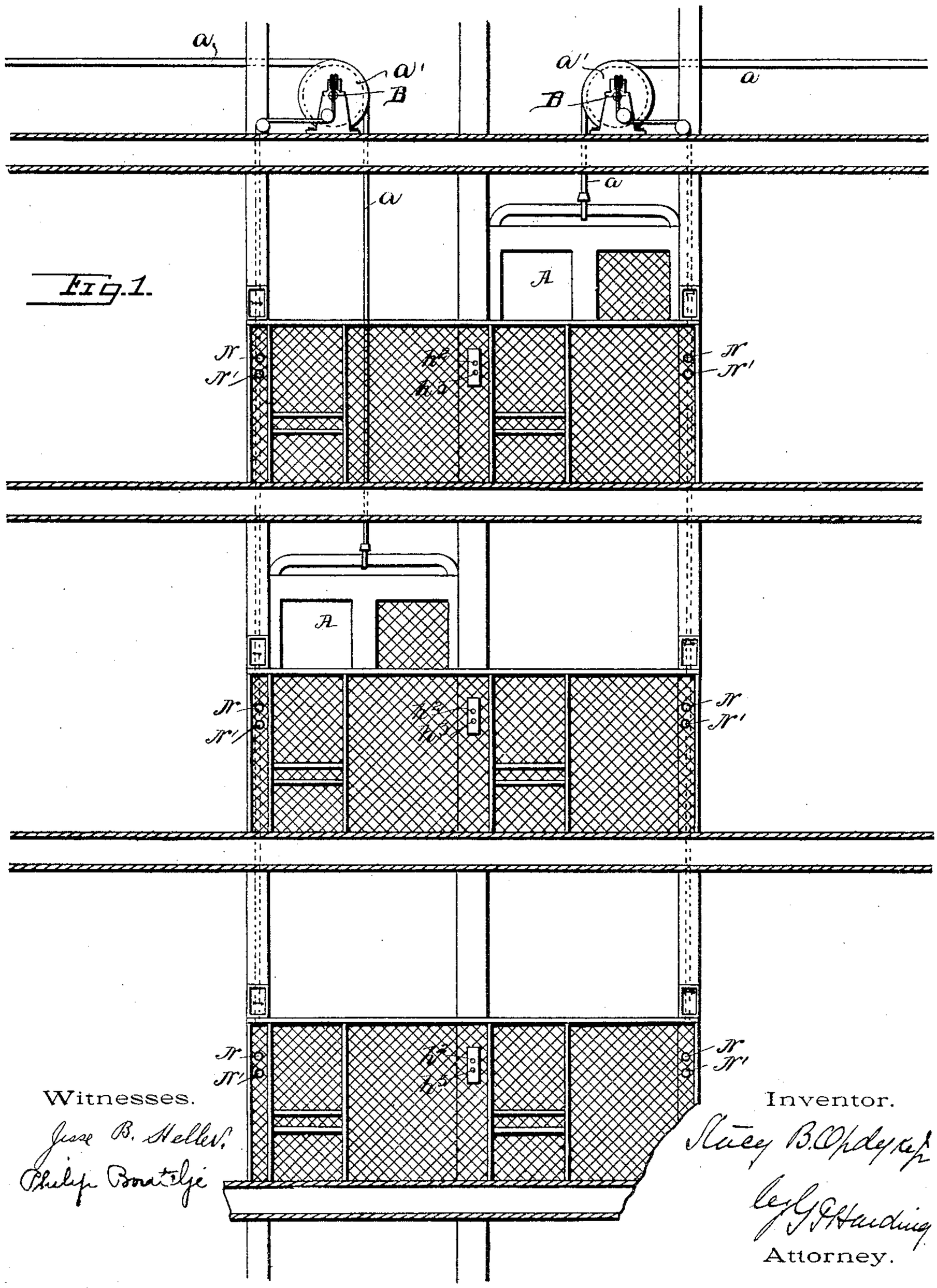
(No Model.) 6 Sheets—Sheet 1.

S. B. OPDYKE, Jr.

ELEVATOR SIGNAL APPARATUS.

No. 572,563. Patented Dec. 8, 1896.

Fig. 1.



Witnesses.
Jesse B. Heller.
Philip Bonatelje

Inventor.
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(No Model.) 6 Sheets—Sheet 2.

S. B. OPDYKE, Jr.

ELEVATOR SIGNAL APPARATUS.

No. 572,563. Patented Dec. 8, 1896.

Fig. 2.

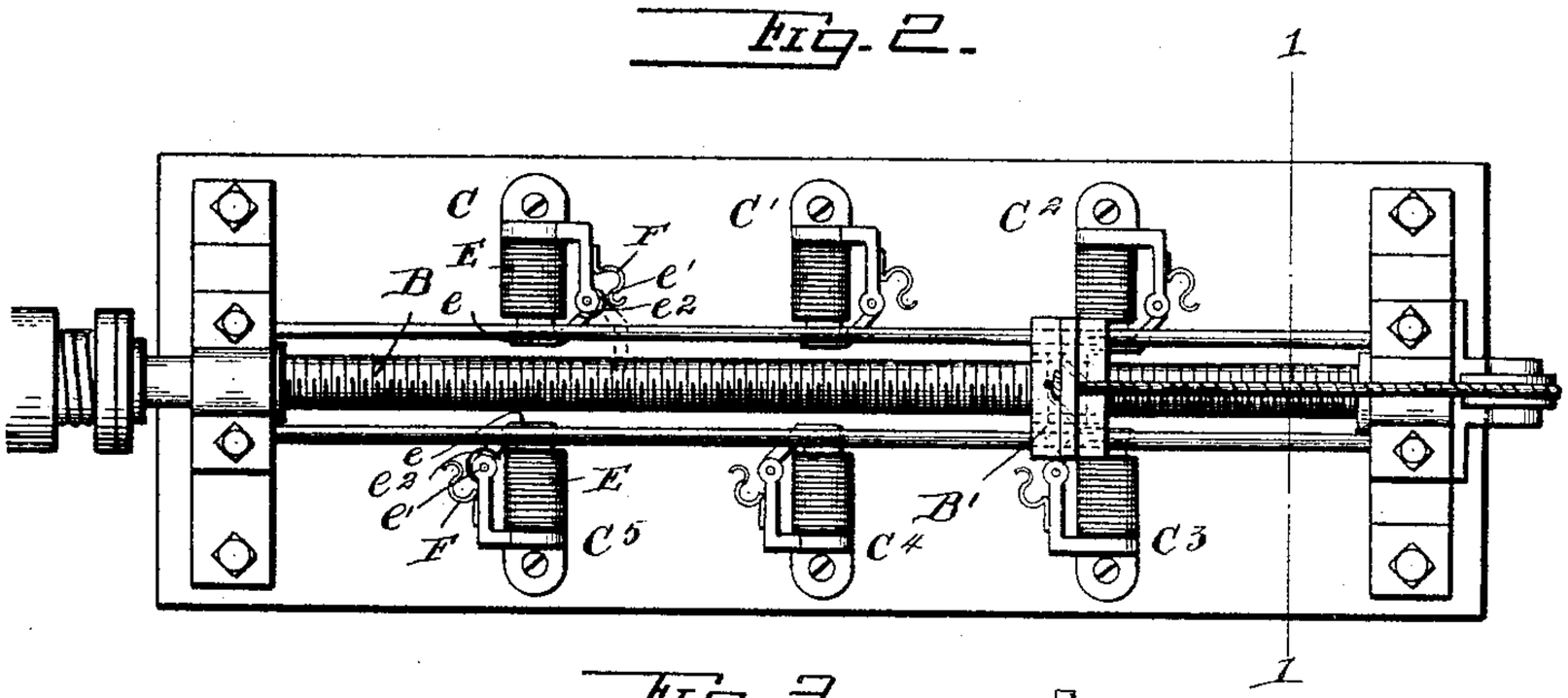


Fig. 3.

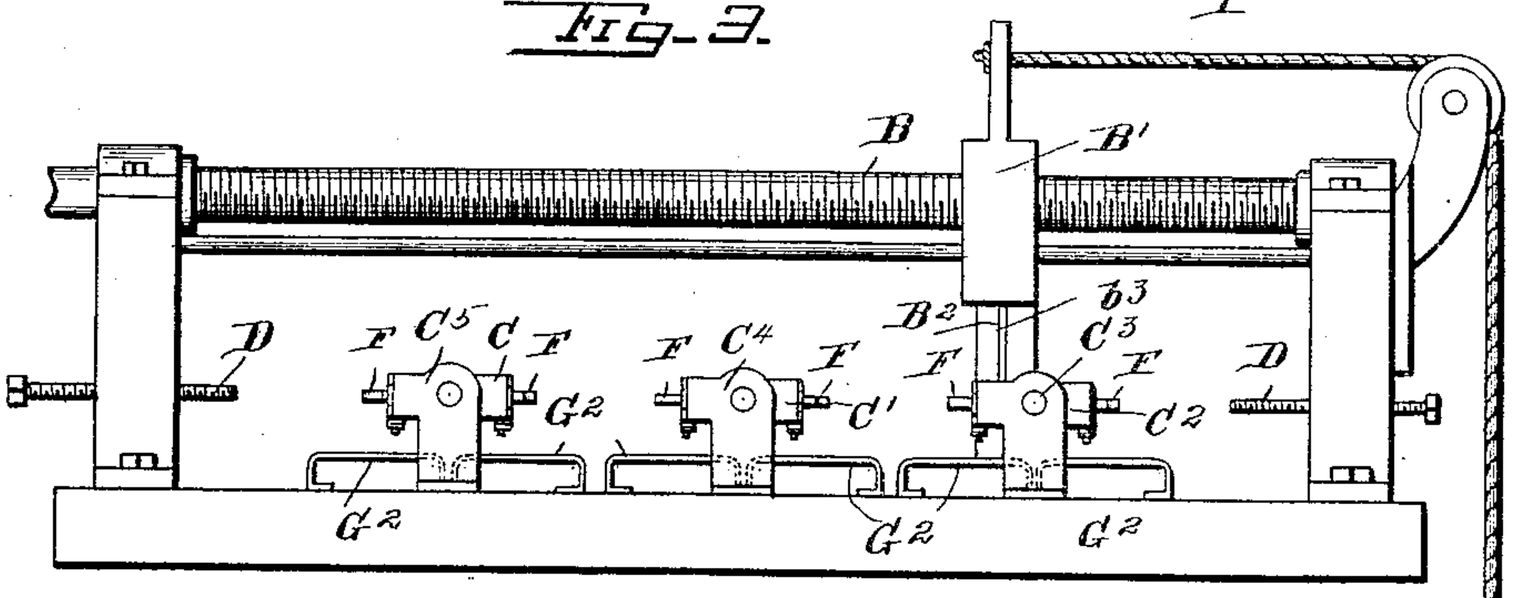


Fig. 5.

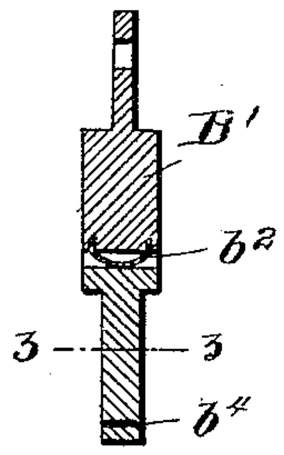


Fig. 4.

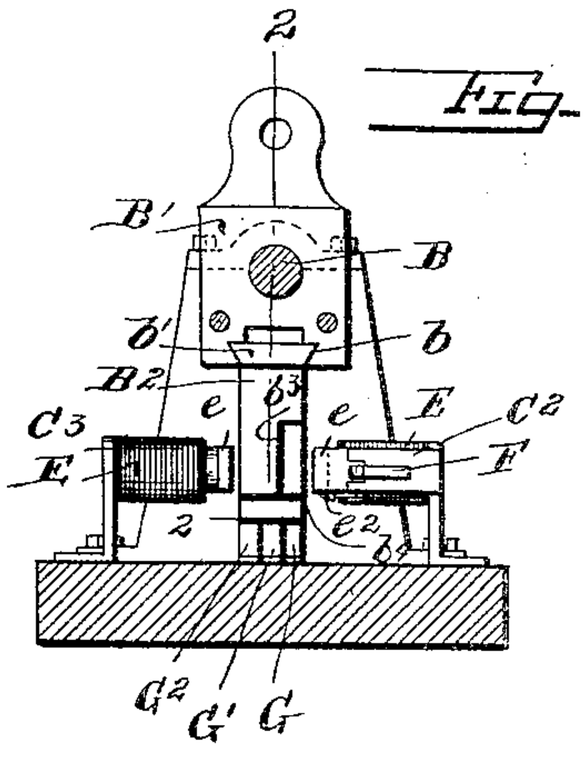
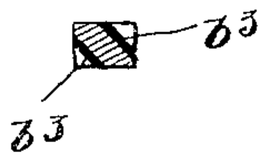


Fig. 6.



Witnesses.

Jesse B. Heller

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(No Model.) 6 Sheets—Sheet 3.

S. B. OPDYKE, Jr.

ELEVATOR SIGNAL APPARATUS.

No. 572,563. Patented Dec. 8, 1896.

Fig. 7.

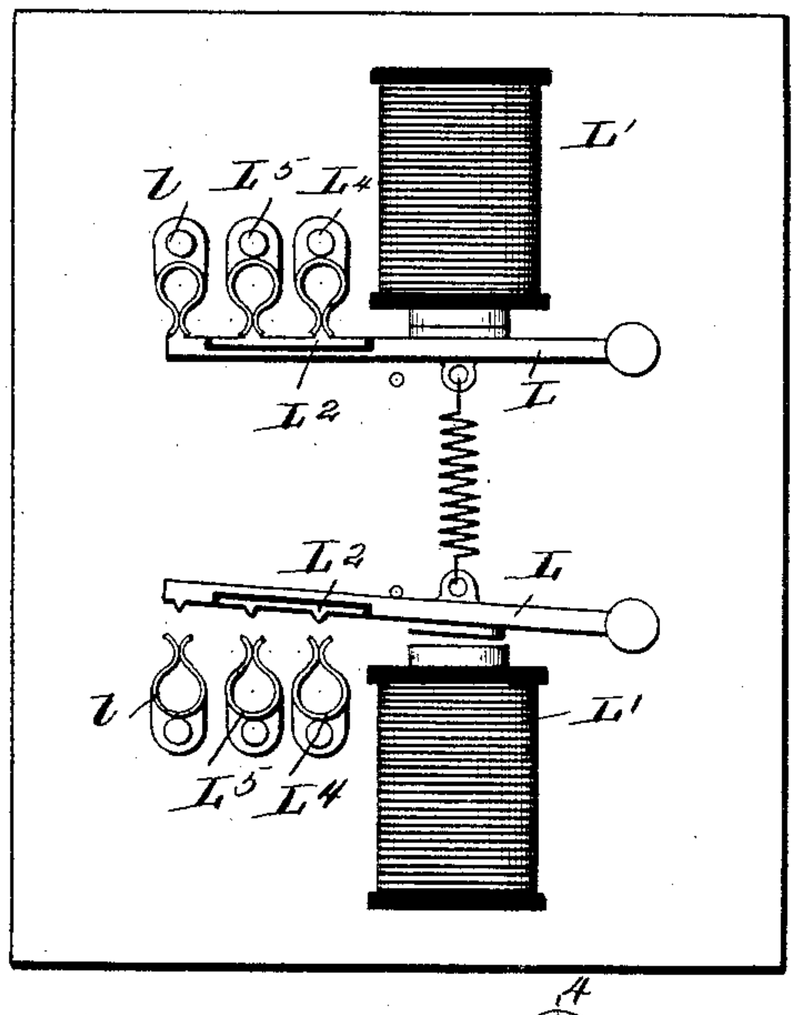


Fig. 8.

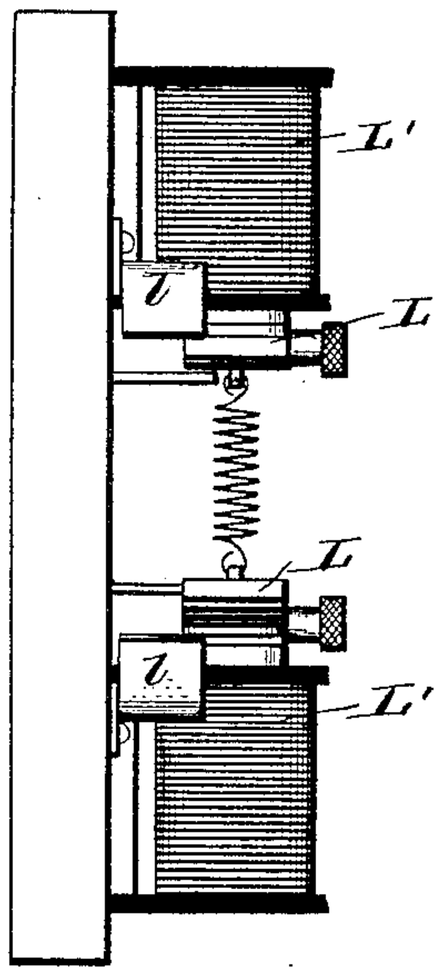


Fig. 9.

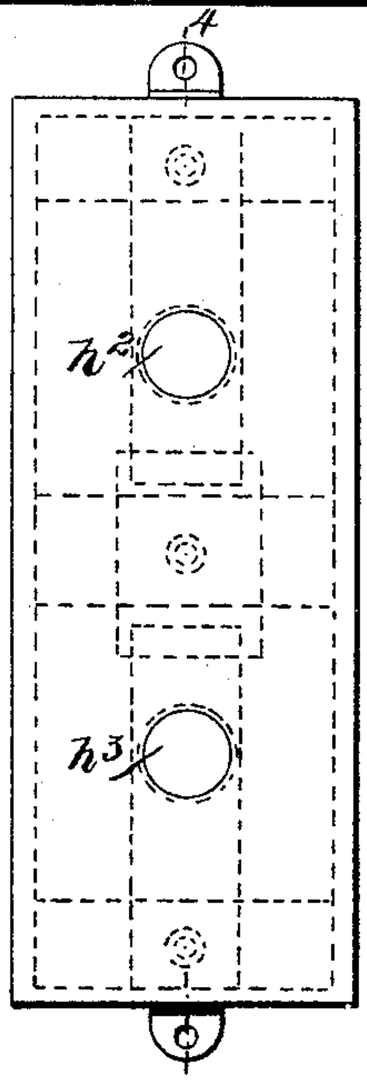
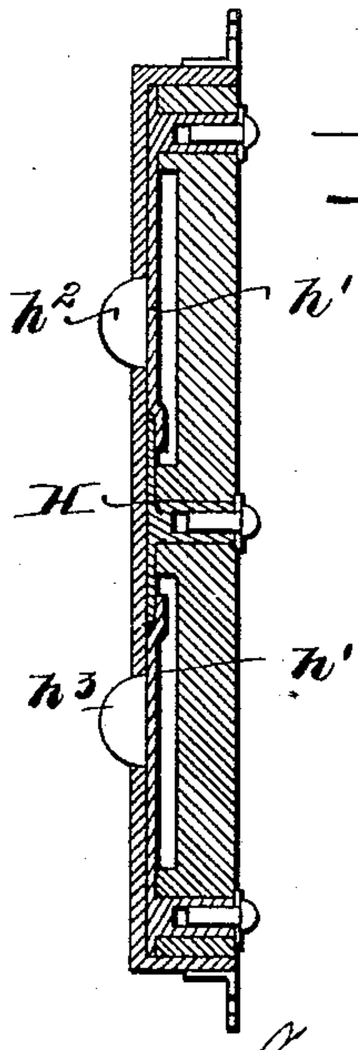


Fig. 10.



Witnesses.

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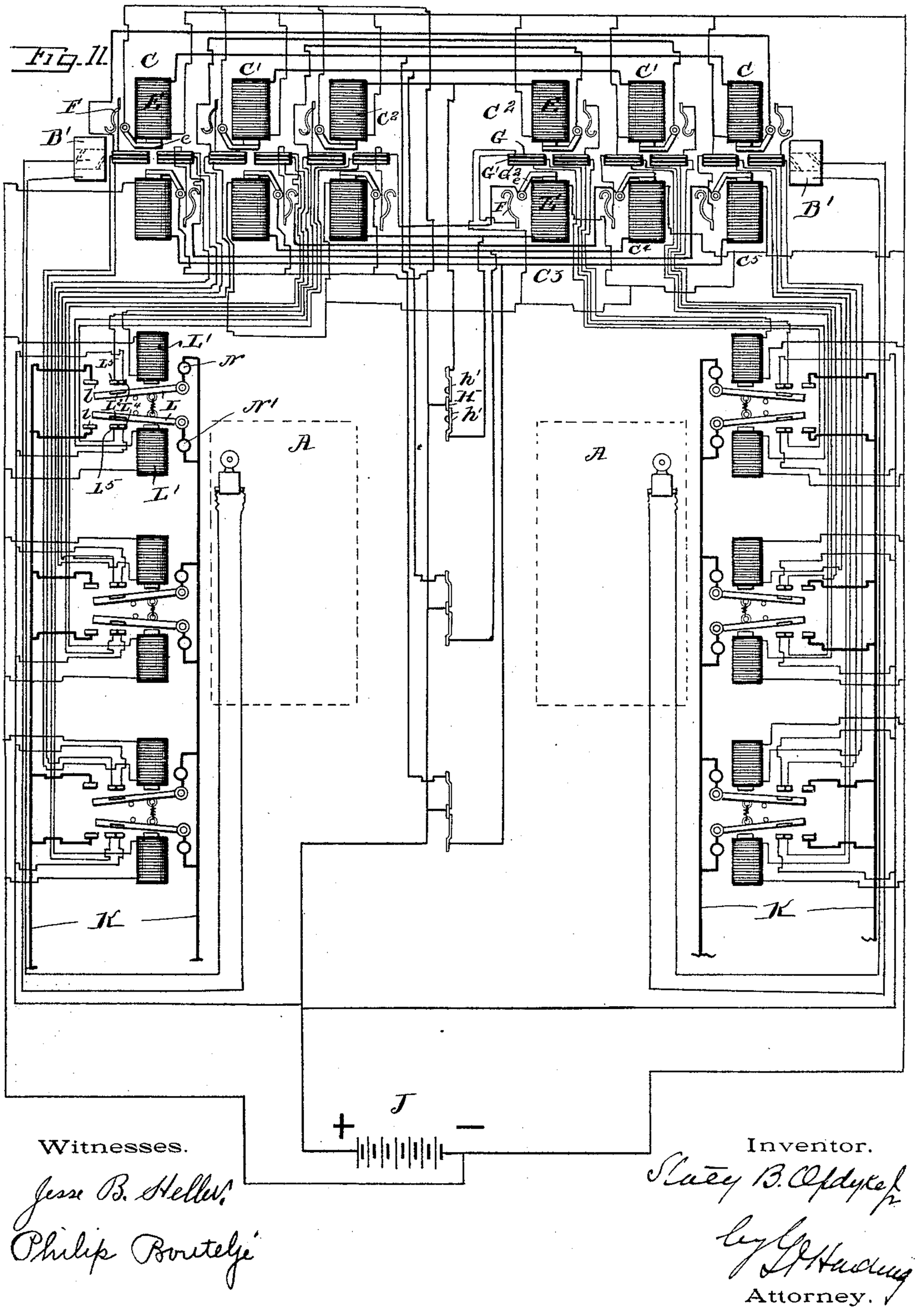
(No Model.) 6 Sheets—Sheet 4.

S. B. OPDYKE, Jr.

ELEVATOR SIGNAL APPARATUS.

No. 572,563. Patented Dec. 8, 1896.

Fig. 11.



Witnesses.

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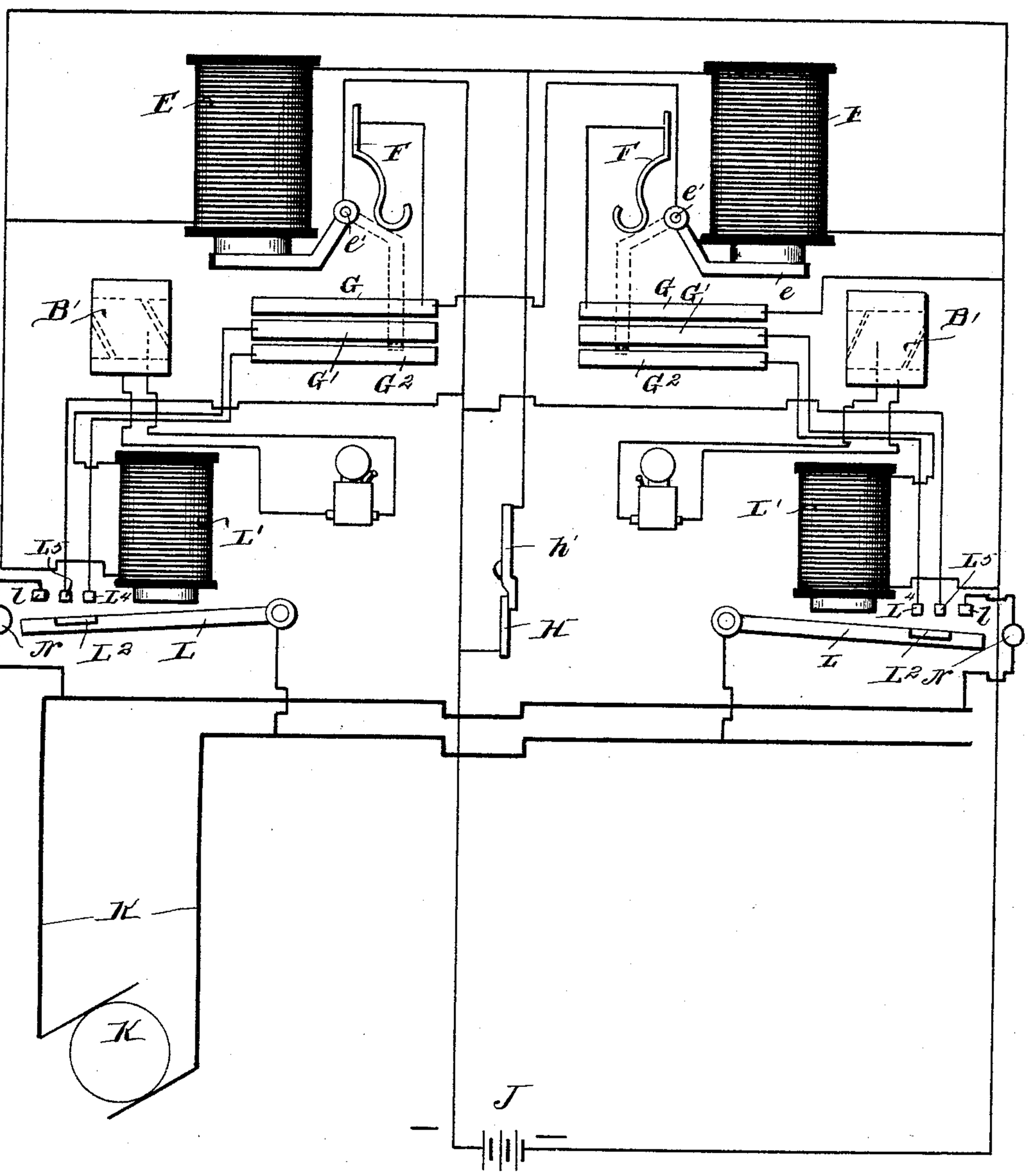
(No Model.) 6 Sheets—Sheet 5.

S. B. OPDYKE, Jr.

ELEVATOR SIGNAL APPARATUS.

No. 572,563. Patented Dec. 8, 1896.

Fig. 12.



Witnesses.
Jesse B. Heller.
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(No Model.)

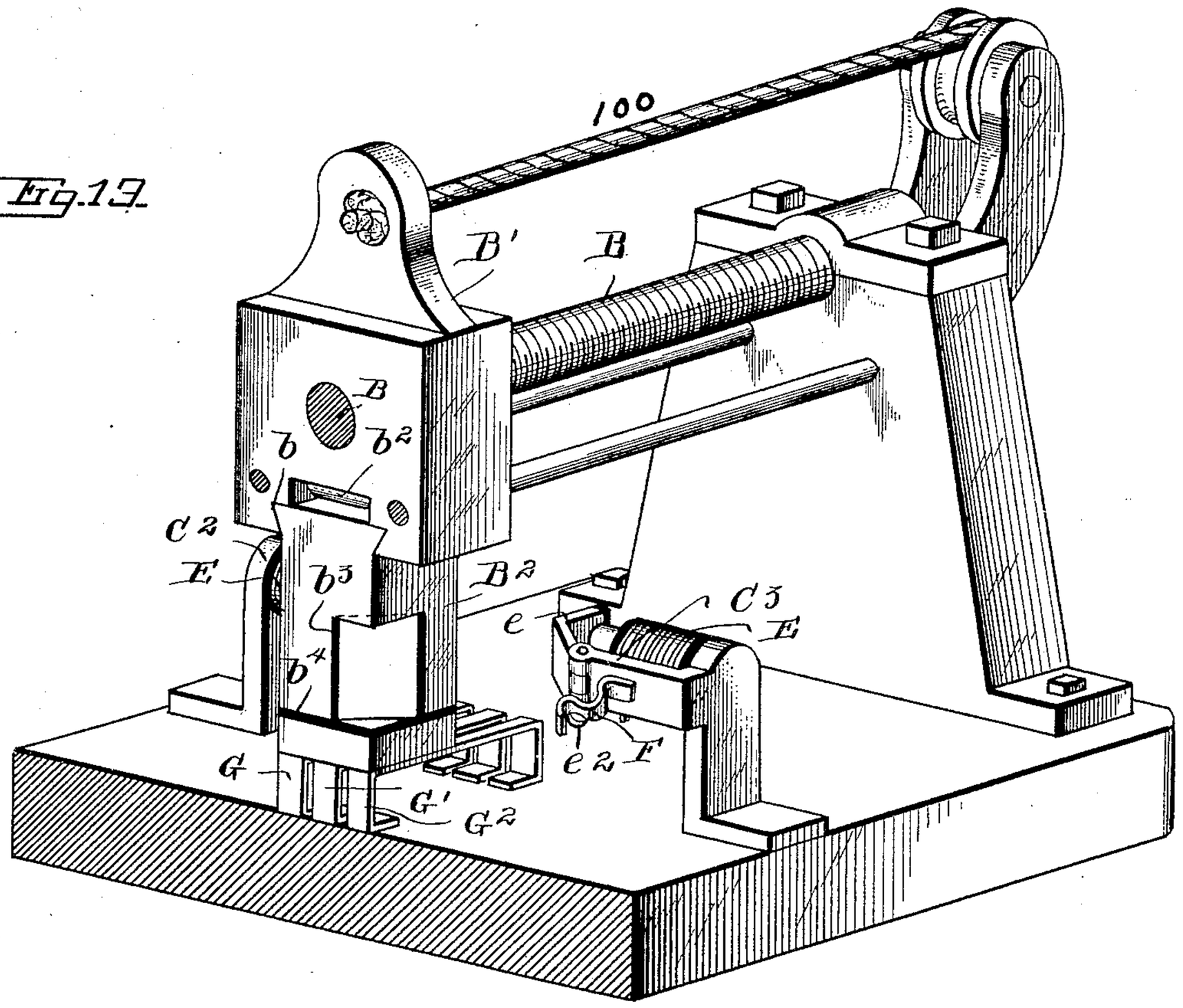
6 Sheets—Sheet 6.

S. B. OPDYKE, Jr.

ELEVATOR SIGNAL APPARATUS.

No. 572,563. Patented Dec. 8, 1896.

Fig. 13.



Witnesses.

Jesse B. Keller

Philip Bourtelje

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Stacy B. Opdyke 2d

by J. P. Harding

Attorney.

UNITED STATES PATENT OFFICE.

STACY B. OPDYKE, JR., OF PHILADELPHIA, PENNSYLVANIA.

ELEVATOR SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 572,563, dated December 8, 1896.

Application filed December 18, 1894. Serial No. 532,150. (No model.)

To all whom it may concern:

Be it known that I, STACY B. OPDYKE, Jr., a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Elevator Signal Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

I will first describe the invention as illustrated in the accompanying drawings, in which—

Figure 1 is a front view of two elevators and their shafts. Fig. 2 is a plan view of one set of magnets. Fig. 3 is a side elevation of same. Fig. 4 is a section on line 1 1, Fig. 2. Fig. 5 is a partial section on line 2 2, Fig. 4. Fig. 6 is a section on line 3 3, Fig. 5. Fig. 7 is a front view of one set of magnets for operating the lamps. Fig. 8 is a side elevation of the same. Fig. 9 is a plan view of push-button switch. Fig. 10 is a section on line 4 4, Fig. 9. Fig. 11 is a diagram showing the connection for three floors and two elevators. Fig. 12 is a diagram showing the ascending connections for one floor and two elevators. Fig. 13 is a section in perspective of switch.

As shown in the drawings, there are two elevator-cars and appurtenant mechanism and three floors, but the number of elevator-cars and floors, or either, may be increased without changing the character of the invention.

A are the two elevators, provided with the lifting-cables *a*, which pass over pulleys *a'* at the top of the shaft and thence go to the operating mechanism. Each pulley *a'* is connected by a friction-clutch to a shaft B, a portion of which shaft is threaded. (See Figs. 2 and 3.) Upon the threaded portion of the shaft is the nut B', which carries the brush B^2. The movement of the car in either direction moves the nut B' correspondingly. Connected to this nut is a cord 100, which passes over a pulley 101 and may have connected with it an indicator to show the position of the cord.

C C' C^2 are devices secured at one side of the screw-shaft B and in position such as to be in alinement with the brush B^2 when the elevator-car is at the different floors—thus, C when elevator-car is at floor 1, C' when at floor 2, and C^2 when at floor 3. On the opposite side and corresponding, respectively, to devices C, C', and C^2 are the devices C^3, C^4, and C^5.

The traveling nut B', with its appurtenant brush B^2, is shown in Figs 4 and 5. The nut B' is provided with a dovetailed groove *b*, in which rests the dovetail end *b'* of brush B^2, and the spring b^2 holds the two together.

D are stops, one at each end, arranged to project in the path of the brush B^2. At the desired limit of its travel in either direction the brush strikes a stop D, and if the shaft tended to move the nut and its appurtenant brush after the brush strikes the projection then either the brush will slip in the dovetail groove in the nut or the pulley *a'* will lose its frictional connection with the shaft B, ceasing to revolve it.

The brush B^2 is in cross-section, such as is shown in Fig. 6, the heavy lines b^3 being the insulated surface of said brush. The brush is also divided vertically into two portions by the insulation b^4. (See Fig. 4.)

The devices C C', &c., consist, essentially, of an electromagnet E, an armature *e*, pivoted at *e'* and provided at that point with the spring e^2, which tends to hold said armature in the position shown in dotted lines in device C, Fig. 2, and in contact with the spring-contact F, the magnet when energized being of sufficient strength to hold the armature C when against it, but not to draw it from the spring-contact F. The devices C C' C^2 and devices C^5 C^4 C^3 are not only on opposite sides of the screw-shaft B, but are set oppositely, as may be seen from Fig. 2.

Beyond each one of the devices C C', &c., is the contact-plate G. The contact-plate G is in alinement with the lower portion of the brush B^2, and the armature *e* when against the contact F is in alinement with the upper portion of brush B^2. There are as many shafts B as there are elevators and as many devices C C', &c., on opposite sides of each shaft as there are floors. Still continuing, however, upon one elevator, for each elevator with three floors, as shown, the devices C C' C^2 are for the elevator when ascending and the devices C^3 C^4 C^5 for descending.

At each floor is a switch device (shown in detail, Figs. 9 and 10) having the contact-plate H and the spring-arms h' h', each adapted to make contact with plate H and each provided with a push-button h^2 h^3, the button h^2 being for the ascending indicator and the button h^3 for the descending indicator. The nut B′ and its brush in moving to the left (the car ascending) presents its insulated surface to the lower set of devices C^3 C^4 C^5 and their appurtenant plates G and its active surface to the upper set of devices C C′ C^2 and their appurtenant contacts G, and vice versa, when the brush is moving to the right, (car descending.)

The wiring is as follows, (see Figs. 11 and 12:) Taking one floor—the one corresponding to the devices C and C^3—J is the battery. The wire passes from one pole of the battery to the contact-plate H, and from one arm h' a wire passes to the electromagnet of device C and from other arm h' to magnet of device C^3 of one of the elevators. A wire connects in multiple the two magnets of corresponding devices of two or more elevators, and from the last magnet of each set of corresponding devices a wire leads to the other pole of the battery. A wire leads directly from one pole of the source of current supply to the armature of magnet of device C, and a wire connects the spring-contact of said device with the contact G corresponding to said device, and from that a wire leads to the armature of the next corresponding device C, and from its spring-contact a wire leads to its contact-plate G and from thence to the other pole of current supply. The same arrangement is made with reference to the devices C^4. From two portions of the brush wires lead to the signal in each of the cars.

Normally the circuit is closed to all the magnets of the respective devices and the armatures are in the position shown in full lines. At the floor, and when a passenger pushes the button h^2, the arm h is pushed from the contact H and the circuit to the magnets of devices of all the elevators corresponding to that floor, say the magnets of devices C, is broken, and the magnets being deën-ergized no longer hold the armature, and the armature-spring brings the armature of device C in the position shown in dotted lines, Fig. 2, and the circuit is completed through it by means of the direct electrical connection from one pole of the battery, its connection with spring-contact F, which is in electrical connection with contact G, which in turn is in electrical connection with the other pole of battery.

The armature of the devices C are, when in position, in alinement with the upper portion of the brush B of their corresponding elevator, and in the travel of the elevator the upper portion of the brush of the first ascending elevator that reaches its device C will come in contact with and force the armature from contact with spring-contact, and the lower portion of the brush comes in contact with contact G, thus including the signal in said car in the last-mentioned circuit, and the car receives a signal. The ascending devices are so set that this occurs slightly before elevator reaches the floor corresponding to said device. The same is true of the descending devices C^3 C^4 C^5. The circuit to the magnet of the device corresponding to the floor is broken by pushing in the button h^3 and the armature brought in position to be struck by the brush of the first descending elevator and the signal in the elevator corresponding to said brush operated. In case certain ascending and descending devices are both set the construction of the devices and the brushes is such that the ascending devices will only cause indication with the brush moving with elevator ascending, as so with descending, and thus any change or disarrangement of the opposite signal prevented. This is arranged by the fact that the devices C C′ C^2 are set opposite from devices C^3 C^4 C^5, which prevents the brush, when moving in the direction to operate devices C C′ C^2, from separating the armature from spring-contact of the devices C^3 C^4 C^5. This prevents the devices from being deranged. The form of construction of brush and its insulation are such that it presents its insulated face in the movement corresponding to the ascent of the elevator-car to the descending devices and in descending presents its insulated face to the ascending devices. (See Fig. 6.) This prevents the signal of an ascending elevator being included in the circuit of a descending device, and vice versa.

In order to indicate to the passenger at the floor the car which is to be the first to approach the landing and which has received his signal, either to ascend or descend, I provide the following means: At each floor I have adjacent to the gate of each elevator two electric lamps N N′, (see Figs. 1, 11, and 12,) one, N, for ascending, the other, N′, for descending. These lamps receive current from a source of current supply K. The circuit from supply passes to the lamp through the pivoted arm L, which, when it makes contact with contact 1, completes the circuit to the lamps. This arm L is controlled by an electromagnet L′, of which it is the armature. When said magnet is energized, the arm L is operated and makes contact with contact 1. A wire passes from a contact G′, adjacent to the device C, corresponding to said floor and elevator to said magnet L′, (said contact G′ being in the line of movement of the lower portion of the brush corresponding to said device and struck by it at the same time the brush strikes the contact G.) A wire leads from the magnet L′ to the other pole of the battery of the main source of current supply to operate the signals heretofore described from that which is connected to the contact G, as heretofore described, so that when the brush B^2 operates upon the armature of de-

vice C to signal the car at the same time it energizes the magnet L′, the current passing from contact G to contact G′ through the brush, causing its armature L to close the circuit to the electric lamp before described and causing said lamp to be illuminated, and thus indicating to the passenger at the floor the coming elevator. In order to hold this in operation until the elevator has reached and passed the landing, I provide a third contact G^2. This contact G^2 is in electrical connection with the contact L^4. The contact L^5 is in direct electrical connection with the source of current supply. When the armature L is acted on by the magnet L′, its brush L^2 connects contacts L^5 and L^4, so that the current can pass from the source of supply to contact L^5, from there through brush L^2 to contact L^4, to contact G^2, by main brush to contact G′, to magnet L′, to the other pole of the battery. When the brush has pushed the armature of the device C so that it comes in contact with the core of its magnet, it is held there and the circuit to the contact-plate G is broken. At this time the brush is still in contact with that contact, as well as the contacts G′ and G^2, and the circuit is still retained through the magnet L′ by means of passing from one pole of current supply to the contact L^5, from thence to contact L^4, thence to contact G^2, thence through the brush to contact G′, and from thence to the magnet L′ and thence to the other pole of source of current supply, and the lamp remains illuminated until after the brush has passed beyond the contacts G and G^2, which is not until after the elevator has reached and passed the landing.

As shown in Fig. 11, each elevator has at each floor two lamps, one to indicate ascending and one to indicate descending. Each lamp has its corresponding magnet. Each is controlled by its corresponding brush and either ascending or descending device and their appurtenant contacts, and the wiring is clearly shown whereby all the lamps are operated from a single source of current supply and their duration of burning determined by a device controlling said lamp, but which device, so far as the circuit is concerned, derives its circuit from a given source.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In combination with an elevator-car and mechanism for operating the same, of a brush and means to cause said brush to move proportionately with said car, devices consisting essentially of an electric magnet corresponding to each floor and each provided with a spring-actuated armature, the spring acting against the magnet, a circuit to each magnet from its corresponding floor, a switch device at each floor included in the circuit to its corresponding magnet, normally open independent circuits each including the armature of one of said last-mentioned magnets, the corresponding circuit being closed when its corresponding armature is retracted, contact devices by which the brush in its movement is adapted to include itself in the circuit, and electrical connection between said brush and a signal in the car.

2. In combination with an elevator-car and mechanism for operating the same, of a brush and means to cause said brush to move proportionately with said car, devices consisting essentially of an electric magnet corresponding to each floor and each provided with a spring-actuated armature, the spring acting against the magnet, a circuit to each magnet from its corresponding floor, a switch device at each floor included in the circuit to its corresponding magnet, independent electrical connection from one pole of the source of current supply to said armature, a contact corresponding to each armature in electrical connection with the other pole of current supply, the aforementioned brush being divided by insulation into two active parts one of which is in alinement with said contact, the other in alinement with said armature when the magnet corresponding to the armature is deënergized, and electrical connection between said portions of the brush and a signal in the car.

3. In combination with an elevator-car and mechanism for operating the same, of a brush and means to cause said brush to move proportionately with said car, two devices corresponding to each floor, each device consisting essentially of an electric magnet, and each provided with a spring-acted armature the spring acting against the magnet, one device of the pair set on one side of the line of travel of the brush, and the other on the opposite side, the devices of the pair being oppositely set, a circuit to each magnet from its corresponding floor, a switch device at each floor included in the circuit to its corresponding magnet, independent normally open circuits, each including an armature of one of said magnets, the corresponding circuit being closed when its corresponding armature is retracted, contact devices by which said brush in its movement in one direction is adapted to include itself in one armature-circuit, and in the other direction in the other of said circuits, and electrical connection between said brush and the signal in the car.

4. In combination with an elevator-car and mechanism for operating the same, of a brush and means to cause said brush to move proportionately with said car, two devices corresponding to each floor, each device consisting essentially of an electric magnet and each provided with a spring-acted armature the spring acting against the magnet, one device of the pair set on one side of the line of travel of the brush and the other on the opposite side, the devices of the pair being oppositely set, a circuit to each magnet from its corresponding floor, a switch device at each floor included in the circuit to its corresponding magnet, independent electrical connection

from one pole of the source of current supply to said armature, a contact corresponding to each armature in electrical connection with the other pole of current supply, the aforementioned brush being divided by insulation into two active parts one of which is in alinement with said contacts, the other in alinement with said armature when the magnet corresponding to the armature is deënergized, and electrical connection between said portions of the brush and a signal in the car.

5. In combination with a series of elevator-cars and mechanism for operating the same, of a series of brushes corresponding to the cars, means to cause each brush to move proportionately with the movement of its corresponding car, devices consisting essentially of an electric magnet corresponding to each floor and each provided with a spring-actuated armature, the spring acting against the magnet, a circuit from each floor including the magnets of all the cars corresponding to said floor, a switch device at each floor included in the circuit to its corresponding magnets, independent normally open circuits each including the armature of one of the corresponding floor-magnets, the circuit being closed when the corresponding armature is retracted, contact devices by which the brushes are adapted in their movement to include themselves in said last-mentioned circuits, and electrical connection between said brushes and the signal in its corresponding car.

6. In combination with a series of elevator-cars and mechanism for operating the same, of a series of brushes corresponding to the cars, means to cause said brush to move proportionately with the movement of its corresponding car, devices consisting essentially of an electric magnet corresponding to each floor and each provided with a spring-actuated armature, the spring acting against the magnet, a circuit from each floor including the magnets of all the cars corresponding to said floor, a switch device at each floor included in the circuit to its corresponding magnets, an independent electrical connection from one pole of the source of current supply to the armatures of corresponding magnets, a contact corresponding to each magnet in electrical connection with the other pole of current supply, the aforementioned brushes each being divided by insulation into two active parts one of which is in alinement with corresponding contacts, and the other in alinement with corresponding armatures when the magnets corresponding to said armatures are deënergized, and electrical connection between said parts and a signal in the car.

7. In combination with an elevator-car and mechanism for operating the same, of a brush and means to cause said brush to move proportionately with said car, two devices corresponding to each floor, each device consisting essentially of an electric magnet, and each provided with a spring-acted armature the spring acting against the magnet, one device of the pair set on one side of the line of travel of the brush, and the other on the opposite side, the devices of the pair being oppositely set, a circuit to each magnet from its corresponding floor, a switch device at each floor included in the circuit to its corresponding magnet, independent normally open circuits, each including an armature of one of said electromagnets, said circuit being closed when the corresponding armature is retracted, and electrical connection between said brush and a signal in the car, the face of said brush being insulated, contact devices by which the brush in its movement in one direction presents its active portion to the armature-circuits of one set of devices, and its inactive portion to the armature-circuits of the other set, and vice versa in its movement in the other direction.

8. In combination with an elevator-car and mechanism for operating the same, of a brush and means to cause said brush to move proportionately with said car, two devices corresponding to each floor, each device consisting essentially of an electric magnet and each provided with a spring-acted armature, the spring acting against the magnet, one device of the pair set on one side of the line of travel of the brush and the other on the opposite side, the devices of the pair being oppositely set, a circuit to each magnet from its corresponding floor, a switch device at each floor included in the circuit to its corresponding magnet, independent electrical connection from one pole of the source of current supply to said armature, a contact corresponding to each armature in electrical connection with the other pole of current supply, the aforementioned brush being divided by insulation into two active parts, one of which is in alinement with said contacts, the other in alinement with said armature when the magnet corresponding to the armature is deënergized, and electrical connection between said portions of the brush and a signal in the car, the face of said brush being insulated, so that in its movement in one direction it presents its active portion to the armature of one set of devices and its inactive to the other set, and vice versa in its movement in the other direction.

9. In combination with a series of elevator-cars and mechanism for operating the same, of a series of brushes, one for each car, and means to cause corresponding brush to move proportionately with its corresponding car, of a series of electromagnets for each floor corresponding to each of the floors provided with pivoted armatures acted on by springs against the action of the magnet, a circuit including all the magnets corresponding to the same floor, and a switch device at the floor corresponding to the magnets, a contact corresponding to each of the magnets, spring-contacts adjacent to each magnet electrical con-

nection with one pole of source of supply and the armatures of one of the series of magnets, and electrical connection between the spring-contact and the contact of each magnet, and the contacts and next armature of corresponding magnets, and electrical connection between the last contact and pole of current supply other than that of the first armature, the armatures being adapted to make contact with their corresponding spring-contacts when the circuit to the magnet is broken, the brushes being divided by insulation, one of which in its movement is in alinement with the armature of its series when said armature is against the spring-contacts and the other part in alinement with the contacts, and electrical connection between said parts and a signal in the car.

10. In combination with an elevator-car and means to operate the same, of a threaded shaft rotated by the movement of the car, a nut working on the threaded portion of said shaft, a brush carried by said nut, electrical connection between said brush and a signal in the car, a device corresponding with each floor in line of movement of said brush and in positions to be reached by said brush when the car is approaching the floor corresponding to said device, a source of current supply and circuits including each of said devices whereby in the movement of the brush the signal in the car is included in the circuits corresponding to the floors.

11. In combination with a source of current supply, a contact-plate, electrical connection with one pole of current supply and said plate, spring-contacts each normally in contact with said plate, electrical connection between each contact and an electromagnet, and from the magnets to the other pole of current supply, whereby either spring-contact may be separated from the plate and the circuit to its magnet broken independent of the circuit to the other magnet.

12. In combination with a series of elevator-cars and means for operating the same, of a series of brushes and means to move each brush corresponding to the movement of its car, a series of contacts, G, G′, for each car corresponding to the floors and in line of movement of said brush, a signal at each floor for each car, a source of current supply, electrical circuit to each signal including the pivoted armature, of a magnet corresponding to each signal, and a contact in line of movement of each said armatures whereby when the magnet corresponding to the armature is energized the circuit is completed to the signal corresponding to said magnet, electrical connection between one pole of a current supply and the corresponding contacts G in series, and electrical connection between each contact G′ and its corresponding magnet, and from the magnet to the other pole of current supply.

13. In combination with an elevator-car and means for operating the same, of a brush and means to move said brush corresponding to the movement of the car, a signal at each floor, a source of current supply, electrical circuit to said signal, including the pivoted armature of a magnet corresponding to each signal, and a contact in line of movement of each of said armatures, whereby when the magnet corresponding to the armature is energized the circuit is completed to the signal corresponding to said magnet, contacts, as G, G′, G^2, corresponding to each floor and in line of movement of said brush, electrical connection between one pole of a source of current supply and contact G, electrical connection between the contact G^2 and a contact adapted to make contact with the armature of magnet and electrical connection between the magnet and other pole of current supply.

In testimony of which invention I have hereunto set my hand.

STACY B. OPDYKE, JR.

Witnesses:
FRANK S. BUSSER,
M. FRANCES ELLIS.