No. 724,722. PATENTED APR. 7, 1903.

C. O. MAILLOUX.

ELECTRICAL CONTROLLING SYSTEM FOR ELEVATORS.

APPLICATION FILED JULY 23, 1896. RENEWED MAR. 24, 1897.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

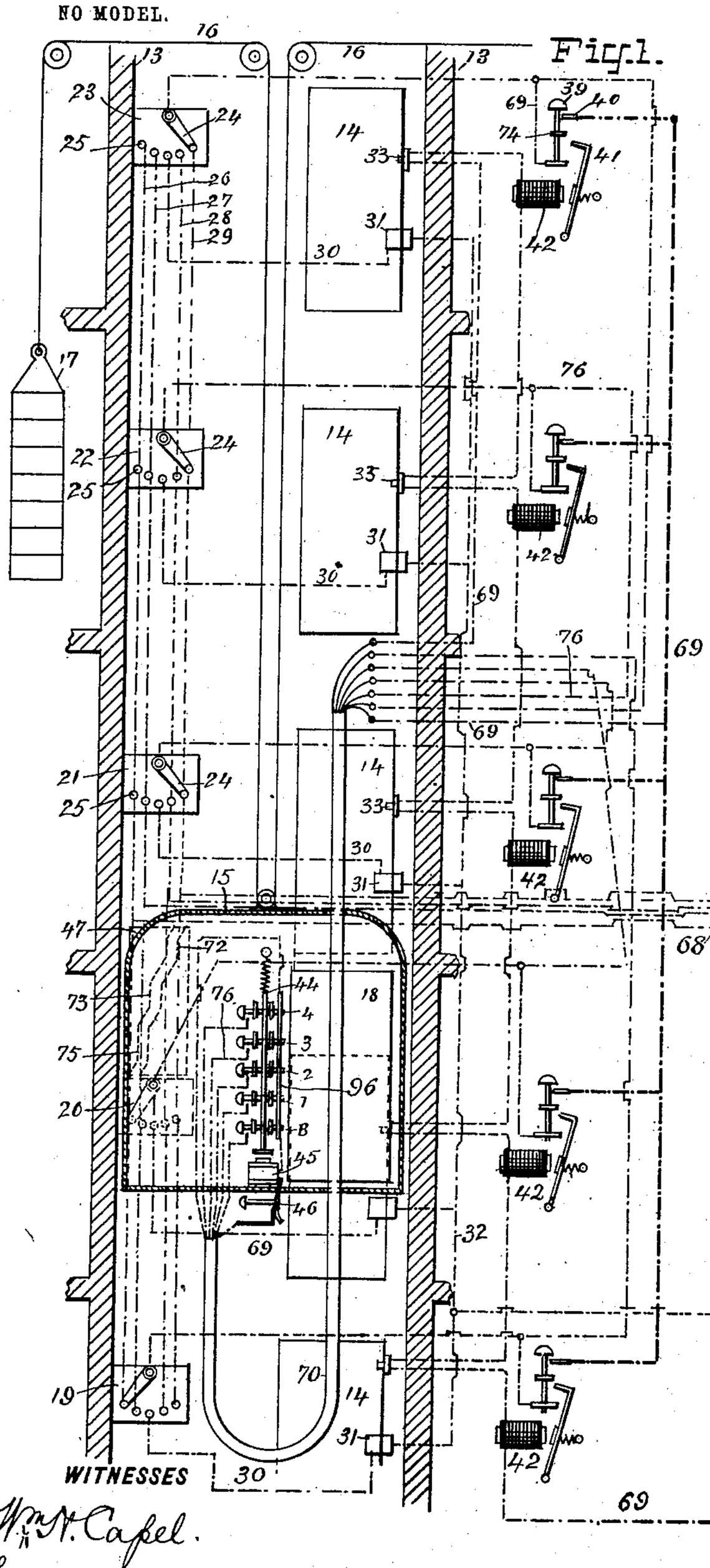
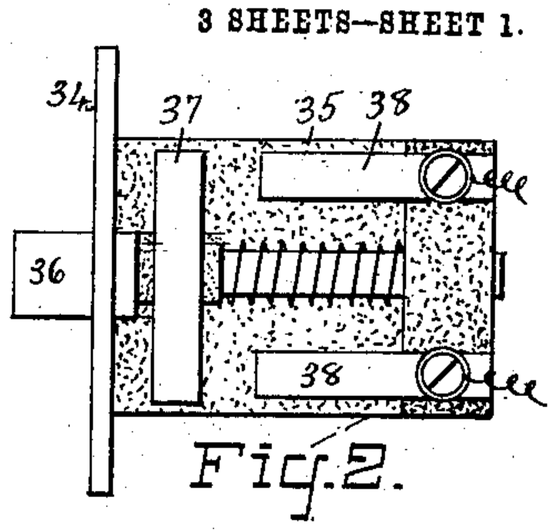
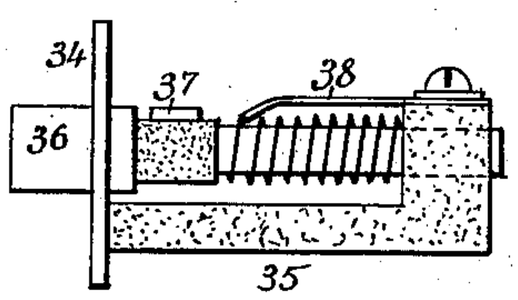


Fig. 2.





Witnesses:
W. M. Capel.
Louis Kaplan

Inventor:
Eugene O. Mailloux
By H. C. Townsend
Attorney

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 4.

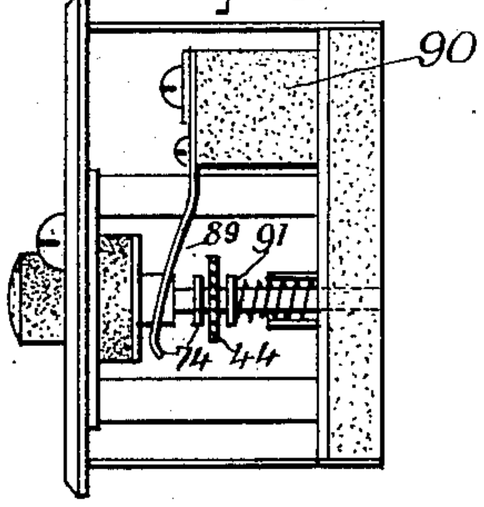


Fig. 3.

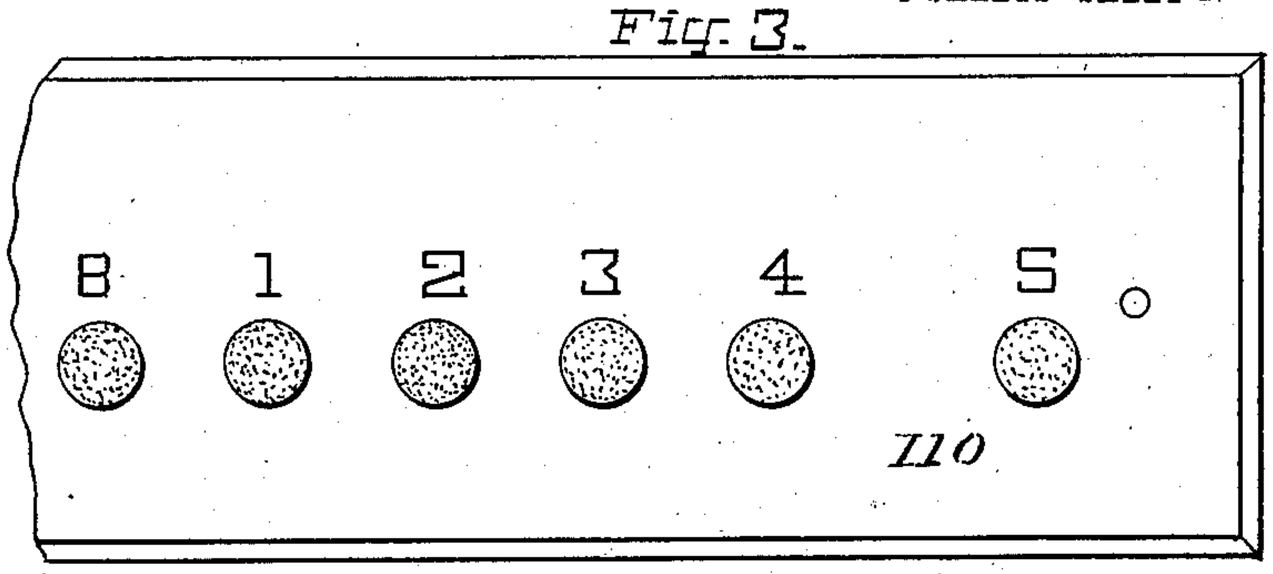


Fig. 5.

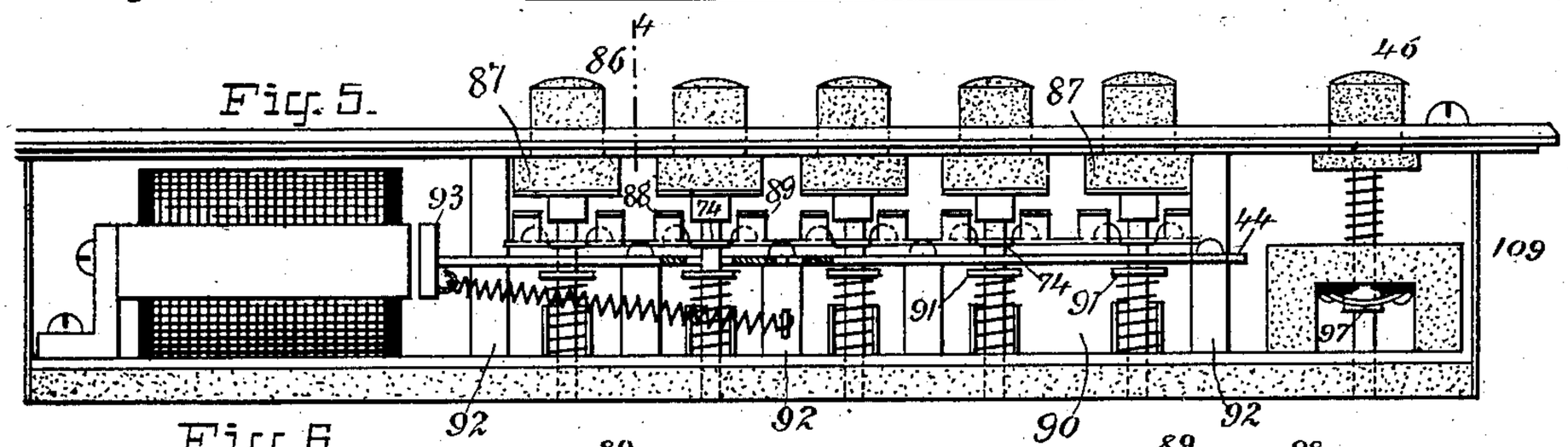
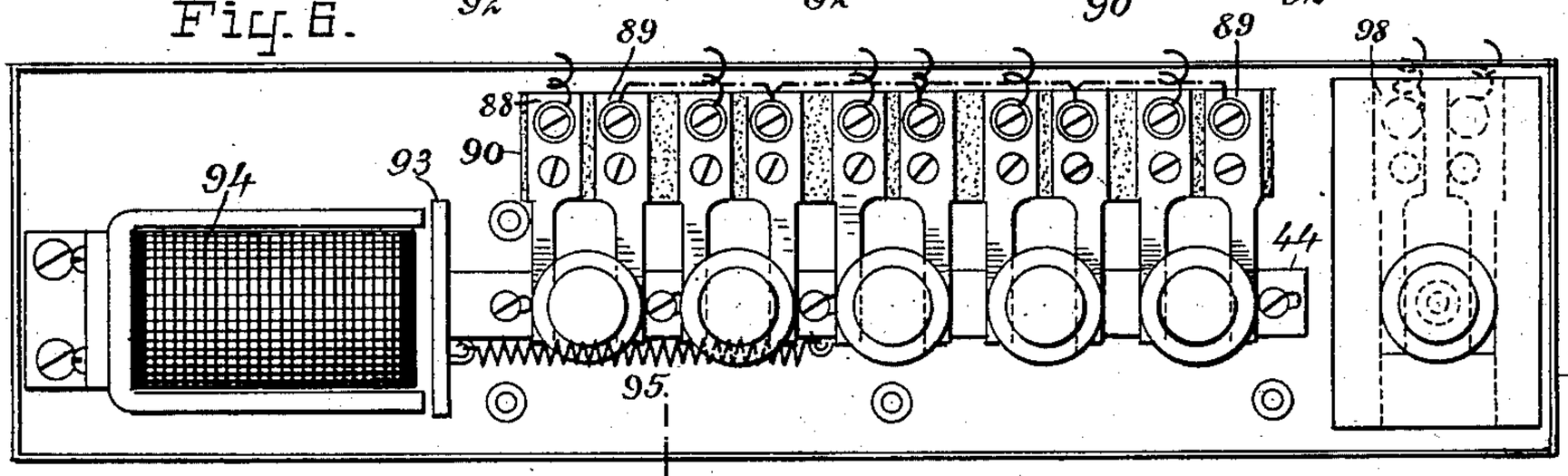


Fig. 6.



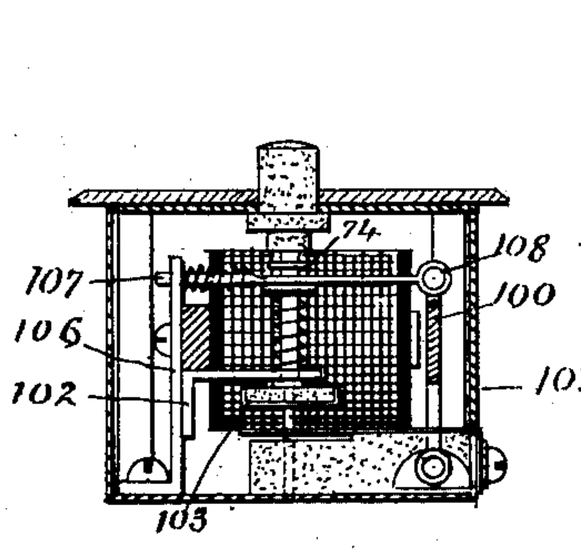


Fig. 9.

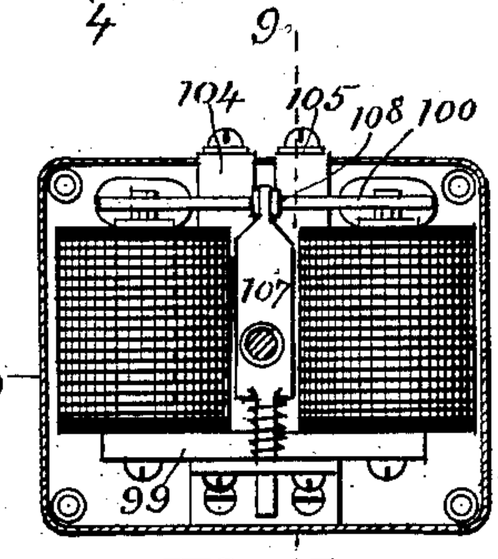


Fig. 7.

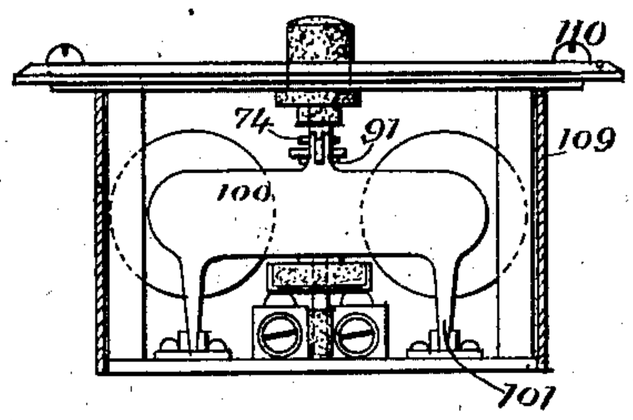


Fig. 8.

WITNESSES

Wm. H. Capel

Louis Kaplan

INVENTOR

Cyprien O. Mailloux

BY

H. C. Townsend

ATTORNEY

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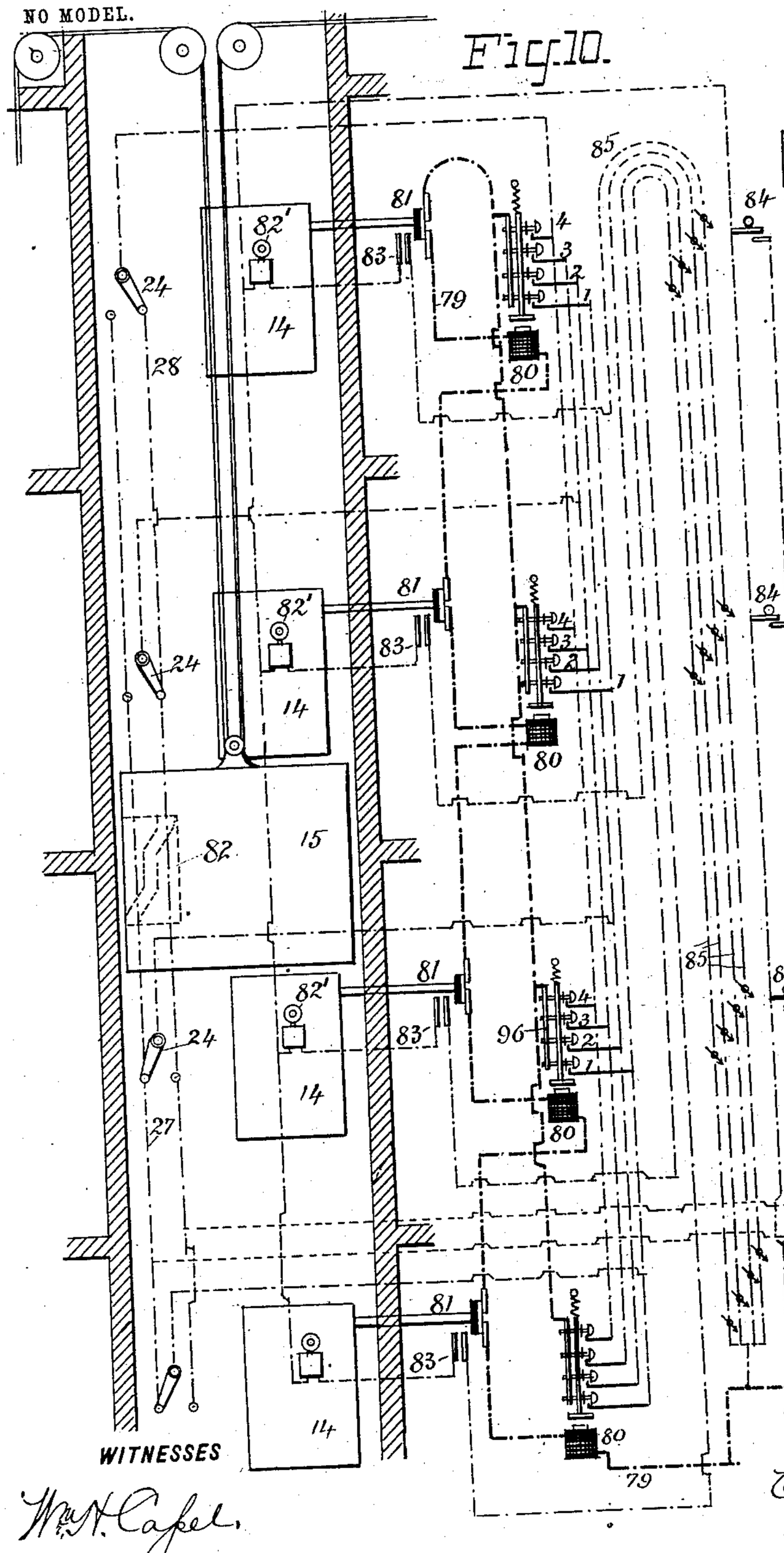
C. O. MAILLOUX.

ELECTRICAL CONTROLLING SYSTEM FOR ELEVATORS.

APPLICATION FILED JULY 23, 1896. RENEWED MAR. 24, 1897.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 10.



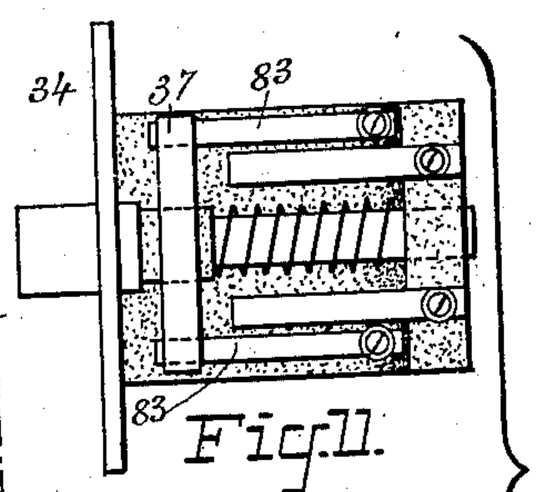
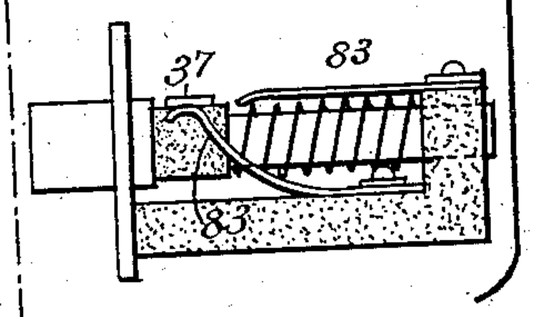


Fig. 11.



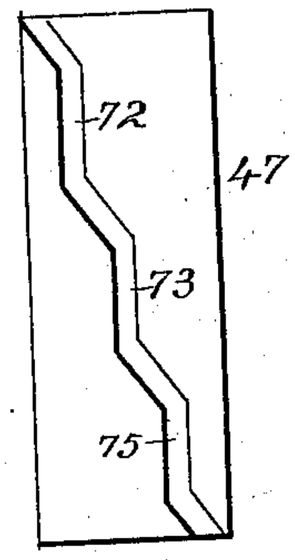


Fig. 12.

WITNESSES

Wm. H. Capel.

Louis Kaplan

INVENTOR

Cybrien O. Mailloux

BY

H. C. Townsend

ATTORNEY

UNITED STATES PATENT OFFICE.

CYPRIEN O. MAILLOUX, OF NEW YORK, N. Y., ASSIGNOR TO OTIS ELEVATOR COMPANY, OF BOROUGH OF MANHATTAN, NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ELECTRICAL CONTROLLING SYSTEM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 724,722, dated April 7, 1903.

Application filed July 23, 1896. Renewed March 24, 1897. Serial No. 629,093. (No model.)

To all whom it may concern:

Be it known that I, CYPRIEN O. MAILLOUX, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a certain new and useful Electrical Controlling System for Elevators, of which the following is a specification.

My invention relates to electrical controlling systems for elevators or other cars, whether for passenger or freight use, and has especial reference to systems of this sort operating in the main automatically and operable by unskilled persons.

The chief object of the invention is to simplify the systems and improve the apparatus which constitute the subject-matter of Patents Nos. 536,730 and 543,495, granted to me April 2, 1895, and July 30, 1895, respectively. In said patented systems non-interference is secured by means of a series of what are termed "individual magnets" and a switch common to them all. These systems operate perfectly, but are more complex and expensive than need be.

In the present invention complete non-interference is established at each manual controlling-switch. These switches are so constructed and connected in circuit that the manipulation of any one of them locks or otherwise renders inoperative all the others, including the switch in the car of a passenger system. In my application filed August 8, 1899, Serial No. 726,518, I have described one form of non-interference switch in connection with the indicators, signals, &c., and in said application are to be found the broad claims for the non-interference and locking mechanisms employed in a freight system. In the present invention I use a similar switch adapted for use upon the car in a passenger system, as well as in a freight system. This switch I apply to the car of a passenger-system service as a multiple switch, by means of which a person may press any certain button allotted to a particular floor or landing and without any further attention on his part be carried to and stopped at that landing. This, broadly, is simply an adaptation of the multiple landing-switch from Patent No. 543,495 to the passenger system of Patent No. 536,730.

Another object of this invention is the provision of a speed-regulator automatically controlled, preferably, by the movement of the car.

With these objects in view the invention consists in a controlling system for elevators or other cars wherein the switches controlling the movement of the car are all provided with locking or other non-interference mechanism and are all controlled absolutely by the action of any one of them.

The invention also consists in a system of electrical control for cars in which there is a series of switches upon a car corresponding to the several landings and each adapted to direct the car to its respective landing and at the same time to prevent interference from any of the landing-switches.

The invention also consists in a system of electrical control for cars wherein the controlling-switches are each provided with non-interference mechanism and are combined with floor-switches actuated by the movement of the car which determine the operation of said controlling-switches and their non-interference mechanism.

The invention also consists in a system of electrical control provided with means automatically actuated by the car to regulate the speed of the driving-motor, substantially as set forth.

The invention further consists in the construction, arrangement, combinations of parts, and improvements in detail fully described, and set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 represents my improved system in diagram. Fig. 2 constitutes a side and edge view, respectively, of one form of door-opening-circuit breaker. Fig. 3 is a face view, partially broken away, of a box containing the controlling-switches designed to be located in the car. Fig. 4 is a sectional view of said box, taken on line 4 4, Figs. 5 and 6. Fig. 5 is a sectional side elevation of said box and contents. Fig. 6 is a plan view with the cover of the box removed. Fig. 7 is a plan view of an individual

self-holding push-button. Fig. 8 is an end view of the same. Fig. 9 is a sectional view taken on line 9 9 of Fig. 7. Fig. 10 is a diagram representing the application of my invention to a dumb-waiter or lift. Fig. 11 constitutes a side and edge elevation, respectively, of a form of door-switch used in connection with a dumb-waiter system. Fig. 12 is a face view of the frog used in the system illustrated in Fig. 1.

In the illustrations my invention is represented as applied to a passenger-elevator and a freight elevator or lift. It has been thus illustrated for the sake of convenience in disclosing the invention and more clearly bringing out its relation to the systems in the patents above referred to, though this system, like those of said patents, is applicable to other purposes involving mechanical arrangements within the skill of the artisan without involving invention.

The system as illustrated in Fig. 1 will be first described. Therein the elevator-shaft is indicated by the sectionized walls 13 and is shown as extending through five stories, the landing-doors being indicated at 14. The car is represented at 15 as between the second and third stories. This is represented as suspended by the cables 16, one of which extends in the usual manner to counterpoise 17 and the other is adapted to be extended to the motor which operates the car. The car-door is indicated at 18. Within the well or shaft at each floor or story is located a switch, which for convenience of description I will term a "floor-switch." These switches are represented at 19, 20, 21, 22, and 23. They consist of a pivoted contact-lever, as 24, moving over and engaging with a series of contacts 25. Corresponding outer contacts in the several switches are connected together by the circuits 26, 27, 28, and 29. The middle contact of each switch is connected by the circuit 30 to a lock 31 on the well-door, all of which locks are connected to a common return 32. At each well-door is also located a door-opening-circuit breaker 33, preferably of the construction shown in Fig. 2, wherein 34 represents a face-plate, 35 a block of insulation secured to the face-plate, and 36 a spring-seated pin, which carries a spanning contact 37, insulated from said pin, as indicated. Upon the block of insulation are mounted contact-springs 38, in position to be engaged by contact 37 when the door is closed and to break circuit with said contact when the door is opened. At each floor is located a controlling button or switch, which for convenience I will term the "landing-switch." In Fig. 1 this is diagrammatically represented as consisting of the push-pin 39, contact 40, lock 41, and locking-magnet 42, the push-pin being provided with a projection or collar 74, with which the lock 41 engages. In the car is located a series of controlling buttons or switches, (marked B 1 2 3 4.) These are represented in the same manner as the landing-switches, but have a common lock, (represented by a plate 44,) to the lower end of which is attached the armature of locking-magnet 45, a retracting-spring being connected to the upper end of said plate 44 and a stop-button, as 46, being provided for the purpose of interrupting the controlling-circuit when desired. Upon the car is also mounted a frog, as 47, with a raceway constructed to engage with a projection upon the contact-levers 24 and so shaped as to move said levers successively over the contacts 25. The power for this system may be derived from any suitable source, and in the drawings feeders from such source are indicated at 48 49, and joining these feeders is the circuit 50, in which is located a series of resistances consisting, preferably, of three sixteen-candle-power lamps 16^c and one or more thirty-two or fifty candle power lamps, (indicated by 32^c.) This arrangement is clearly set forth in my patent first above mentioned. In said patent, however, there are but three lamps shown, while here four are shown. I may, however, use any number, depending upon the different voltages which are necessary for the several circuits of the system. Where the power is taken from a one-hundred-and-fifteen-volt circuit, I generally employ the lamps here shown, while for a two-hundred-and-thirty-volt circuit I generally employ three sixteen-candle-power lamps and two thirty-two-candle-power or fifty-candle-power lamps.

The motor for operating the car may be of any suitable kind and driven by any suitable power, the electrical controlling system being employed to throw said power into or out of action. I have, however, shown herein an electric motor as controlled by this system, the armature being indicated at 51 and the field-coil at 52.

The starting-switch for controlling the motor is substantially of the construction shown in my prior patents and is here represented by the "up" and "down" magnets and the armature-lever 53, controlled thereby. This lever is here shown as carrying contact-plates 54 and 55 at one end, and 56 and 57 at the other end. From the feeder 48 a conductor 58 leads to contacts for engagement with 55 and 56, while from feeder 49 conductor 59 leads to contacts for engagement with 54 and 57. This conductor 59 has a branch at 60, extending through the rheostat 61, the resistance 62, the armature 51, and connects at the switch with conductor 58. The field-coil connects at one end by conductor 43 with contacts adapted to be engaged by contacts 55 and 57, and at the other end after passing through the controlling-magnet 63 of the rheostat it connects with contacts adapted to be engaged by contacts 54 and 56 of the starting-switch. The resistance 62 is inserted and withdrawn from the armature-circuit by means of the contact-lever 64, which is operated by a mag-

net having a coil, as 65, located in a supplemental up-circuit branch 66 of the controlling-circuit, and a coil 67, located in a supplemental down-circuit branch 68, the circuits 26 and 29, joining the outer contacts of the floor-switches, constituting portions of said supplemental circuits. The remaining circuits of this system will be located in the statement of operation.

Should a person on the fourth floor desire to call the car, he will do so by depressing button 39, thereby making circuit between it and contact 40. Current will then flow from 48 over controlling-circuit 69, through magnets 42 of the landing-switches and the door-circuit breakers 33 to and through the cable 70, extending from some suitable point in the well to the car, through the stop-button 46, magnet 45, back through the cable to contact 40, then through the button 39 to lever 24 of floor-switch 23, down conductor 29 of the supplemental up circuit, over conductor 66, through magnet 65, to and through the up magnet, and by conductor 71 to a point on circuit 50 between second and third lamps, through the third and fourth lamps to the feeder 49. This will operate the starting-switch to bring contacts 54 and 55 into engagement with their respective opposing contacts, thereby completing circuit from 48 over 58 to contact 55, thence by conductor 43 through the field-coil 52, the rheostat-coil 63 to contact 54, thence by conductor 59 to the feeder 49. This will energize the field of the motor and close the armature-circuit through the rheostat 61. The armature-circuit will then be completed from 48 over conductor 58, conductor 60, and conductor 59, back to the feeder 49, the resistance 62 having been cut out by the completion of the controlling-circuit 69 at the landing-switch just operated. The car will then move up the shaft, frog 47 first engaging the lever 24 of switch 21 and shifting it to the supplemental down circuit. It will next do the same at floor-switch 22, and upon arrival at floor-switch 23 it will shift the lever thereof from the supplemental up circuit 29 to the up circuit 28, thereby de-energizing coil 65 and allowing the resistance 62 to be thrown into the armature-circuit, whereby the speed of the motor-armature is reduced, so as to facilitate stopping the motor. The projection on lever 24 then travels for a short interval through the vertical portion 72 of the raceway of frog 47, whence as the car advances it will pass into the middle parallel portion 73 of the raceway, thereby breaking the up branch of the controlling-circuit and the circuits through the motor, bringing the car to rest. The lever 24 then rests in its middle position and completes the circuit to the door-lock, unlocking the door and permitting the door-opening-circuit breaker to start the door back, thereby making a permanent break in the controlling-circuit at said circuit-breaker. The lever 24 in passing from circuit 28 to the lock-circuit preserves the contact, so that the controlling-switch 39 is not released until the circuit is broken at the door-circuit breaker 33, a special form of floor-switch for preserving this contact being shown in the second patent above referred to.

The unlocking-circuit is over the same path as the controlling-circuit above described up to lever 24 of the floor-switch, thence by conductor 30 through lock 31 over the common return 32 to a point on circuit 50 between the first and second lamps. If it is found that this point of connection for the locking-circuit with the circuit 50 does not give the required voltage, it may obviously be shifted to a point between the second and third lamps, and this same remark applies with equal force to the connection of circuit 71 with circuit 50.

When the button 39 was depressed, the lever 41 was drawn up by its magnet 42 and the hook on the end thereof passed over the collar or projection 74 from the stem of said button, thereby holding it depressed.

At all the other controlling-switches, both at the landings and in the car, the magnets 42 and 45 actuated their respective locking-plates which engaged with the under side of said collars or projections 74, and so prevented any of the controlling-switches save the one first operated from being operated. All of these switches, of course, were released as soon as the door 14 of the fourth floor was opened, and the system remains inoperative so long as this door remains open, thereby holding the car at that door and preventing any accident from open well-doors.

The car in descending will operate the floor-switches as just described, only in the reverse direction, the parallel portion 75 of the frog-raceway acting in the same relative manner as portion 72.

The operation of the car by a person within it is as follows: It first being observed that the multiple switch therein has a button allotted to each floor of the building, the lower one (marked B) being allotted to the basement and the others to the upper floors, as indicated by their numbers, if a person in the car desires to go to the third floor he has but to depress button No. 3. This will complete a circuit from 48, over 69, to button 3, thence by circuit 76 through the cable and to the lever 24 of floor-switch 22, thence over conductors 29 and 66, through coil 65, and the up magnet to feeder 49, as above described, when the motor will be thrown into operation and the car will ascend and stop at the third floor of the landing, as just described with respect to the fourth-floor landing. The closure of button 3 also acts to lock all the other controlling-buttons of the system, as just described, so that when one button in the car is depressed the movement of the car cannot be interfered with by persons at the landings. Should the person on the car desire to stop it at any landing other than the one first chosen, he has

but to depress the button 46, when the button first depressed will be released and any other button may be operated.

It will be noticed that when the car is started and while it is traveling the resistance 62 is cut out of circuit, allowing the motor to travel at full speed, but that as the car approaches the landing at which it is to stop the resistance is thrown into circuit and the motor checked prior to completely breaking its circuit.

The non-interference system just described may be applied to freight-elevators or dumbwaiters, as indicated in Fig. 10. The landing-switches in this instance are substantially the same as the car-switch in the previous system. Likewise the power may be derived from any suitable source, herein represented as a battery 77 78.

The up and down magnets of the starting-switch may operate upon any suitable motor in any suitable way and are the only parts of the switch here shown. In operation, the car being represented between the second and third floors and the switch-levers 24 above the car being on the up branch of the controlling-circuit 28, the depression of button 4 on the fourth floor closes circuit from the battery over conductor 79, through the locking-magnets 80, the door-opening-circuit breakers 81, the button 4, switch-lever 24 of the upper-floor switch, circuit 28 to and through the up magnet and back to the battery. This will act to lock the controlling-switches at all the other floors and hold them locked until the car has reached the fourth floor, when the circuit will be broken by the frog 82 moving the switch-lever 24 from the circuit 28. This will release all the controlling-switches. The well-door may be unlocked and opened in the manner previously described, though I have not shown the locks in this figure. I do not limit myself to the use of these locks, as the doors may be locked and unlocked by any of the automatic mechanical contrivances now in use, and as soon as the door is unlocked, no matter by what means, it will be started back by the door-opening-circuit breaker and the controlling-circuit permanently broken at that point.

As in the second patent above referred to, it is essential that some means be provided for calling attention to the person at the landing where the door is open. For this purpose I locate at each landing a call-bell or buzzer 82′, the circuit of which is closed at each door by the door-opening-circuit breaker, as by a projection on said circuit-breaker, closing two contact-springs, (indicated at 83.) This projection is preferably of insulation, so that current may not pass from the controlling-circuit 79 to the call-circuit, the call-circuit depending upon its completion by the use of the call-buttons 84.

Supposing the upper door open, the call-circuit would be as follows: from battery 77, over circuit 85, through contacts 83, call-bell 82′, and any one of the call-buttons 84, back to the battery 77. At each floor I locate indicators in the circuits 85, which shall show at which floor a door is left open, so that should a person at that floor have gotten out of hearing of the call some one may be sent to close the door. Should any one desiring the use of the car 15 find upon operation of a controlling-switch that a car does not respond, he has but to press the call-button 84 and notice the door-indicators and determine the location of the open door, the call at said door operating at the same time. In the second patent above referred to running-indicators are shown; but in this instance they have been omitted, inasmuch as the non-interference system itself indicates whether or not the car is running, since if the car is running none of the controlling-switches can be depressed. In this figure I have also omitted the supplemental branches of the up and down circuits, though, if desired, they may be used here as well as with the passenger-car. I do not, however, confine myself to their use.

It will be noticed that the battery is divided into two sections, section 77 alone being used in the call-circuit, since said circuit requires only sufficient current to operate one bell at a time and one set of door-indicators, while the controlling-circuit requires more current and is shown as using both sections of the battery.

The door-opening-circuit controller shown in Fig. 11 is formed by the addition to the circuit-breaker shown in Fig. 2 of the spring-contacts 83, between which circuit is closed by the spanning-contact 37 when the door is open, the contacts 83 being in the call-circuit, as just described. The manipulation of the car in this figure is the same substantially as that shown in the second patent before referred to, it being possible to call the car to any floor and from that floor to send it to any other floor.

The multiple switch used on the car, as shown in detail in Figs. 3 to 6, consists of a suitable box in which are spring-mounted the push-button stems B 1 2 3 4, consisting of insulated heads 86, carrying contact-plates 87, which engage with spring-tongues 88 and 89, mounted upon a strip of insulation 90. On the push-button stems are collars 91, with which the upper ends of the returning-springs engage, and above them collars 74, with which the locking-plate 44 engages. This locking-plate is mounted upon and guided by posts 92 and carries at its end the armature 93, which is presented to the magnet 94. The retracting-spring for the armature is shown at 95 as connected thereto and to one of the posts 92. The contact-springs 89 are connected together and form a common return corresponding to the common return-plate 96 of Figs. 1 and 10. The stop-button 46 consists of a spring-seated push-pin, carrying at its lower end a contact-plate 97, which engages nor-

mally with the contact-plates 98. In the locking-plate 44, at each button, is an opening of sufficient size to permit the passage of the collar 74 when the magnet 94 is deënergized, (see Fig. 5, button 1, where said plate is broken away,) but upon the energization of said magnet plate 44 is drawn toward the magnet, so that any attempt to depress a push-button stem will be frustrated by the collar 74 coming in contact with the plate, and any push-button stem which has been depressed will be held depressed by said collar coming in contact with the under side of plate 44, as in my application above referred to.

The landing or individual controlling-switches, as indicated in Figs. 7, 8, and 9, consist of a horseshoe-magnet 99, having an armature 100 hinged at one side, as by the projections 101. The push-button stem passes down between the coils of the magnet and is provided with the collars 74 and 91, as and for the purpose just described in connection with a multiple switch. The lower end of the spring which returns the push-button stem rests upon the bracket 102, secured to the support for the magnet, as indicated in Fig. 9. To the lower end of the push-button stem is secured the contact-plate 103, suitably insulated from such stem. Below this plate and insulated from each other are contact-springs 104 105, with which the plate 103 engages upon the depression of the button. Passing through a suitable guide upon the upper end of the magnet-support 106 is the locking-plate 107, which is provided with a suitable opening surrounding the push-button stem and adapted for the passage of the collar 74, said plate being hinged to the upper edge of the armature, as at 108. A spring is placed between the support 106 and the shoulder upon the locking-plate for retracting the armature and returning the locking-plate to its normal position.

The contact and magnetic elements of the multiple and individual switches just described are preferably inclosed in cases 109 and provided with face-plates 110 in the manner described in the patent granted to me January 19, 1897, No. 515,523.

Many changes may be made in the formation, construction, and the relative location of parts and arrangement of circuits from those above described without departing from my invention.

What I claim as my invention is—

1. In an electric controlling system for elevator or other cars, the combination with the controlling-circuit, of floor-switches automatically operated by the car, and a series of switches in the car corresponding to the several landings and each connected to the floor-switch of its respective landing, as and for the purpose set forth.

2. In an electric controlling system for elevator or other cars, the combination with the controlling-circuit, of floor-switches automatically operated by the car, an up-circuit branch and a down-circuit branch of the controlling-circuit common to said switches, and a series of switches in the car corresponding to the several landings and each connected to the floor-switch of its respective landing, as and for the purpose set forth.

3. In an electric controlling system for elevator or other cars, the combination with the main up and down circuit branches of the controlling-circuit, of auxiliary up and down circuit branches, floor-switches controlling the flow of current through these branches, the driving-motor, and speed-controlling mechanism operated by the current over said auxiliary branches, substantially as set forth.

4. In an electric controlling system for elevator or other cars, the combination of a switch operated by the movement of the car, and a speed-regulator controlled by said switch, as and for the purpose set forth.

5. In an electric controlling system for elevator or other cars, the combination with the controlling-circuit and the driving-motor, of retarding mechanism in the circuit of the motor, floor-switches in the controlling-circuit, and supplemental branches of said circuit extending through said switches and the retarding mechanism, substantially as and for the purpose set forth.

6. In an electric controlling system for elevator or other cars, the combination with the up and down branches of the controlling-circuit, of floor-switches automatically moved by the car from one branch to the other, and controlling-switches connected to the floor-switches for the purpose set forth.

7. In an electric controlling system for elevator or other cars, the combination with the floor-switch having a lever adapted to take five distinct operable positions, of a frog on the car for moving said lever through said positions successively, for the purpose set forth.

8. In an electric controlling system for elevator or other cars, the combination with the floor-switch having a lever provided with a projection, of a frog carried on the car for engaging said projection, the raceway of said frog consisting of three staggered positions parallel to the movement of the car, and oblique portions joining said parallel portions and extending from ends thereof, as and for the purpose set forth.

9. In an electric controlling system for elevator or other cars, the combination with the call-bells and door-indicators in series independent of the controlling-circuit, a circuit-closer for each bell operated by the opening of a well-door, and a call-button at each landing, as and for the purpose set forth.

10. A door-opening circuit maker and breaker, consisting of a spring-mounted pin, a spanning-contact mounted upon and insulated from said pin, a pair of contact-springs normally in engagement with said contact, and another pair of contacts engaged by the spanning-contact upon its disengagement

from the first pair, as and for the purpose set forth.

11. The combination with the controlling-circuit, of floor-switches at each landing, automatically operated by the car, an up-circuit branch and a down-circuit branch of said controlling-circuit common to said switches, a series of switches in the car each connected to the floor-switch of its respective landing, landing-switches, and means for locking all the landing and car switches upon the operation of any one of them, as and for the purpose set forth.

12. In an electric controlling system for elevator or other cars, the combination with controlling-switches at the landings and on the car, of locking mechanism at each switch and means actuated by any one of the switches for locking all the others.

Signed at New York, in the county of New York and State of New York, this 21st day of July, A. D. 1896.

CYPRIEN O. MAILLOUX.

Witnesses:
WM. H. CAPEL,
D. H. DECKER.