 56 is turned accordingly.

As previously stated, the parts above described relate to the up-signal magnets 29 and 30. The down-signal magnets 31 and 32 are correlated with elements of the same number, size, and function, of which the fork is designated by number 63, the long rock-shaft corresponding to shaft 56 is marked 64, and the counterweighted arm is referred to by number 65. For the down-signal magnets the arm 65, while possessing in its hub the slot 66, engaging pin 67, secured in shaft 64, has those parts so arranged, as appears in Fig. 2, that the end of the arm may be turned up without rocking the shaft, which is rocked when the arm is turned downwardly. In order that the pin 67 may normally engage the lower end of the slot 66 and cause arm 65 to come to rest promptly in its approximately horizontal position, it is obviously necessary that the portion of the arm having the flattened end shall be the heavier part. To effect this variance in weight of the two portions of arm 65 and still preserve the desired uniformity of appearance of all the arms 62 and 65, any designer's expedient

may be employed—as, for example, by making the apparently weighted portions of arm 65 hollow.

The vertical posts or rods by which the units of electromechanism are adjustably supported are marked 68, and upon the front rods 68 will be noted the sleeves 69, having the set-screws 70, enabling them to be fixed higher or lower on the rods. Sleeves 69 have inwardly-projecting arms or lugs 71, in which is secured the horizontal rod 72, which also passes through the eyes of the brackets 73, that carry the table or plate 74, upon which are the mercury-cups 48 and 49 before mentioned.

The two horizontal shafts described as “long rocking shafts” 56 and 64 are journaled in the projecting portions 75 and 76 of sleeves 77 and 78, attached by set-screws to rear rods 68, those sleeves being of the same form as sleeves 69.

Considering Fig. 1, it will be noted that the chains or cables 79, 80, and 81, by which the miniature elevators are raised and lowered, are operated by the shafts of the sheaves. The movement up or down of each miniature elevator is therefore very much less in extent and speed than that of the large car. It may be stated, consequently, that while the miniature elevator-cars carry certain projecting devices intended to strike other parts held stationary upon the supports the blows delivered are in no sense violent or destructive, owing to the relatively slow movement of the miniature cars.

Fig. 4 discloses the interior of one of the miniature cars—for example, car 25 on the right of the three described. The solenoid contained within the car is designated by number 82 and its movable core by the number 83. A current passing through the coils of the solenoid would obviously draw the core 83 into it against the force of the spring 84, that is shown encircling the upper end of the core between the washer 85 and the top of the miniature car. The reaction of spring 84 withdraws the core when the current is broken. Above and below the solenoid pins 86 and 87 project from the core and engage slots 88 and 89 in arms 90 and 91. Arm 90 has one end secured to the short rocking shaft 92, that passes through one side of the miniature car, and arm 91 has one end secured to a like short rocking shaft 93, passing through the opposite side of the car. Outside of the car the shaft 92 carries fixed upon it the crank-arm 94, and a similar crank-arm 95 is attached to the shaft 93 also on the outside of the car. The upper end of the crank-arm 94 is provided with the outwardly-projecting pintle 96, and the crank-arm 95 has at its upper end a like pintle 97.

In Fig. 2 it will be now seen that the pintle 96 is directly under the inner end 62 of the counterweighted arm 57, and, bearing in

mind the preceding explanation, if the miniature car 25 is raised the pintle 96 will encounter the end 62 of the arm 57 and rock the shaft 56, thereby turning the cam 55 toward the downwardly-extending finger 54 of that fork described as being related to the up-signal magnets. The pintle 97 of crank-arm 95 carries a laterally-projecting pivoted strike or tappet 98, and a spiral spring 99 has one end attached to the strike and one end to the lower portion of arm 95. The spring 99 is constructed to yieldingly hold the strike horizontally and to return it to that position when displaced either way by contact with another part. The crank-arm 94 carries upon its pintle 96 a strike 100 of the same nature and construction as strike 98 with the exception that strike 98 has secured to it upon its upper side a strip of insulation 101, while the strike 100 bears a like piece of insulation 102 upon its under edge or side. The spiral spring 103, having one end attached to strike 100 and one end to the lower portion of the crank-arm 94, is a twin in structure and operation with the spring 99. In Fig. 4 will also be noted the adjustable sleeve 104, held by its set-screw upon one of the rear rods 68. The sleeve is composed of insulation and is provided with a projecting pin of metal 105. The pin 105 is, as shown, directly in the path of the strike 100 as the miniature car is raised.

Returning to Fig. 1, attention is now called to the switches 106, each large car having one conveniently placed. The switch illustrated is in car 6, and the conductors 107 from it include a battery 108 or other source of electricity. Those conductors form a part of the cable 28, leading from that car. In Fig. 1 are also shown the three conducting-cables 109, 110, and 111, which, with the like cables 26, 27, and 28, connect each of the switches 106 in the large elevator-cars with the solenoids 82, contained within the miniature cars. The ends of cable 111 are shown connected to the binding-posts 112 on the miniature elevator 25, and the ends of the solenoid are likewise led to those posts.

The remaining features of my invention will be described in connection with the explanation of the mode of operation. In the usual way a conductor 113 is common to the circuits of both of any pair of push-buttons—for example, in connection with push-buttons 11 and 12 on floor 1 and relating to large elevator 6. The complementary conductor for the up-signal push-button 11 is marked 114 and that for the down-signal push-button 12 has the reference-number 115. Those conductors are arranged, the common conductor 113 including the battery 116, and are suitably connected to enable an intending passenger who presses the up-signal push-button to energize on the same floor all the up-signal magnets 29 before mentioned as the

passenger-operated magnets of the pairs of up-signal magnets. Each armature 33 is now attracted and moves toward the core of the magnet and from beneath one end of the rocking bar 42, which it had supported. The rocking bar has been described as pivoted in the middle. Therefore the unsupported end drops slightly. It may be noted here, as appears in Figs. 4 and 6, that the drop of the ends of the rocking bars is limited by the lugs 117 118, projecting from the sides of each of the forks 45. The dropping of the ends of the rocking bars is all the immediate result of the actuation of the push-button, and each fork is, under the circumstances, supported only by the end of the rocking bar that is still resting on top of armature 34 of the companion magnet 30.

It will be understood that by reason of the fact that lug 117 of fork 45 prevents any but a certain inclination of the rocking bar with respect to the fork the end of the rocking bar still supported carries the weight of the fork. To effect the desired signal, a magnet 30 must be energized. The necessary circuit, termed herein the "independent" circuit, composed of the conductors 119, including a battery 120, is completed by the operation of miniature elevator 25. The strike 100 as the car rises comes into contact with metal pin 105 of insulated sleeve 104. The conductor being connected with the pin, and the miniature car being necessarily grounded by its metallic connection with the remaining machinery, the current flows through the coil of magnet 30 again to ground, whereby armature 34 is attracted and the rocking bar 42 robbed of its last support. The fork falls and the prongs 46 may be thus constituted the bond to complete two circuits, one of which, composed of conductors 121, battery 122, or other source of electricity, includes a red light 123, located above the door of the right-hand elevator-shaft upon the floor where the passenger waits, indicating to him that the nearest elevator going up is in the shaft at which he is standing. The second circuit completed by the prong is composed of conductors 124 and suitable battery and is comprised in the cable of conductors 28 with which car 6 is provided. Conductors 124 constitute the indicator-circuit, and they lead from the indicator in the car to the electromagnetic units related to the car 6 and corresponding to floor 1, as shown in Fig. 1. There are twice as many indicator-circuits for the same elevator as there are floors, excepting the very highest and lowest floors, because there are two units for each elevator for each floor; one unit to effect the up-signal and one unit to bring about the down-signal.

It is my practice to furnish each car with an indicator 125, having a colored light and a white light arranged side by side for each floor. The colored light is to signify that an

up-going passenger is waiting at the floor indicated and a white light for the opposite direction. A colored light would therefore be made to glow in the car 6, indicating the signaling-floor, and it would continue to glow until the pintle 97 of the crank-arm 95 rises against the end 62 of the counterweighted arm 57 and rocks the shaft 56, bringing cam 55 of the shaft against finger 54 of the fork, thus lifting prongs 46 out of the mercury and breaking both indicating-lamp circuits mentioned, at the same time permitting armatures 33 and 34 of the magnets 29 and 30 to resume their original positions and to receive and support the ends of the rocking bar 42 upon their upper edges. The contact of the pintle 97 and the end of the counterweighted arm 57 is of short duration, as the arm turns up and the pintle rises away from it. Such escapement permits the fork to drop; but the armatures are already in place to catch the descending rocking bar. It is thought to be clear from the foregoing that the indicator-lamps may be lighted in the car some time before the car reaches the floor if the contact-pin 105 is placed low enough on rod 68. Furthermore, the lamps may be kept glowing for a time by introducing some distance between the pin 105 and the fork-resetting counterweighted arm 57.

As stated above, the fallen prongs 46 may afford a common path for the current to light 123 and the current to the indicator 125. Under those circumstances the light-circuit and the indicator-circuit are made sensibly the same in resistance, and the batteries are of equal strength. In Fig. 6 it is shown that there are two binding-posts 126 for each mercury-cup 48, and the binding-posts for each cup are connected by the strips 127 with each other and with the mercury 47. Two binding-posts are provided for each cup as a matter of convenience in connecting up the two circuits mentioned and for the reason that light 123 and its circuit may be omitted on all or on certain floors. Let it be assumed that car 6 is not the nearest approaching elevator to the intending passenger pressing the push-button at the shaft of car 6. Manifestly, if another miniature car belonging to another elevator is to effect the polarization of a magnet 30 and drop a fork its up-signal unit must be in circuit with the push-button. In fact, all up-signal units for that floor must be in circuit with it and with each of its fellow up-signal push-buttons on the same floor, as indicated in the drawings. Each rising miniature car approaching each floor energizes one of the magnets 30 for that floor and allows the corresponding end of one rocking bar of one fork to drop; but no signal is given unless some push-button be pressed. The signaling operation demands the action of

two magnets, yet it is unimportant which acts first. If a miniature car has approached near enough to the level representing a particular floor to energize one of the magnets 5 30 on that floor and a person on the same floor then presses a push-button, a fork will drop immediately, because magnet 30, directly concerned, has already allowed the other end of rocking bar 42 to fall. While, 10 as stated, the approach of any miniature car drops one end of one rocking bar 42 for any given floor, it will be understood that the progress of the car lifts any fallen fork for that floor and permits the armatures to reset 15 themselves in their normal rocking-bar-supporting attitudes. In Fig. 5 it is shown that the long rocking shaft 56 and its twin shaft 64 extend to all the units of electromechanism relating to the same floor, and there are 20 as many counterweighted arms and cams on each shaft as there are elevators.

I have stated herein that each large car is provided with a switch 106, one of such switches being shown in car 6 in Fig. 1. It 25 has been explained also that the conductors 107 from the switch are comprised in the cable 28, leading from car 6, and those conductors likewise form a part of the cable 111, connecting with miniature car 25 and with the 30 solenoid carried within the car. When the switch 106 is closed, the current from the battery 108 passes through the solenoid, and the movable core 82 is drawn down into it. By reason of the engagement of the pins 86 and 35 87 with slots 88 and 89 in the arms 90 and 91 the short shafts 92 and 93 are turned, causing those ends of the crank-arms 94 and 95 which have been described as provided with the projecting pintles and the spring-held strikes 40 to be retracted and to move inwardly and holding them, so long as the current flows, in such positions that the pintles will not touch the ends of the counterweighted arms or the strikes encounter the conducting-pins 105 as 45 the miniature car 25 rises and descends. In other words, the large car 6 now runs "express" and cannot be signaled from intermediate floors. It has been, in fact, cut out of the general signaling system, the system being, however, in no particular affected thereby. 50 Pressure on the up-signal push-button at any door of the shaft traversed by the express-elevator results in a signal displayed in the nearest approaching large car going upward in either of the other shafts. 55

The operation of all the remaining devices shown in the drawings, whether for up signals or for down signals, being of precisely the same nature as that just explained, it is 60 thought to be unnecessary to prolong this specification by setting out their structure and action.

Having thus described my invention and its mode of operation, what I claim is—

65 1. In elevator signaling apparatus, the

combination with an elevator and shaft, of a push-button and circuit for each floor, a magnet included in each push-button circuit, an independent circuit for each floor, a magnet included in each independent circuit, devices 70 actuated by the elevator and adapted to make and break the said independent circuits, an indicator borne by the elevator, indicator-circuits leading from the elevator to the electromagnetic units for each floor, circuit-making means in the indicator-circuits 75 adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means arranged to reset 80 the circuit-making means.

2. In elevator signaling apparatus, the combination with an elevator and shaft, of up-signal and down-signal push-buttons and circuits, magnets included in the said circuits, 85 independent circuits, magnets included in the said circuits, devices actuated by the elevator and adapted to make and break the independent circuits, an indicator borne by the elevator, indicator-circuits, circuit-making 90 means in the indicator-circuits adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means arranged to reset the said 95 circuit-making means.

3. In elevator signaling apparatus, the combination with an elevator and shaft, of independent circuits, magnets included in the said circuits, push-buttons and push-button 100 circuits, magnets included in said circuits, devices actuated by the elevator and adapted to make and break the independent circuits, an indicator borne by the elevator, indicator-circuits, circuit-making means in 105 the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and independent circuit, and resetting means arranged to reset the said circuit- 110 making means.

4. In elevator signaling apparatus, the combination with an elevator, of electromagnetic units having magnets arranged near each other, push-buttons and circuits 115 and independent circuits connected with said magnets, the said magnets having pivoted armatures provided with means for limiting their movements, a pivotally-supported switch-arm, a transversely-disposed rock- 120 ing bar pivotally attached to the switch-arm and having a limited movement, the said armatures being constructed and arranged to support the ends of the said rocking bar thereby carrying the weight of the switch- 125 arm when no current flows, the said armatures being movable out of contact with the said rocking bar when attracted thus permitting the switch-arm to drop, the said rocking bar being arranged to fall in rear of 130

the armatures preventing them from moving from the magnets when the current ceases, and means operated by the elevator for raising the said switch-arm.

5 5. In elevator signaling apparatus, the combination with an elevator and shaft, of a push-button and circuit for each floor, a magnet included in each push-button circuit, an independent circuit for each floor, a magnet
10 included in each independent circuit, devices actuated by the elevator and adapted to make and break the said independent circuits, an indicator borne by the elevator, indicator-circuits leading from the elevator to
15 the electromagnetic units for each floor, circuit-making means in the indicator-circuits adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an inde-
20 pendent circuit, and mechanical resetting devices constructed to be operated by the movements of the elevator and arranged to reset the circuit-making means.

6. In elevator signaling apparatus, the
25 combination with an elevator and shaft, of up-signal and down-signal push-buttons and circuits, magnets included in the said circuits, independent circuits, magnets included in the said circuits, devices actuated
30 by the elevator and adapted to make and break the independent circuits, an indicator borne by the elevator, indicator-circuits, circuit-making means in the indicator-circuits adapted to be operated and to make a cir-
35 cuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and mechanical resetting devices constructed to be operated by the movements of the elevator and arranged to
40 reset the circuit-making means.

7. In elevator signaling apparatus, the combination with an elevator and shaft, of independent circuits, magnets included in the said circuits, push-buttons and push-
45 button circuits, magnets included in said circuits, devices actuated by the elevator and adapted to make and break the independent circuits, an indicator borne by the elevator, indicator-circuits, circuit-making means in
50 the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and independent circuit, and mechanical resetting devices constructed to be op-
55 erated by the movements of the elevator and arranged to reset the circuit-making means.

8. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of push-buttons and circuits for each
60 elevator for each floor, a magnet included in each push-button circuit, an independent circuit for each elevator for each floor, a magnet included in each independent circuit, devices actuated by the elevators and adapt-
65 ed to make and break the independent cir-

uits, indicators borne by the elevators, indicator-circuits leading from each indicator to the electromagnetic units for each floor, circuit-making means in the said indicator-circuits each adapted to be operated and to
70 make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the circuit-making means for all the indicator-circuits
75 for each floor.

9. In an elevator signaling apparatus, the combination with a plurality of elevators and shafts, of up-signal and down-signal push-
80 buttons and circuits for each elevator for each floor, a magnet included in each push-button circuit, an independent circuit for each elevator for each floor, a magnet included in each independent circuit, devices
85 actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-circuits leading from each indicator to the electromagnetic units for each floor, circuit-making means in the said indicator-circuits
90 each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the cir-
95 cuit-making means for all the indicator-circuits.

10. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of independent circuits, magnets in-
100 cluded in the said circuits, push-buttons and push-button circuits, magnets included in said circuits, devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the
105 elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit,
110 and resetting means constructed and arranged to reset the said circuit-making means for all the indicator-circuits.

11. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of push-buttons and circuits for each
115 elevator for each floor, a magnet included in each push-button circuit, an independent circuit for each elevator for each floor, a magnet included in each independent circuit,
120 devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-circuits leading from each indicator to the electromagnetic units for each floor,
125 circuit-making means in the said indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means
130

constructed to be actuated by the movements of every elevator and arranged to reset the said circuit-making means for all the indicator-circuits for each floor.

5 12. In an elevator signaling apparatus, the combination with a plurality of elevators and shafts, of up-signal and down-signal push-buttons and circuits for each elevator for each floor, a magnet included in each
10 push-button circuit, an independent circuit for each elevator for each floor, a magnet included in each independent circuit, devices actuated by the elevators and adapted to make and break the independent circuits,
15 indicators borne by the elevators, indicator-circuits leading from each indicator to the electromagnetic units for each floor, circuit-making means in the said indicator-circuits each adapted to be operated and to make a
20 circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to be actuated by the
25 said circuit-making means for all the indicator-circuits.

13. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of independent circuits, magnets included in the said circuits, push-buttons and
30 push-button circuits, magnets included in said circuits, devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-circuits, circuit-making
35 means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit,
40 and resetting means constructed and arranged to be actuated by the movements of every elevator and to reset the said circuit-making means for all the indicator-circuits.

14. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of push-buttons and circuits for each elevator for each floor, a magnet included in each push-button circuit, an independent circuit for each elevator for each
50 floor, a magnet included in each independent circuit, devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-circuits leading from each indicator
55 to the electromagnetic units for each floor, circuit-making means in the said indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an
60 independent circuit, and mechanical resetting devices constructed and arranged to be actuated by the movements of every elevator and to reset the circuit-making means for all the indicator-circuits for each floor.

65 15. In an elevator signaling apparatus,

the combination with a plurality of elevators and shafts, of up-signal and down-signal push-buttons and circuits for each elevator for each floor, a magnet included in each
70 push-button circuit, an independent circuit for each elevator for each floor, a magnet included in each independent circuit, devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-
75 circuits leading from each indicator to the electromagnetic units for each floor, circuit-making means in the said indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of
80 magnets in a push-button circuit and in an independent circuit, and mechanical resetting devices arranged to be actuated by the movements of every elevator and to reset the said circuit-making means for all the indi-
85 cator-circuits.

16. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of independent circuits, magnets included in the said circuits, push-buttons and
90 push-button circuits, magnets included in said circuits, devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-circuits, circuit-making means in the
95 indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and mechanical resetting devices arranged to be actuated
100 by the movements of every elevator and to reset the said circuit-making means for all the indicator-circuits.

17. In elevator signaling apparatus, the combination with a passenger-elevator and
105 shaft, of a miniature elevator actuated by the movements of the said passenger-elevator in correspondence therewith, independent circuits, magnets included in the said circuits, push-buttons and push-button cir-
110 cuits, magnets included in said circuits, devices actuated by the miniature elevator and adapted to make and break the independent circuits, an indicator borne by the passenger-elevator, indicator-circuits, cir-
115 cuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and independent circuit, and resetting means arranged to
120 reset the said circuit-making means.

18. In elevator signaling apparatus, the combination with a passenger-elevator and
125 shaft, of a miniature elevator actuated by the movements of the said passenger-elevator in correspondence therewith, independent circuits, magnets included in the said circuits, push-buttons and push-button circuits, magnets included in said circuits, devices actu-
130 ated by the miniature elevator and adapted

to make and break the independent circuits, an indicator borne by the passenger-elevator, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be
 5 operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and mechanical resetting devices constructed and arranged to be operated by one of said
 10 elevators and to reset the said circuit-making means.

19. In elevator signaling apparatus, the combination with a passenger-elevator and shaft, of a miniature elevator actuated by
 15 the movements of the said passenger-elevator in correspondence therewith, independent circuits, magnets included in the said circuits, push-buttons and push-button circuits, magnets included in said circuits, devices actuated by the miniature elevator and adapted
 20 to make and break the independent circuits, an indicator borne by the passenger-elevator, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be
 25 operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and mechanical devices constructed and arranged to be operated by the movements of the said
 30 miniature elevator and to reset said circuit-making means.

20. In elevator signaling apparatus, the combination with a plurality of passenger-elevators and shafts, of the same number of
 35 miniature elevators actuated by the movements of said passenger-elevators and in correspondence with them, independent circuits, magnets included in the said circuits, push-buttons and push-button circuits, magnets
 40 included in said circuits, devices actuated by the miniature elevators and adapted to make and break the independent circuits, indicators borne by the passenger-elevators, indicator-circuits, circuit-making means in
 45 the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to
 50 reset the said circuit-making means for all the indicator-circuits.

21. In elevator signaling apparatus, the combination with a plurality of passenger-elevators and shafts, of the same number of
 55 miniature elevators actuated by the movements of said passenger-elevators and in correspondence with them, independent circuits, magnets included in the said circuits, push-buttons and push-button circuits, magnets
 60 included in said circuits, devices actuated by the miniature elevators and adapted to make and break the independent circuits, indicators borne by the passenger-elevators, indicator-circuits, circuit-making means in the
 65 indicator-circuits each adapted to be oper-

ated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to be actuated by one member of every
 70 couple comprising a passenger-elevator and a miniature elevator, the said resetting means being adapted to reset the said circuit-making means for all the indicator-circuits.

22. In elevator signaling apparatus, the
 75 combination with a plurality of passenger-elevators and shafts, of the same number of miniature elevators actuated by the movements of said passenger-elevators and in correspondence with them, independent circuits,
 80 magnets included in the said circuits, push-buttons and push-button circuits, magnets included in said circuits, devices actuated by the miniature elevators and adapted to make and break the independent circuits, indica-
 85 tors borne by the passenger-elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum
 90 of the actions of magnets in a push-button circuit and in an independent circuit, and mechanical resetting devices constructed and arranged to be actuated by the movements of every miniature elevator and to reset the
 95 said circuit-making means for all the indicator-circuits.

23. In elevator signaling apparatus, the combination with an elevator and shaft, of independent circuits, magnets included in
 100 the said circuits, push-buttons and push-button circuits, magnets included in said circuits, vertically-adjustable metal contacts included in said independent circuits, devices actuated by the elevator and adapted to
 105 make and break the independent circuits by touching the said contacts, an indicator borne by the elevator, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a
 110 circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means arranged to reset the said circuit-making means.

24. In elevator signaling apparatus, the
 115 combination with a plurality of elevators and shafts, of independent circuits, magnets included in the said circuits, push-buttons and push-button circuits, magnets included in said circuits, vertically-adjustable metal con-
 120 tacts included in said independent circuits, devices actuated by the elevators and adapted to make and break the independent circuits by touching the said contacts, indicators borne by the elevators, indicator-cir-
 125 cuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means
 130 constructed and arranged to reset the said

circuit-making means for all the indicator-circuits.

25. In elevator signaling apparatus, the combination with a plurality of passenger-elevators and shafts, of the same number of miniature elevators actuated by the movements of the said passenger-elevators and in correspondence with them, independent circuits, magnets included in the said circuits, push-buttons and push-button circuits, magnets included in the said circuits, vertically-adjustable metal contacts included in said independent circuits, devices actuated by the miniature elevators and adapted to make and break the independent circuits by touching the said contacts, indicators borne by the passenger-elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the said circuit-making means for all the indicator-circuits.

26. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of independent circuits, magnets included in the said circuits, up-signal and down-signal push-buttons and circuits, magnets included in the said circuits, the circuit of each up-signal push-button on any floor being arranged to include all the magnets in all the up-signal push-button circuits for the same floor whereby any such up-signal push-button pressed effects the magnetization of all such magnets, the circuit of each down-signal push-button on any floor being arranged to include the magnets in all the down-signal push-button circuits for the same floor whereby any such down-signal push-button pressed effects the magnetization of all such magnets, devices actuated by the elevators and adapted to make and break the independent circuits, indicators borne by the elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to move a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the said circuit-making means for all the indicator-circuits.

27. In elevator signaling apparatus, the combination with a plurality of passenger-elevators and shafts, of the same number of miniature elevators actuated by the movements of said passenger-elevators and in correspondence with them, independent circuits, magnets included in the said circuits, up-signal and down-signal push-buttons and circuits, magnets included in said circuits, the circuit of each up-signal push-button on any floor being arranged to include all the magnets in all the up-signal push-button circuits

for the same floor whereby any such up-signal push-button pressed effects the magnetization of all such magnets, the circuit of each down-signal push-button on any floor being arranged to include all the magnets in all the down-signal push-button circuits for the same floor whereby any such down-signal push-button pressed effects the magnetization of all such magnets, devices actuated by the said miniature elevators and adapted to make and break the independent circuits, indicators borne by the passenger-elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the said circuit-making means for all the indicator-circuits.

28. In elevator signaling apparatus, the combination with a plurality of elevators and shafts, of independent circuits, vertically-adjustable metal contacts included in said independent circuits, magnets included in the said circuits, up-signal and down-signal push-buttons and circuits, magnets included in said circuits, the circuit of each up-signal push-button on any floor being arranged to include all the magnets in all the up-signal push-button circuits for the same floor whereby any such up-signal push-button pressed effects the magnetization of all such magnets, the circuit of each down-signal push-button on any floor being arranged to include all the magnets in all the down-signal push-button circuits on the same floor whereby any such down-signal push-button pressed effects the magnetization of all such magnets, devices actuated by the elevators and adapted to make and break the said independent circuits by touching the said contacts, indicators borne by the elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the said circuit-making means for all the indicator-circuits.

29. In elevator signaling apparatus, the combination with a plurality of passenger-elevators and shafts, of the same number of miniature elevators actuated by the movements of said passenger-elevators and in correspondence with them, independent circuits, magnets included in the said circuits, vertically-adjustable metal contacts included in said independent circuits, up-signal and down-signal push-buttons and circuits, magnets included in said circuits, the circuit of each up-signal push-button on any floor being arranged to include all the magnets in all the up-signal push-button circuits for the same

floor whereby any such up-signal push-button pressed effects the magnetization of all such magnets, the circuit of each down-signal push-button on any floor being arranged to include all the magnets in all the down-signal push-button circuits for the same floor whereby any such down-signal push-button pressed effects the magnetization of all such magnets, devices actuated by the miniature elevators and adapted to make and break the said independent circuits by touching the said contacts, indicators borne by the passenger-elevators, indicator-circuits, circuit-making means in the indicator-circuits each adapted to be operated and to make a circuit only by the sum of the actions of magnets in a push-button circuit and in an independent circuit, and resetting means constructed and arranged to reset the said circuit-making means for all the indicator-circuits.

30. In a signaling apparatus, the combination with a movable signal-controller comprising separately-operative portions, of controller-operating means for actuating a portion of the said signal-controller, controller-operating means for actuating the remaining

portion of the said signal-controller thereby completing the operation of the said signal-controller, and resetting devices constructed and arranged to reset the said signal-controller.

31. In a signaling apparatus, the combination with a movable signal-controller comprising separately-operative portions, of controller-operating means for actuating a portion of the said signal-controller, controller-operating means for actuating the remaining portion of the said signal-controller thereby completing the operation of the said signal-controller, signal-giving means constructed to be set in operation by the complete operation of the said signal-controller, and resetting devices arranged to reset the said signal-controller thereby stopping the action of the said signal-giving means.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN D. BOWNE.

Witnesses:

JOSEPH S. HYNES,
SAML. BIRNEY.