No. 786,016. PATENTED MAR. 28, 1905.

W. T. DULANY, JR.

COMBINED ELECTRIC AND MECHANICAL SIGNAL APPARATUS FOR ELEVATORS.

APPLICATION FILED MAY 11, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

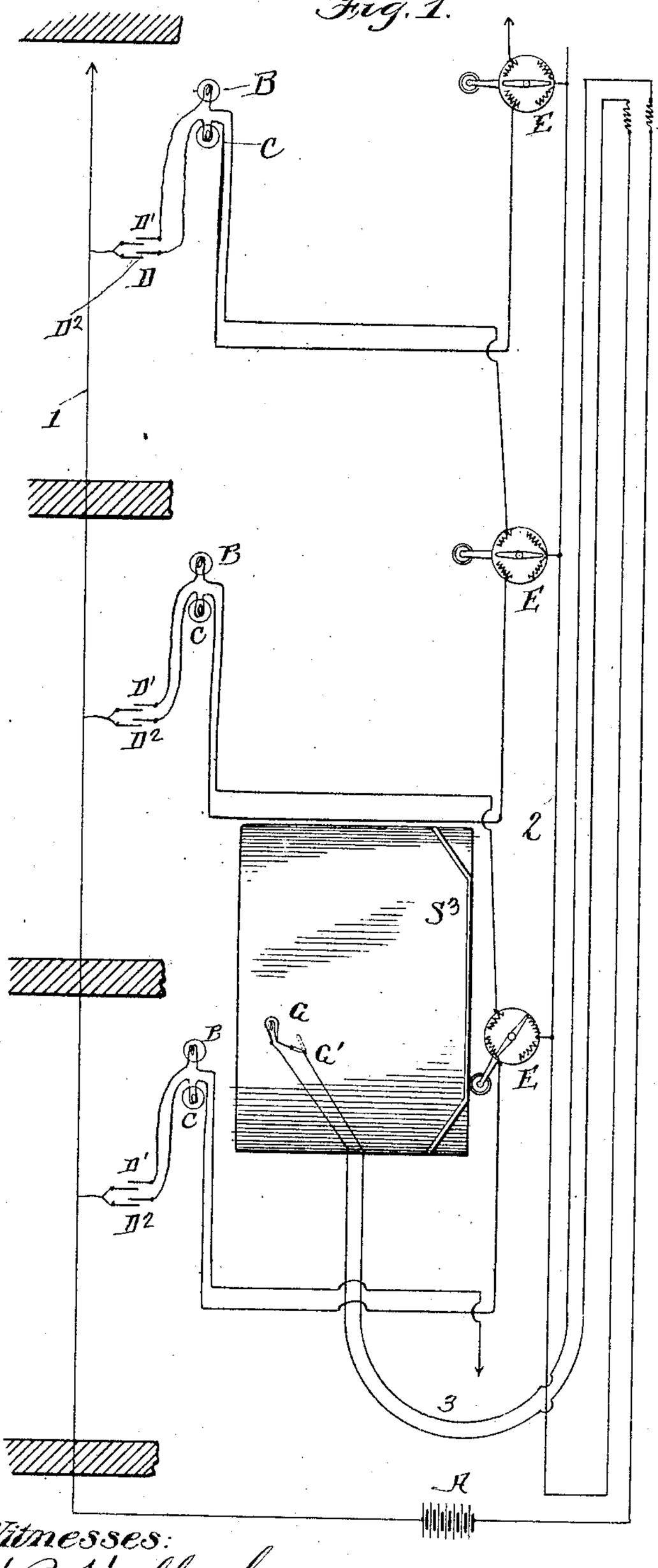
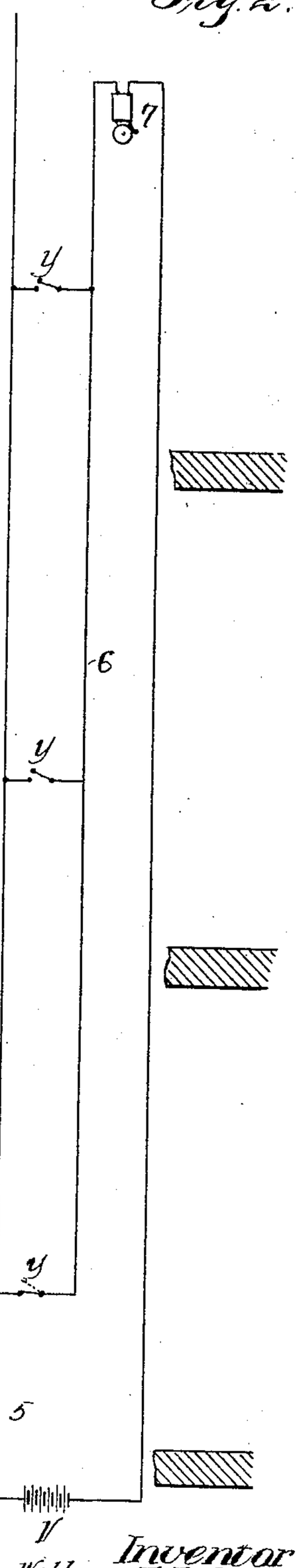


Fig. 2.



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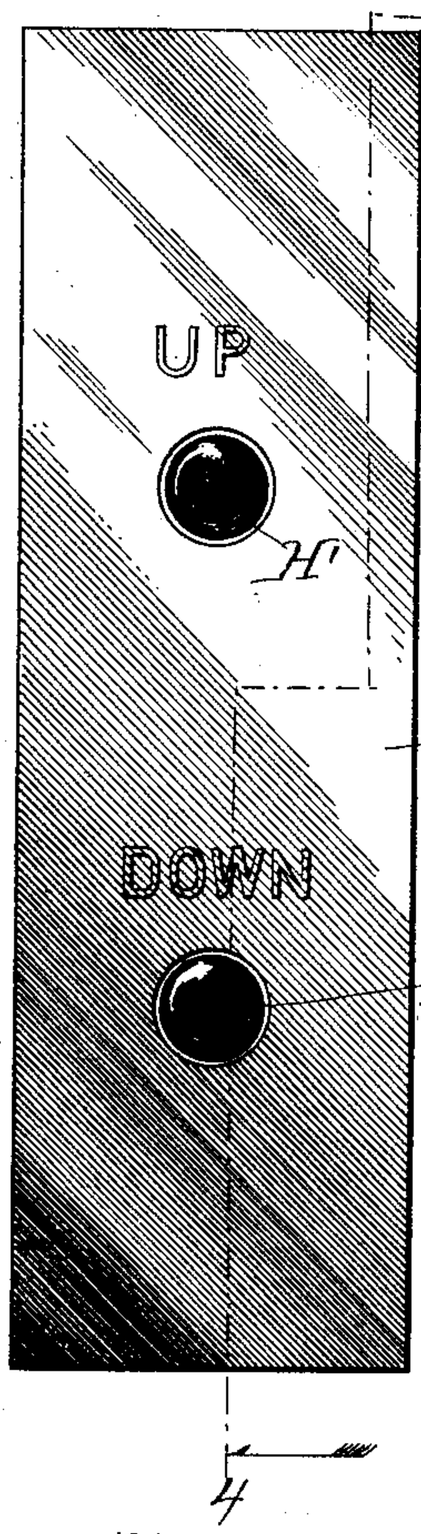

Fig. 3

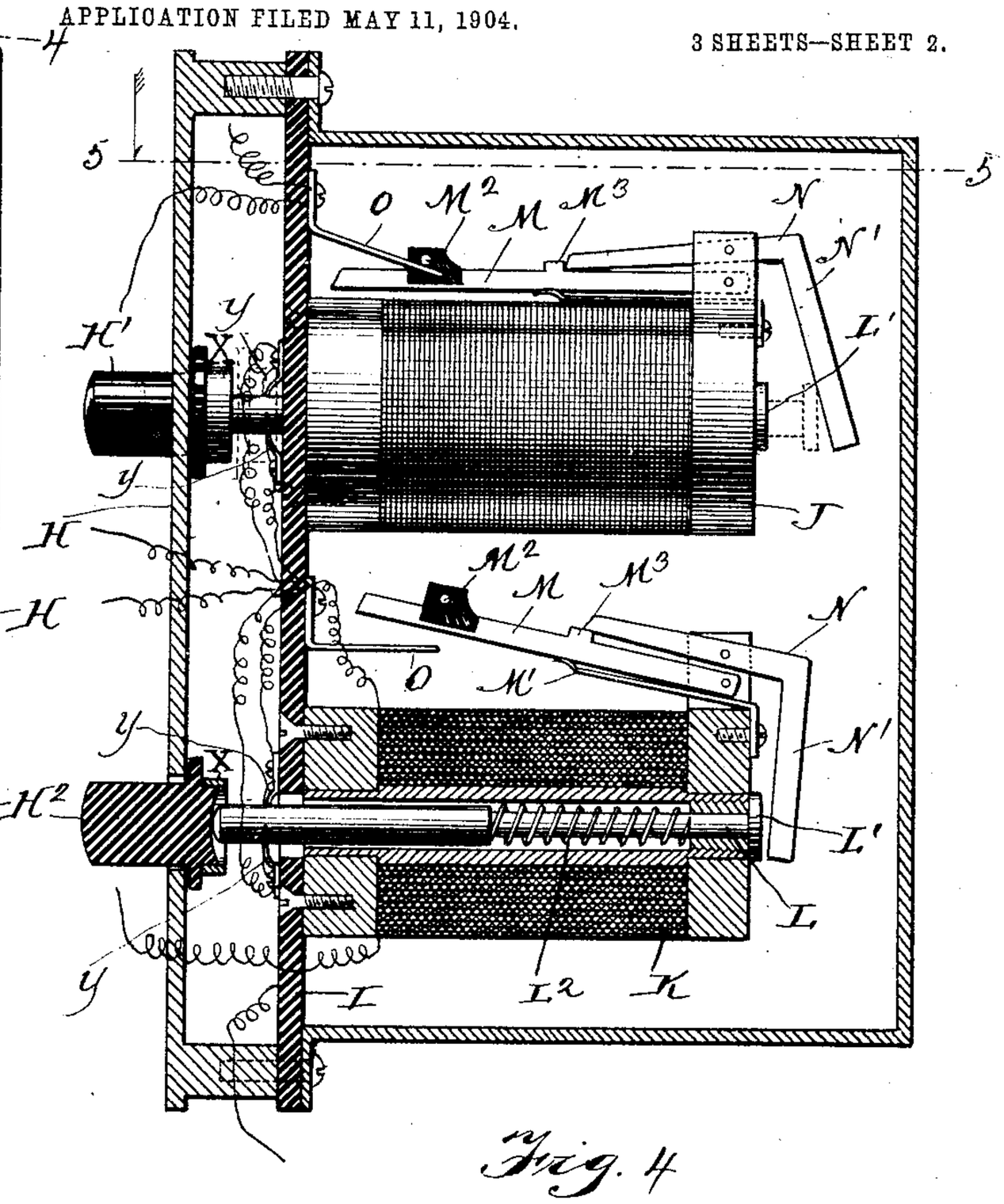

Fig. 4

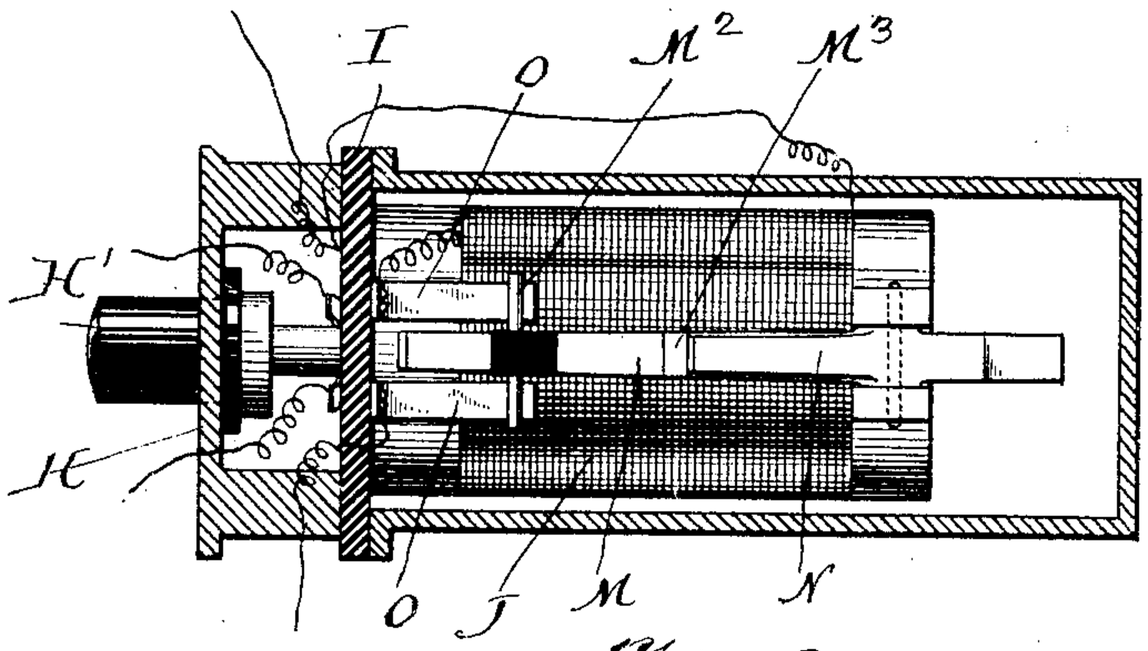

Fig. 5.

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3 SHEETS—SHEET 3.

Fig. 6.

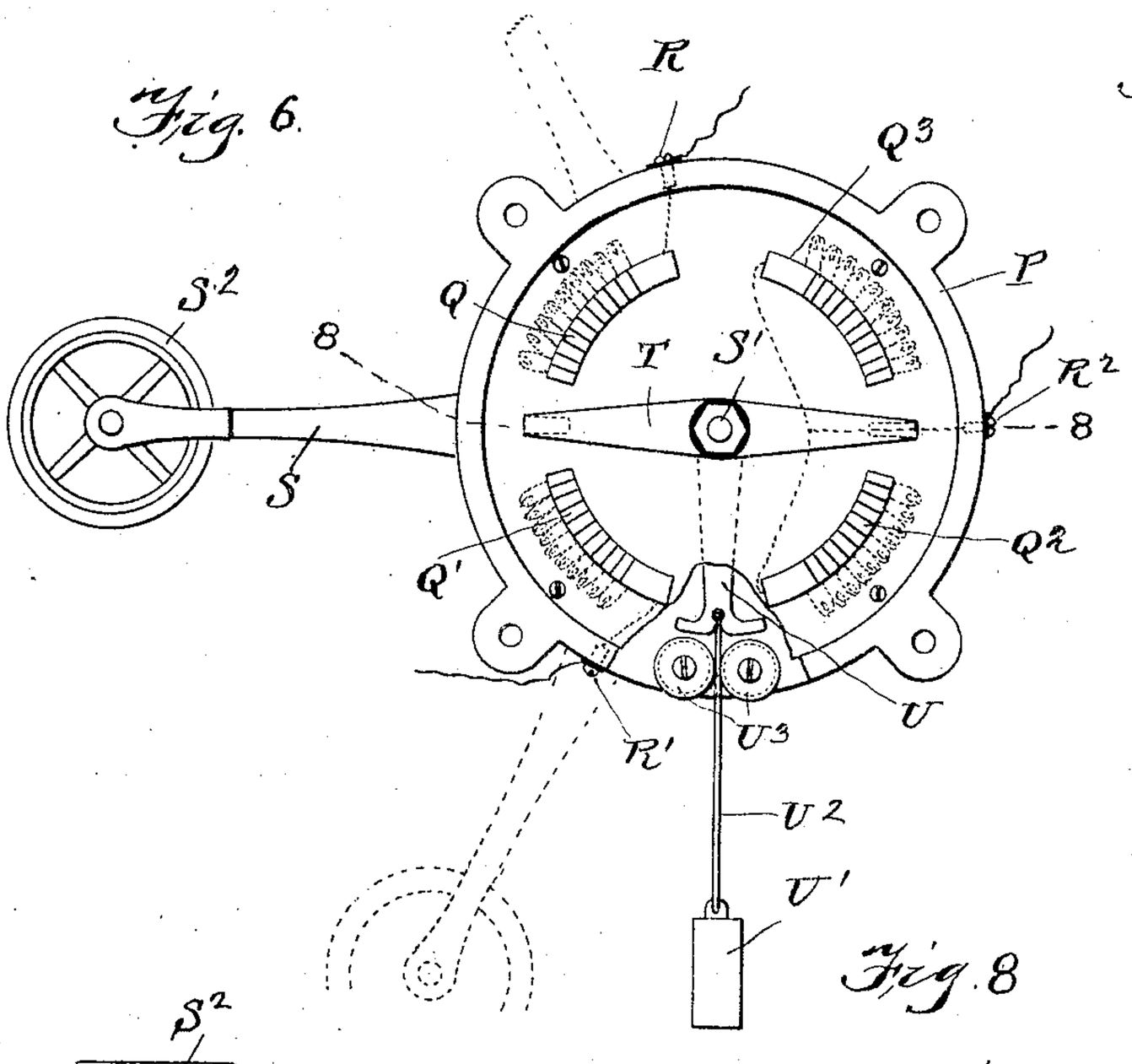


Fig. 7

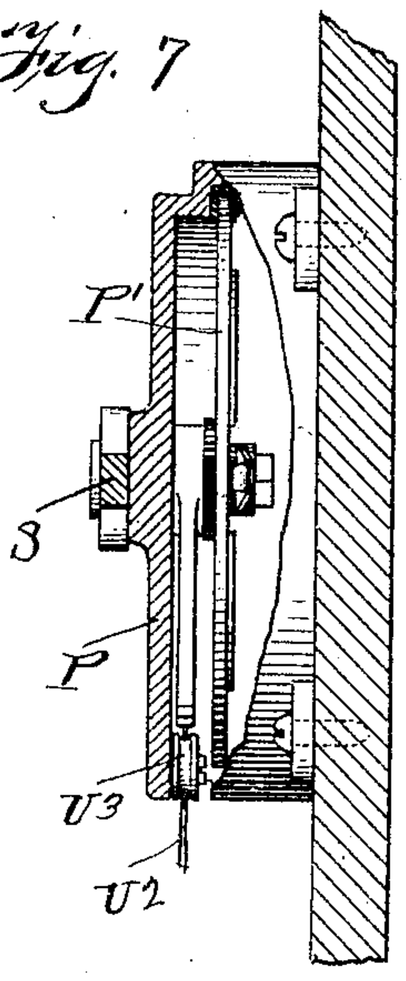


Fig. 8

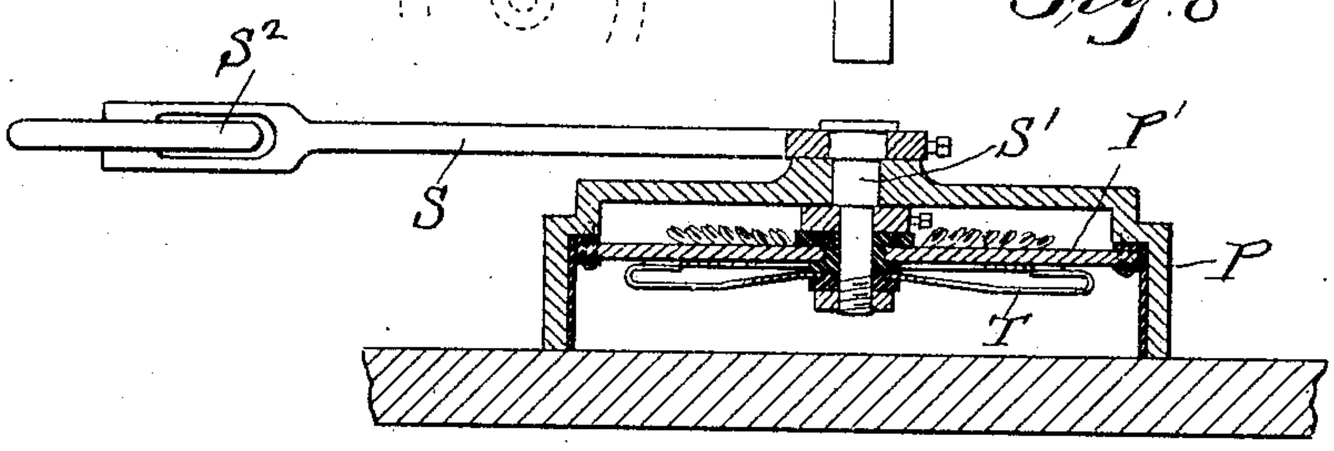


Fig. 9

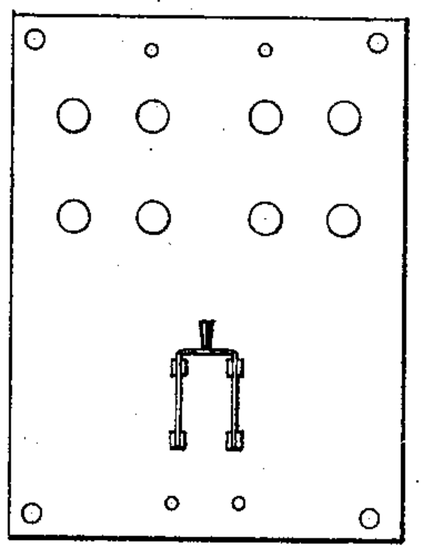


Fig. 10.

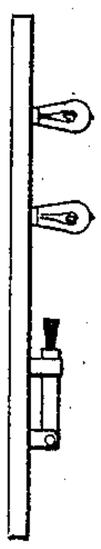
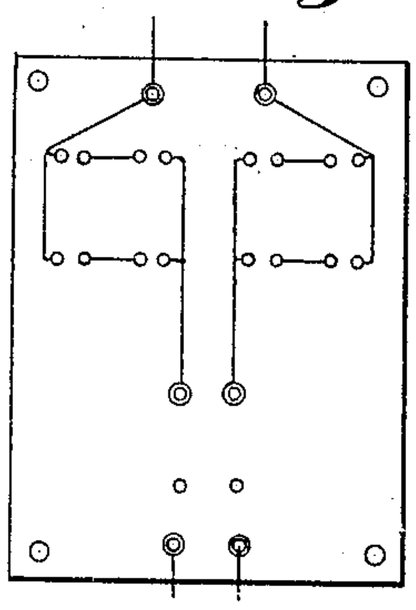


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM T. DULANY, JR., OF BROOKLYN, NEW YORK.

COMBINED ELECTRIC AND MECHANICAL SIGNAL APPARATUS FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 786,016, dated March 28, 1905.

Application filed May 11, 1904. Serial No. 207,385.

To all whom it may concern:

Be it known that I, WILLIAM T. DULANY, JR., a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Improvement in a Combined Electric and Mechanical Signal Apparatus for Elevators, of which the following is a specification.

My invention relates to a new and useful improvement in combined electric and mechanical signal apparatus for elevators; and I have for my object to provide an apparatus of this description whereby a party wishing to descend may notify the operator of the car when the car has reached the floor directly above that on which the person is waiting, or said person, if wishing to ascend, by pressing the button marked "Up" may notify the operator of the car one floor below, and in either case the waiting person would be notified by a light-signal of the approach of the car, the location of the approaching car, and the direction of its movement.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a diagrammatical view illustrating my improved signaling apparatus; Fig. 2, a diagrammatical view showing the wiring of the elevator-shaft for the call-bell; Fig. 3, a front elevation of the push-button apparatus; Fig. 4, a section taken on the line 4 4 of Fig. 3; Fig. 5, a section taken on the line 5 5 of Fig. 4; Fig. 6, a front elevation of one of the double-throw rheostat-switches, the different positions of the movable arm being shown in dotted lines; Fig. 7, an edge elevation of one of said double-throw rheostat-switches, a portion of the casing being broken away; Fig. 8, a horizontal section taken through Fig. 6 on the line 8 8; Fig. 9, a front elevation of the lamp-rheostat terminal-board; Fig. 10, an edge elevation of Fig. 9; Fig. 11, a rear view of the lamp-rheostat terminal-board.

In my apparatus there are two electric lights in front of and directly over the doorway of each of the several elevators upon each floor, one light marked "Up" and the other "Down," and upon each floor is one push-button apparatus having two buttons, one marked "Up" and the other "Down." In the elevator-shaft between each floor is located a double-throw rheostat-switch which is normally held horizontal out of contact; but if the arm which operates the switch is moved downward it will make contact through the lamp of this particular elevator-shaft marked "Down" in the hall below, and if the arm is moved upward it will make contact so that the current will flow through the lamp of this particular shaft marked "Up" in the hall above, and the push-button apparatus is so constructed that it will be automatically returned to its normal position, breaking the circuit when the rheostat-arm resumes its normal position after being operated.

Referring to Fig. 1, A represents the source of electricity, a wire 1 leading from one terminal of the source of electricity upward along the elevator-shaft. B and C represent lamps in the hall upon each floor. D represents the push-button apparatus, one located upon each floor. Each push-button apparatus contains two switches. (Represented in diagram in Fig. 1 as D' and D^2.) From the wire 1 the circuit is as follows: through the switches D' and D^2 in multiple series, through lamps B and C that are situated upon the same floor with the push-button switches, and from the lamp B on each floor to and through the double-throw rheostat-switch E below that floor, and from the lamp C of each floor to and through the double-throw rheostat-switch situated just above the floor, through said double-throw rheostat-switches to the individual fuse-blocks F situated midway in each elevator-hatch, and from the fuse-block to and through the flexible cable 3 to the elevator, to operator-switch G', to operator-lamp G, back through the cable to the fuse-block, and back to the source of supply. Thus it will be seen that if the

push-button marked "Down" is pressed inward and the switch D^2 closed when the car strikes the movable arm of the next rheostat above the floor on which the person wishing to descend is waiting a circuit will be established through the wire 1, through the lamp C, switch D^2, through the double-throw rheostat-switch, through the wire 2, through the fuse-block F, through the flexible cable E, through the light and switch in the car, and then backward through the flexible cable 3 to the source of electricity A. Thus the light marked "Down" will glow in the hall and notify the person waiting which car is descending and the light C within the car will glow and notify the operator that the person wishing to descend is waiting on the floor below, and as soon as the car passes the rheostat-switch the movable arm will return automatically to its normal position, breaking the circuit, and by the breaking of the circuit in the rheostat-switch the push-button apparatus will automatically break the connection at this point and the parts will return to their normal or unset position.

I will now describe the several parts of this system in detail, referring to Figs. 3, 4, and 5 in detail.

H represents the push-button plate through which the push-buttons H′ and H^2 protrude, said push-buttons being preferably made of insulating material. One push-button is labeled "Up" and the other "Down."

I is a plate of insulating material located back of the plate H, and to this plate I is secured all the operating parts.

J and K are two electromagnets secured to the rear of the plate I and directly back of the push-buttons H′ and H^2.

L represents pins or plungers which extend through the hollow core of the magnets longitudinally, a head L′ being secured upon the rear end of each pin or plunger.

L^2 represents springs interposed between a bushing secured at the rear end of the magnets through which the pins slide, and shoulders formed upon the pins or plungers L, said springs tending to force the pins or plungers L outward in their normal or unset position, the forward ends being in contact with their respective push-buttons H′ and H^2.

K^{10} represents the heads of the electromagnets composed of magnetic material.

M represents armatures, one pivoted to each magnet-head and normally held in their raised position by means of the springs M′.

N represents latches pivoted to the magnet-heads above the pivotal points of the armatures M, and the rearward ends of these latches are bent down in the form of bell-crank levers, the rearward ends coming opposite the rear ends of the pins or plungers L, and these latches are made of hard non-magnetic metal. The forward end of the nose of the latches N normally rests upon the lugs M^3, extending upward from the armatures M.

When a push-button is pressed inward, the rear end of the plunger which it operates will come in contact with the rearward downwardly-bent end of the latch N, and as it is pressed outward the forward end of the latch N will press downward upon the armature M, and on account of the arrangement of the pivots of the latch and armature M the nose of the latch will drop behind the lug M^3 when the armature M is depressed, and thus hold said armature M depressed until said latch is released by the action of the current flowing through coil K. Each armature M is provided with a switch blade or bar M^2, insulated from said armature, and when the armature M is depressed said switch-bar is adapted to come in contact with two springs O, and thus make an electrical connection between said springs. These springs represent the switches D′ and D^2 in Fig. 1. One of the springs of each set is connected to the wire 1. The other spring of the upper set after passing through the coil of the magnet J passes through the lamp B and extends to one binding-post of the rheostat E just below. The other spring of the lower set after passing through the magnet K and lamp C is connected to a binding-post of the rheostat just above. Thus it will be seen that if the push-button marked "Up" is pressed inward the armature M will be locked in its depressed position, making contact between the two springs O directly above the magnet J. Then whenever a car raises the arm of the double-throw rheostat-switch just below this floor a circuit will be established through the magnet J, and this magnet will attract its armature M, thereby releasing the nose of the latch N from behind the lug M^3, and thereby leave the armature M free to move upward; but said armature will be held in the depressed position by the attraction of the magnet J as long as the rheostat-switch arm is held raised by the car; but as soon as the car passes the rheostat-switch the movable arm of said switch will resume its normal position, breaking the circuit and allowing the armature M to be raised by the spring M′. Then all other parts will be in their normal position. The same operation will be repeated if the button marked "Down" is pressed inward, except that the magnet K will only be energized when the arm of the rheostat next above is depressed.

It will be understood that the rearward ends of the latches N′ are heavy, so that when the latches are released they will automatically return to their normal or unset position.

In Figs. 6, 7, and 8 I have illustrated the double-throw rheostat-switch in detail, which consists of a box-casing P, adapted to be secured to the wall. This casing has secured therein the disk P′, properly insulated from

the casing, the casing being preferably lined with asbestos. Upon this disk P′ are arranged four series of contacts Q, Q′, Q^2, and Q^3, which contacts are connected with the three binding-posts R, R′, and R^2. The series of contacts Q′ and Q^3 are diametrically opposite one another, as also are the series of contacts Q and Q^2, said contacts being arranged in a circle concentric with the center of the disk P′. Both of the series of contacts Q^2 and Q^3 are connected with the binding-post R^2, said binding-post being connected to the wire 2, as shown in Fig. 1. The series of contacts Q are connected to the binding-post R, said binding-post being connected by wire to the switch D′ on the floor above, the series of contacts Q′ being connected to the binding-post R′, and said binding-post is connected by wire with the switch D^2 on the floor below. It is understood that said double-throw rheostat-switches are preferably located about two feet below the floors, and it is also understood that each contact of each series is connected with the next contact of the same series through a resistance-coil. S is an arm connected at its inner end to a shaft S′, passing through the center of the disk P′, and in the outer end of the arm S is journaled a rubber-tire wheel S^2, which is adapted to come in contact with the shoe S^3, carried by the car, as shown in Fig. 1. Secured to the shaft S′ is a spring contact-arm T, which extends outward each side of the shaft and when turned is adapted to connect the series of contacts diametrically opposite one another. In its normal position this arm T is out of contact with any of the series of contacts; but if the lever S is pressed downward one end of the contact-arm T will come in contact with the contacts Q′ and the other end of the arm T will come in contact with the contacts Q^3. The contacts Q and Q^2 will be connected when the lever is raised. U is an arm extending downward from the shaft S. U′ is a weight secured at is upper end to a flexible connection U^2, which flexible connection passes between two guide-rollers U^3 and is connected at its upper end to the arm U. Thus it will be seen that the weight will hold the arm S horizontally in its normal position and will return the arm S to this normal position no matter which way the arm is moved. It will be obvious that instead of a weight a spring could be used, one end of the spring being attached to the wall and the other end to the flexible connection; but as I understand a weight and spring are equivalent when used in this manner I have not deemed it necessary to illustrate the spring. When the weight is used, it would be inclosed in a casing for guiding the same.

In Figs. 9, 10, and 11 I have illustrated my lamp-rheostat terminal-board F. If electric lights are used having the capacity to carry the current with which the building is wired, it would only be necessary to use a simple fuse-block with the double-throw rheostat-switch; but should it be desired to use lamps of a lower voltage than that with which the building is wired it would then be desirable to use the aforesaid lamp-rheostat terminal-board connected in multiple series with the switch and fuse-block. In this apparatus I have included an alarm-bell circuit to be used in conjunction with the light-signal to be used at night and on holidays and Sundays, when traffic is light and it is desired to cut down the number of operating cars and have these cars only operate upon call. The bell-circuit is cut out by the opening of a switch included in said circuit during business hours or during the day, as the cars run continuously. The object of the alarm-bell is to call the operator's attention to the fact that there is some one desirous of using the car, and the operator upon hearing said audible alarm immediately answers by starting up with his car, and as he approaches the floor from which said signal was given his light is caused to glow in the car, and in turn he gives a like signal to the waiting passenger, thereby notifying said passenger of the approach of the car.

The alarm-bell apparatus is operated from the same push-button as the light-signals, and the apparatus is constructed as follows: The wire 4 extends upward through the shaft from any suitable source of electricity, (lettered V in Fig. 2,) a switch 5 for controlling this circuit being included in the same. Each of the push-buttons H′ and H^2 have upon their inner ends a metallic sleeve or core X, which are adapted to come in contact, when pressed inward, with two springs Y, so as to connect these springs electrically, and one of each set of springs Y is connected to the wire 4 and the other spring of each set is connected to a wire 6, extending to a call-bell 7, and from there to the other terminal of the battery or other source of electricity V.

It will be understood that each car operates only its own individual lamps that are situated in front of and over their respective doorways; yet it is only necessary to have one of the combination electro push-button switches to each floor, it being connected in multiple series with all of the several double-throw rheostat-switches upon one floor. Whether there be one or twenty it sets all of the circuits, and the first car in either direction (unless the operator throws his switch) takes the signal, thereby unlocking the push-button switch, causing the same to resume its normal position, in which condition it will remain until some one else desiring service presses either button, which again sets the signal, as before, for all the cars. The object of the operator's switch is to enable him to run by in either direction if his car should be loaded,

thereby leaving the signal set for the next succeeding car in that direction; otherwise he would trip the signals and cause confusion.

I do not wish to be understood as limiting myself to the exact construction herein shown, as slight modifications must be made to conform to the various conditions met with, and therefore I do not wish to be so limited that I cannot make these modifications without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is—

1. In a signaling system for elevators, two lamps located in the hall of each floor, a double-throw switch located between each floor, a lamp traveling with the car of the elevator, a push-button electromagnetic switch apparatus located on each floor, each push-button electromagnetic switch apparatus containing two push-buttons, one marked "Up" and the other "Down," two switches located in each push-button electromagnetic switch apparatus, each switch adapted to be closed and locked by the pushing in of the push-button, one terminal of each of the lamps in the hall being connected to one member of one switch in the electromagnetic switch apparatus upon the same floor, the other members of said switches being connected to the source of electrical supply, the other terminal of one of the lamps being connected to one binding-post of the double-throw rheostat-switch above, the other terminal of the other lamp connected to the binding-post of the double-throw rheostat-switch below, all of said double-throw switches being connected to a wire extending through a suitable fuse-box, flexible cable and signal in the car to the source of electricity, a movable switch-arm provided upon each double-throw switch, said switch-arms adapted to be moved upward when the car is traveling upward, and moved downward when the car is descending, as and for the purpose specified.

2. In a signaling system for elevators, a push-button switch apparatus located on each floor, each push-button apparatus consisting of two push-buttons, one marked "Up" and the other "Down," two switches located in each push-button apparatus, one switch operated by each push-button, said switches adapted to be closed and locked by the pressing inward of the push-button, two signals located in the hall in front of each elevator upon each floor, one marked "Up" and the other "Down," one terminal of each signal in the halls connected in multiple to one source of electricity, the switch controlled by the push-button marked "Up" included in the circuit from the signal marked "Up" to the source of supply, and the switch controlled by the push-button marked "Down" included in the circuit from the signal marked "Down" to the source of supply, a series of double-throw rheostat-switches located between each floor, the other terminal of the signal marked "Up" being connected to one binding-post of the double-throw switch next below, and the other terminal of the signal marked "Down" being connected to one binding-post of the double-throw switch next above, one binding-post of each double-throw switch being connected to a return-wire extending to the source of electricity, said return-wire extending through a flexible cable to an elevator-car, an electric signal and switch included in said circuit within the car, a movable contact-arm carried by each double-throw switch which are adapted to be raised or lowered as the car ascends or descends to establish a circuit through one or the other of the signals or alarms located in the hall, according to the push-button which is actuated, magnetic means located in each push-button apparatus for releasing the locking arrangement of the switch as soon as the current is established but holding the switch closed as long as the current continues to flow, the parts automatically returning to their normal position when the current is broken by the double-throw switch returning to its normal position, as specified.

3. In a signaling system for elevators, two lamps located in the hall upon each floor in front of each elevator, a source of electricity, an automatic push-button electromagnetic switch apparatus located upon each floor, each push-button apparatus containing two push-buttons, one marked "Up" and the other "Down," a switch controlled by each push-button, a series of two-way switches located between each floor, each two-way switch composed of three contacts, a movable arm carried by each switch, one contact of each two-way switch being connected to a return-wire extending to the source of electricity, the second contact of each two-way switch being connected through one of the lamps on the floor above to the switch controlled by the push-button marked "Up" on the floor above, and the third contact being connected through one of the lamps on the floor below to the switch controlled by the push-button marked "Down" on the floor below, each of said switches in the push-button apparatus being connected to the other terminal of source of electricity, a spring normally holding the movable arm of each two-way switch out of contact with any of the three contacts, a shoe or friction-surface arranged upon the car adapted to come in contact with the movable arm of the two-way switches as the car ascends or descends to raise or lower said contact-arms and thus establish a circuit through either one of the switches and lamps upon each floor according to the push-button that is actuated and according to the direction in which the car is traveling, means for unlocking the push-button switch apparatus and allowing the parts to return to their normal position as the circuit is made and broken in the two-way switches, and a signal and switch

carried by the car included in the return-wire, as specified.

4. In a signaling system for elevators, the combination of the source of electricity, two signal-lamps located on each floor in front of each elevator, a series of two-way switches located a slight distance below each floor, one binding-post of each two-way switch being connected to the other source of electricity, said two-way switches adapted to be operated by the ascending and descending of the elevator with a push-button switch apparatus located on each floor, each push-button apparatus consisting of two push-buttons, two electromagnets in each apparatus, two switches located in each apparatus, one member of one switch being connected to one terminal of one half of the lights in the same hall after passing through the magnet controlling said switch in the push-button apparatus, one member of the other switch being connected to one terminal of the other half of the lamps in the same hall after passing through the magnet controlling said switch in the push-button apparatus, the other members of the switches being connected to the source of electricity, the other terminals of half of the lights being connected to one binding-post of their respective two-way switches directly below, the other terminals of the other half of the lights being connected to their respective two-way switches next above, two movable armatures, one for each magnet, said armatures adapted to close the switches when operated, springs normally holding the armatures in their normal positions with the switches open, means for operating either one of these armatures by the pressing inward of their respective push-buttons, means for locking these armatures in this position against the tension of their springs, springs for returning the push-buttons to their normal position after being released, locking devices, one for each magnet, said locking devices adapted to hold the armatures in the position placed by the push-buttons by means of the tension of the armature-springs, said locking devices so constructed that they will automatically release and unlock the armatures when the magnets are energized, said armatures then remaining in their operated position by the attraction of the magnets as long as the current is flowing through said magnets, the armature-springs returning said armatures to their normal position when the current is broken, the two-way switches adapted to be operated by the car when the car is ascending to establish a circuit through all the lamps upon the floors marked "Up" upon those floors in which the push-button marked "Up" has been pressed inward when the car actuates the two-way switches directly below said floors and the circuit is established through the lamps marked "Down" upon each floor on which the push-button marked "Down" has been pressed inward by the actuating of the two-way switches directly above these floors as the car descends, as specified.

5. In combination with a signaling system of the character described, a push-button apparatus consisting of a double push-button, one marked "Up" and the other "Down," two electromagnets, one opposite each push-button, a plunger extending through each magnet, a spring normally holding said plunger in its forward position, the forward end of said plunger being in contact with the push-buttons, an armature pivoted to each magnet, springs normally forcing said armatures away from the magnets, two spring-contacts arranged in juxtaposition to each armature, a metallic connector insulated from each armature and adapted to connect the two spring-contacts when the armature is depressed, a locking device pivoted above each armature, a weighted extension extending downward from the rear end of each latch or locking device within the path of travel of the plunger, the nose of said locking device being pressed downward when the weighted portion is pressed outward by the plunger, the nose of the locking device when pressed downward also pressing the armatures toward the magnets, lugs extending upward from each of the said armatures behind which the nose of the locking devices are adapted to lodge when said nose has pressed the armature a predetermined distance downward bringing the connector in contact with the two springs, said locking device adapted to return automatically to its normal position by gravity when the magnet is energized and the armature attracted toward the magnet thus releasing the tension between the lug and the nose of the locking device, as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

WILLIAM T. DULANY, JR.

Witnesses:

WALTER ORPEN,

ROLLAND WILBER