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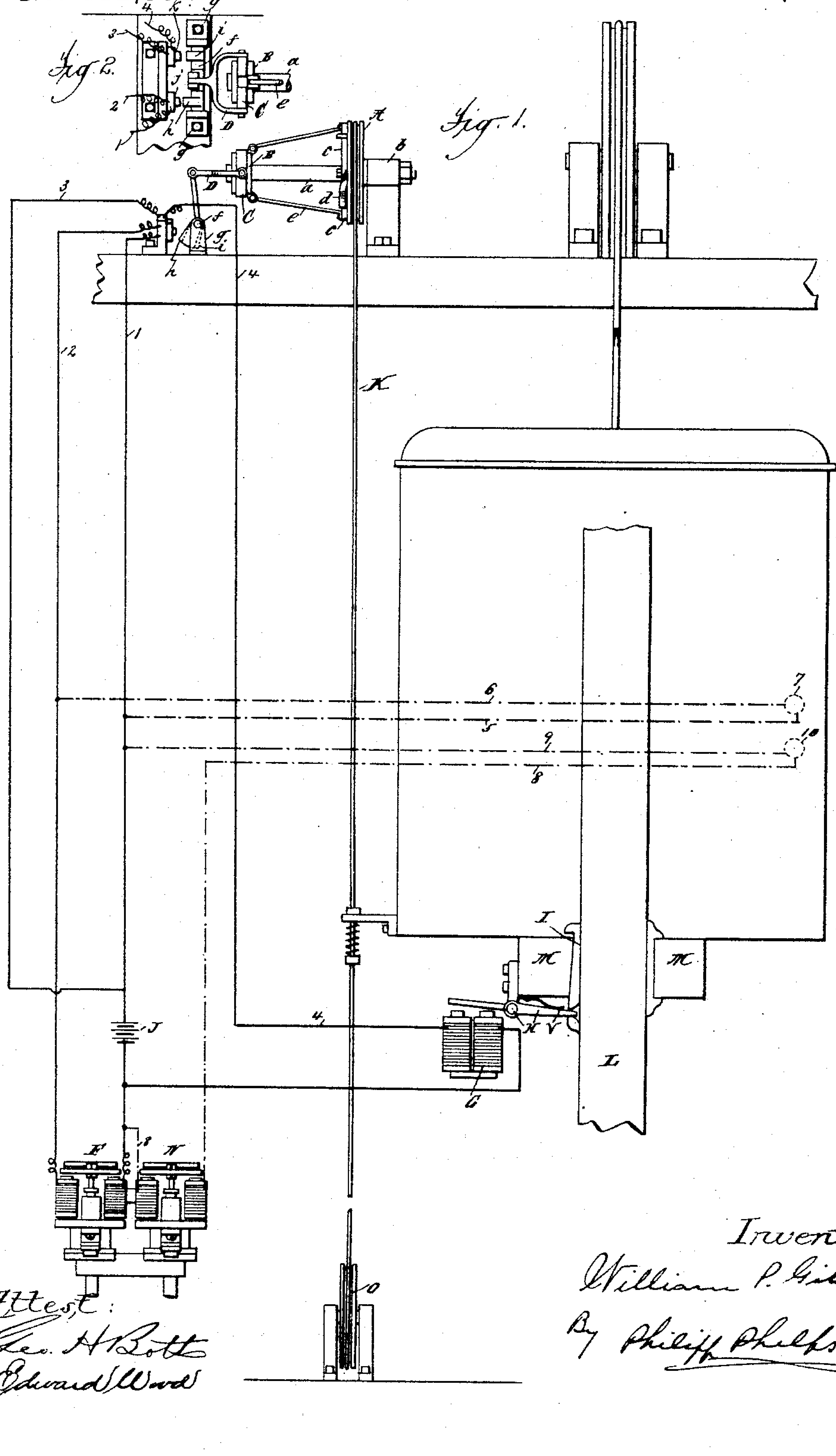
ELECTRICALLY CONTROLLED SPEED GOVERNOR MECHANISM FOR ELEVATORS.

No. 412,332. Patented Oct. 8, 1889.



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(No Model.) 3 Sheets—Sheet 2.

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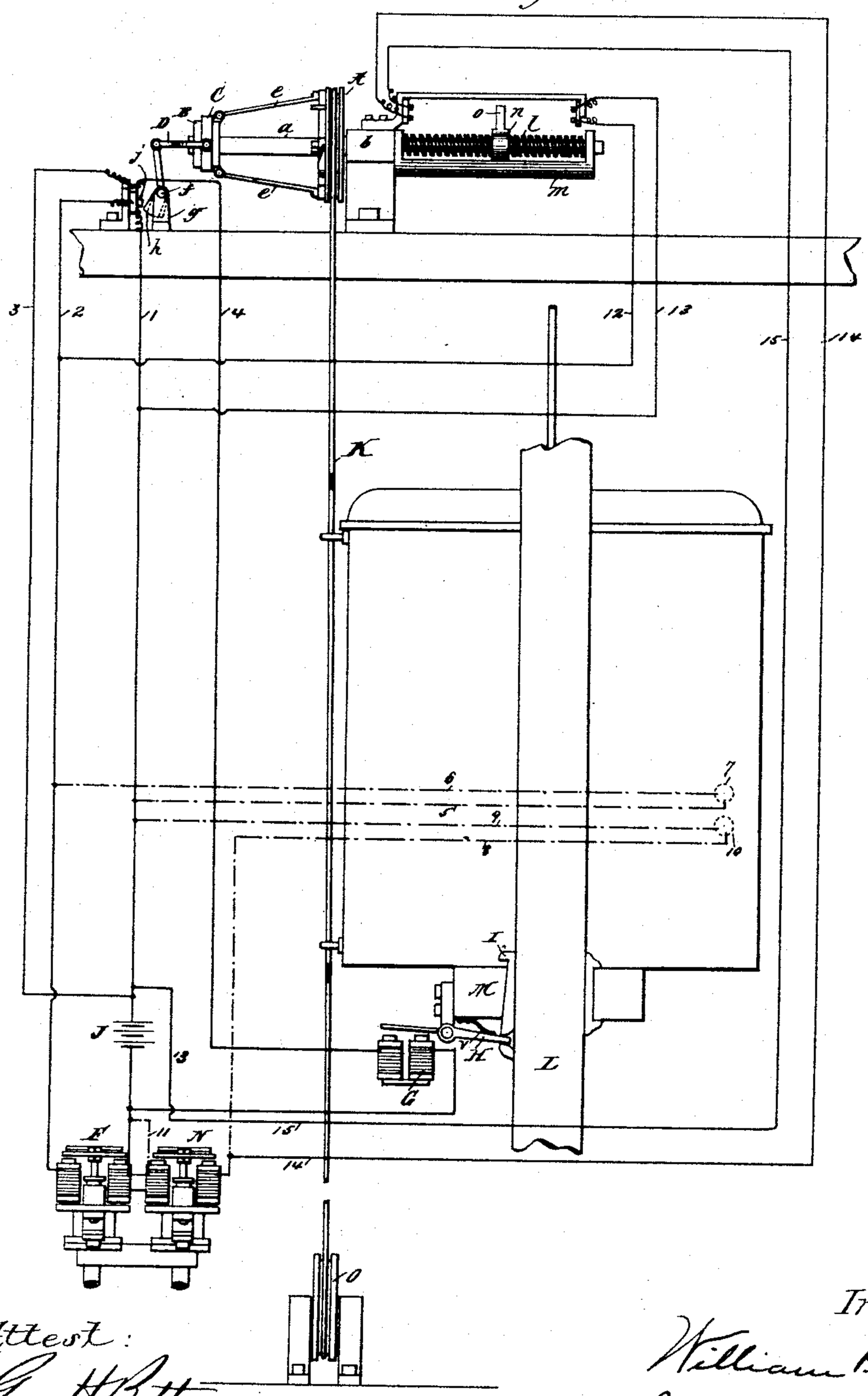
Fig. 3.



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(No Model.)

W. P. GIBSON. 3 Sheets—Sheet 3.

ELECTRICALLY CONTROLLED SPEED GOVERNOR MECHANISM FOR ELEVATORS.

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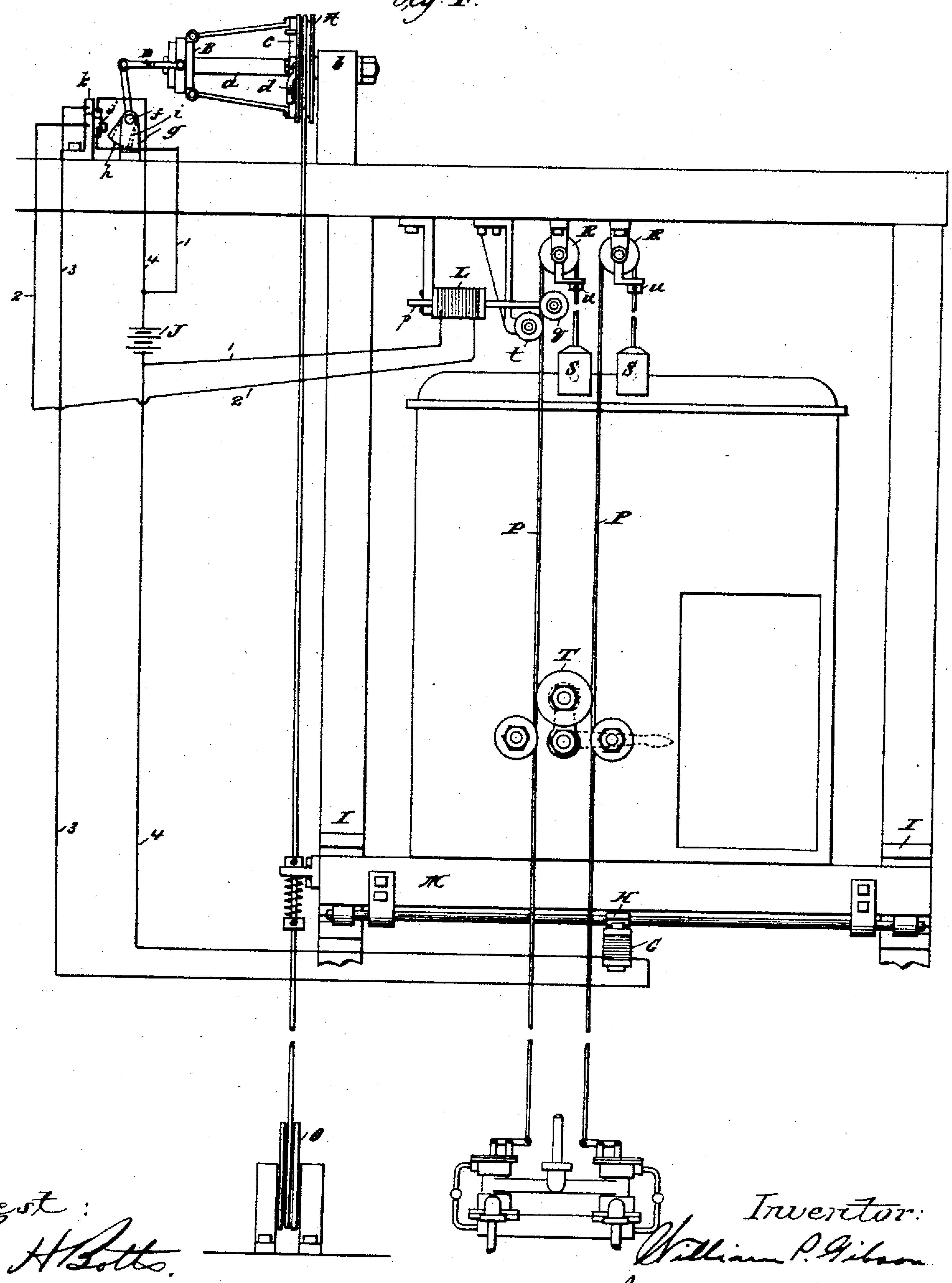
Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM P. GIBSON, OF NEW YORK, N. Y.

ELECTRICALLY-CONTROLLED SPEED-GOVERNOR MECHANISM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 412,332, dated October 8, 1889.

Application filed January 5, 1889. Serial No. 295,549. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. GIBSON, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Electrically-Controlled Speed-Governor Mechanism for Elevators, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in speed-governing apparatus for elevators.

It is the object of the present invention to provide a speed-governing apparatus of improved construction for operating through electrical connections the valve mechanism of the elevator and also the safety appliances of the same when from any cause the elevator-car becomes unduly accelerated in its descent.

To this end the invention consists of certain improvements in construction and combinations, which will be hereinafter described.

The invention further consists of certain modifications, which will be hereinafter referred to in connection with the accompanying drawings, in which—

Figure 1 is a diagrammatic view of an elevator mechanism embodying my invention. Fig. 2 is a plan view illustrating the construction of the speed-governing apparatus. Figs. 3 and 4 are diagrammatic views illustrating modifications, which will be hereinafter described.

Referring particularly to Figs. 1 and 2, the construction therein illustrated will now be described. The construction of the speed-governing apparatus proper in the present case is substantially the same as that described and claimed in a companion application for Letters Patent filed December 31, 1888, Serial No. 295,000. Briefly, it consists of a sheave A, mounted to turn loosely about a shaft *a*, secured in a standard *b* upon the frame-work of the elevator-shaft. Motion is communicated to the sheave A by an endless cable K passing around it and around a second sheave O at the bottom of the elevator-shaft, said cable being also secured to the elevator-car, as shown, so as to be caused to travel therewith in the usual manner. The sheave A has pivotally secured to its outer face a pair of swinging levers *c*, to which are connected a pair of arms *e*, extending outward from the face of the sheave A, with their outer ends converging slightly toward each other and secured pivotally in ears formed upon a sleeve B, mounted loosely upon the shaft *a*, and are held in their normal positions by means of light springs *d*, secured to the face of the sheave A and bearing against the levers *c*. The sleeve B has also loosely mounted upon it a collar C, to which is pivoted the bifurcated end of a rod D, the other end of which is pivoted to an arm extending from a rock-shaft *f*, journaled in bearings provided in standards *g* and carrying a pair of arms *h i*, for operating the electrical connections hereinafter described, communicating, respectively, with the operating-connections of the valve mechanism and the safety appliances of the elevator. Mounted in a plate secured to the frame-work opposite the shaft *f* is a pair of push-buttons *j k*, or other suitable circuit-closing devices, the former of which controls an electric circuit 1 2, which includes an electro-magnet F, which is arranged to operate the valve mechanism to move the main valve of the elevator to position to arrest the descent of the car, and the latter of which controls an electric circuit 3 4, including an electro-magnet G, located beneath the elevator-car and having its armature arranged to rock the shaft H, carrying the fingers V, abutting against the safety-wedges I, both circuits being provided with a battery J, located in any convenient position. The arms *h i* are so located upon the shaft *f* that the arm *h* will make contact with its push-button *j*, so as to close the circuit through the magnet F slightly in advance of the contact of the arm *i* with its push-button *k* to close the circuit through the magnet G.

The operation of the apparatus thus organized is as follows: So long as the car descends at normal or proper speed the governor apparatus will remain inoperative, the sheave A not being revolved upon the shaft *a* by the cable K with sufficient velocity to throw the levers *c* outward against the pressure of the springs *d*. As soon, however, as the descent of the elevator becomes unduly accelerated from any cause—as, for example, by carelessness of the conductor or the breaking of its hoisting-cable—the increase of speed will be

communicated to the sheave A, which then, revolving at increased speed, will throw the levers *c* outward, said levers in their outward movement spreading the arms *e*. As the arms *e* are thus spread, they will draw the sleeve B inward along the shaft *a*, thereby rocking the arms *h i* upward into contact with their respective push-buttons *j k*, the contact of the arm *h* with the push-button *j* taking place slightly in advance of the contact of the arm *i* with the push-button *k*. As the arm *h* comes in contact with the push-button *j*, it will close the circuit through the magnet F, thereby operating the main valve to retard or stop the car. If, however, the speed of the car is not arrested by the closing of the circuit through the magnet F, the shaft *f* will be rocked still farther, and the arm *i* will then press the push-button *k* inward and close the circuit 3 4 through the magnet G. The closing of the circuit through the magnet G energizes said magnet, which will then rock the shaft H and raise the finger V and force the wedge I upon each side of the car into position between the guides L and the beam M upon the bottom of the car, thus preventing the further movement of the car. The energizing of the magnet F to arrest the descent of the car or to move it upward when stationary in the regular working of the elevator may be accomplished through a branch circuit 5 6, connected to the circuit 1 2 and provided with a push-button or other circuit-closing device 7 within the car for closing the circuit through the magnet F. The car is also provided with an electric circuit 8 9, having a push-button or other circuit-closer 10, and including an electro-magnet N, which operates the mechanism for moving the main valve of the elevator to cause the car to descend in any of the ways now well known in connection with elevators. To arrest the car in its descent or to move the car upward from a stationary position, the conductor will press the button 7, thereby closing the circuit through the magnet F and causing the movement of the main valve into position to arrest the downward movement of the car or to cause its ascent, as the case may be. To arrest the car in its ascent or to cause it to move downward from a stationary position, the conductor will press the push-button 10 and close the circuit through the magnet N, thereby moving the valve into position to arrest the upward movement of the car or to cause it to move downward.

The valve mechanism partly illustrated in the present case is that described and claimed in a companion application filed December 31, 1888, Serial No. 294,995. Reference is therefore made to said application for a detailed description of the same; but the present invention is not limited to this particular form of valve mechanism.

The speed-governing apparatus of the present invention may be applied to other forms of valve mechanism and to valve mechanisms which are operated by mechanical instead of electrical connections from the car, and also with any form of safety appliance other than that illustrated—as, for example, the well-known pawl-and-ratchet mechanism. The construction illustrated in Fig. 3 is the same as that described, with the exception of the addition of mechanism connected to the speed-governor proper and operated thereby for automatically operating the valve mechanism to arrest the car at its upper and lower limit of movement when through any cause the valve mechanism of the elevator has not been previously operated by the conductor for this purpose. The sheave A is in this case secured to its shaft *a*, which is loosely mounted on bearings in the standard *b*. The shaft *a* is also elongated, so as to provide an extension *l*, which is screw-threaded, as shown. The screw-threaded portion of the shaft *l* has mounted upon it a traveling nut *n*, which is held against movement with said shaft and caused to travel along the same from end to end by a projection upon its under side which enters a groove formed longitudinally in a fixed guide *m*. The nut *n* is also provided at its upper side with a projection *o*, for forming or operating circuit-closers for branch circuits 12 13 and 14 15, which connect with the circuits of the magnets F and N, respectively. The mechanism described operates with the sheave A, but independently of the speed at which the car ascends or descends, the movement of the nut *n* along the shaft *a* to close the circuits 12 13 and 14 15 being so timed that such closing will not take place until the car has about reached its upper or lower limit of movement, as the case may be. The operation of the speed-governing apparatus in this case is the same as before described.

The operation of the automatic stop mechanism is as follows: When the car is ascending, the cable K, moving therewith, will cause the sheave A to revolve in the usual manner, and through it the shaft *a*. As the shaft *a* revolves, its threaded extension, working in the nut *o*, will move it toward the branch circuit 14 15 and into position to close the circuit through the magnet N, energizing said magnet and securing the operation of the valve mechanism heretofore described for arresting the upward movement of the car. When the car is descending, the sheave A and shaft *a* will be revolved in the opposite direction, the nut *n* then being moved toward the branch 12 13 and into position to close the circuit through the magnet F, energizing the same and operating the valve mechanism to arrest the downward movement of the car, as heretofore described.

It is manifest that many changes may be made in the connections for and the manner of operating the valve mechanism and safety devices. An example of one such change is illustrated in Fig. 4. In this case the valve mechanism, instead of being controlled by electro-magnets F N, is operated by ropes P,

which pass through or adjacent to the car, and are either operated by hand or by a deflecting-pulley T, carried by the car. The circuit 3 4 includes the magnet G, for operating the safety appliances, as in the former constructions; but in this case the circuit 1 2, instead of including a magnet for operating directly upon the valve mechanism, includes a magnet L, secured in a bracket at the upper end of the elevator. The magnet L may be of the ordinary form, but will preferably be of the solenoid type, as shown. The core *p* of the solenoid is connected to a deflecting-pulley *q* for deflecting one of the ropes P to operate the valve mechanism to stop the car in its descent. Journaled in a bracket upon the frame of the elevator, below the deflecting-pulley *q* and upon the opposite side of the rope P, is a stationary pulley *t*, upon which said rope is drawn upward when deflected by the deflecting-pulley *q*. The ropes P may be fixed at the upper end of the elevator-shaft; but they will preferably pass over pulleys R and be provided at their ends with weights *s*, which are sufficient to counterbalance the weight of the respective ropes and keep them taut without exerting any or but little tendency to move the valves. To prevent the weights *s* from being raised when the ropes are deflected, so as to prevent the valves from being operated, the ropes are provided with stops *u*, which engage with fixed guides and prevent the weights from being raised.

The apparatus operated by the governor to close the circuits 1 2 and 3 4 is the same as first described.

The operation of the other apparatus when thus organized is substantially the same as that heretofore described in connection with Figs. 1 and 2, except that in this case the electrical connections with the governor operate upon the rope P instead of directly upon the valve mechanism.

What I claim is—

1. The combination, in an elevator mechanism, of an electro-magnet for operating a valve mechanism to stop the car, an electric circuit including said magnet and a circuit-closer, and a speed-governor operated by the movement of the car and arranged to operate said circuit-closer to close the circuit through said magnet when the speed of the car increases beyond the proper limit, substantially as described.

2. The combination, in an elevator mechanism, of an electro-magnet for operating a valve mechanism to stop the car, an electro-magnet G, for operating the safety appliances of the car, electric circuits including said respective magnets, a circuit-closer for each of said circuits, and a speed-governor operated by the movement of the car and arranged to operate said circuit-closers to close the circuits through the respective magnets successively when the speed of the car increases beyond its proper limit, substantially as described.

3. The combination, in an elevator mechanism, of a rope P, connected to operate a valve mechanism to stop the car, a deflecting-pulley *q*, for deflecting said rope to operate the valve mechanism, an electro-magnet for operating said deflecting-pulley, an electric circuit including said magnet and a circuit-closer, and a speed-governor operated by the movement of the car and arranged to operate said circuit-closer to close the circuit through said magnet when the speed of the car increases beyond the proper limit, substantially as described.

4. The combination, in an elevator mechanism, of a rope P, connected to operate a valve mechanism to stop the car, a deflecting-pulley *q*, for deflecting said rope to operate the valve mechanism, an electro-magnet for operating said deflecting-pulley, an electro-magnet G, for operating the safety appliances of the car, electric circuits including said respective magnets, a circuit-closer for each of said circuits, and a speed-governor operated by the movement of the car and arranged to operate said circuit-closers to close the circuits through the respective magnets successively when the speed of the car increases beyond its proper limit, substantially as described.

5. The combination, in an elevator mechanism, of electro-magnets F N, for operating the valve mechanism to control the up and down movements of the car, electric circuits including said respective magnets, a cable K, driven by the car and passing over a sheave A, a threaded shaft *l*, driven by said sheave, and a nut *n*, traveling upon said shaft and operating to close the circuit through the respective magnets as the car reaches the limit of its up and down movements, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WM. P. GIBSON.

Witnesses:
J. J. KENNEDY,
G. M. BORST.