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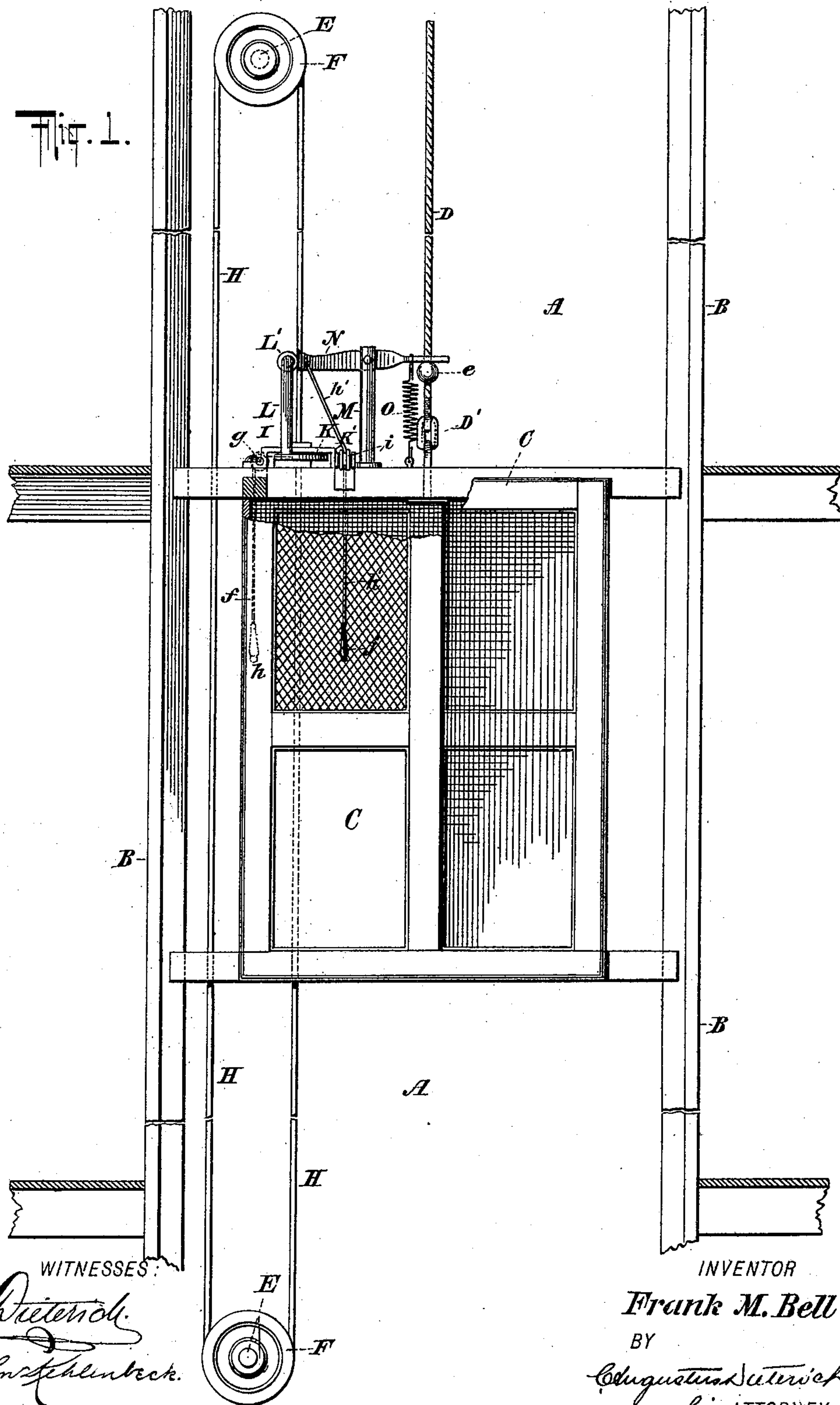
Patented Mar. 21, 1899.

F. M. BELL.
SAFETY DEVICE FOR ELEVATORS.

(Application filed May 31, 1898.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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John Scheinbeck.

INVENTOR

Frank M. Bell

BY

Augustus Waterich
his ATTORNEY.

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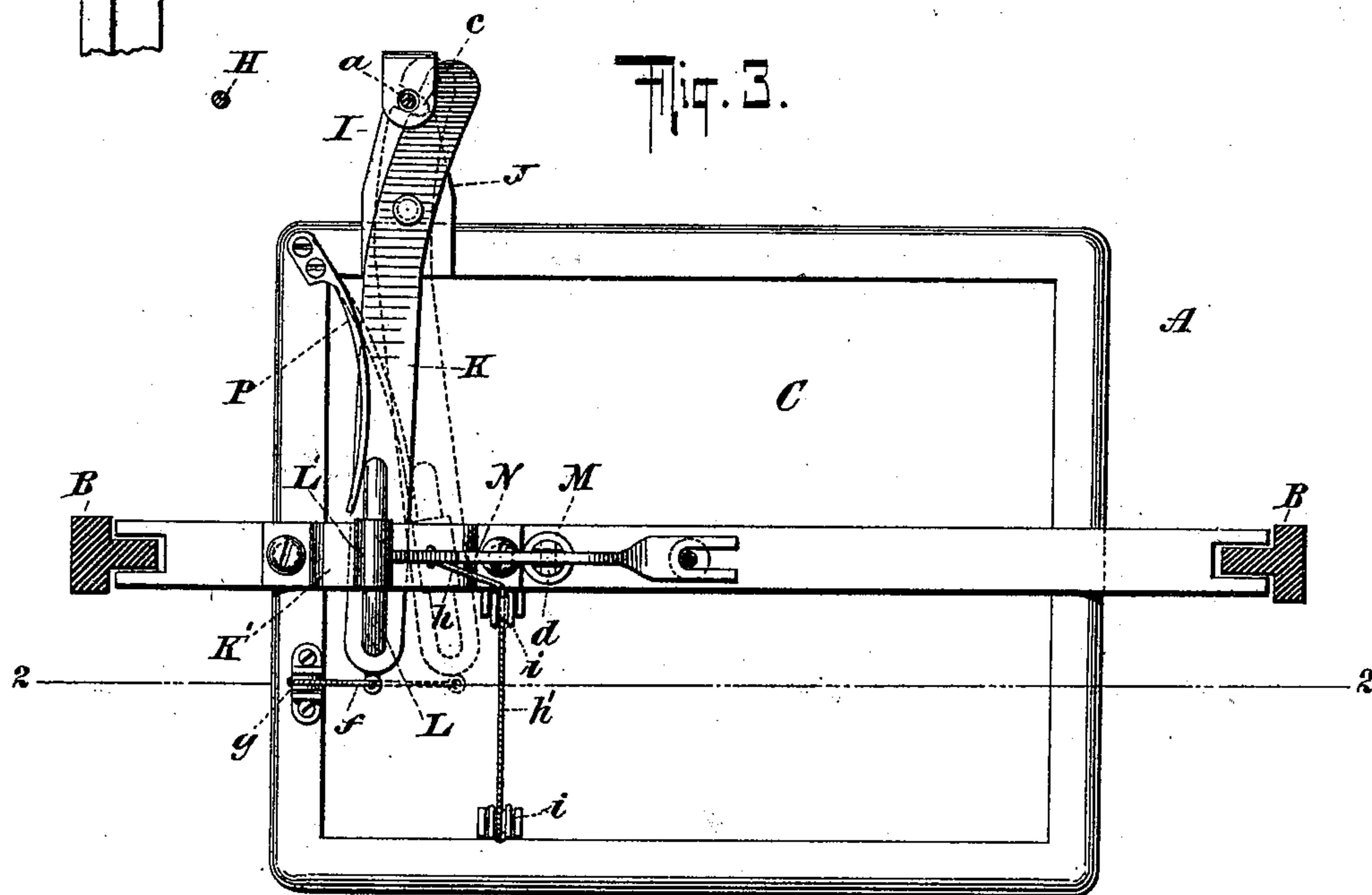
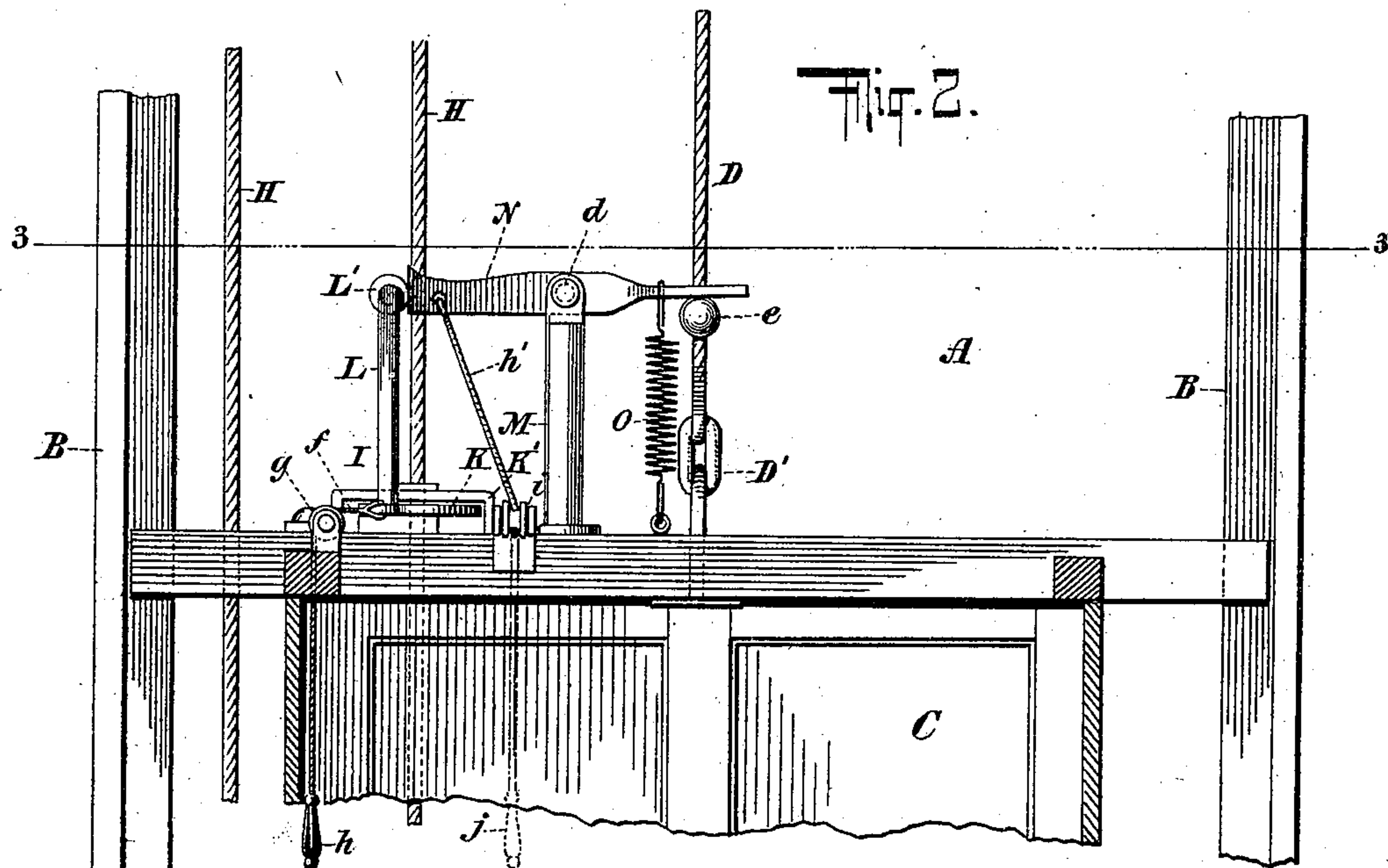
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3 Sheets—Sheet 2.



WITNESSES :

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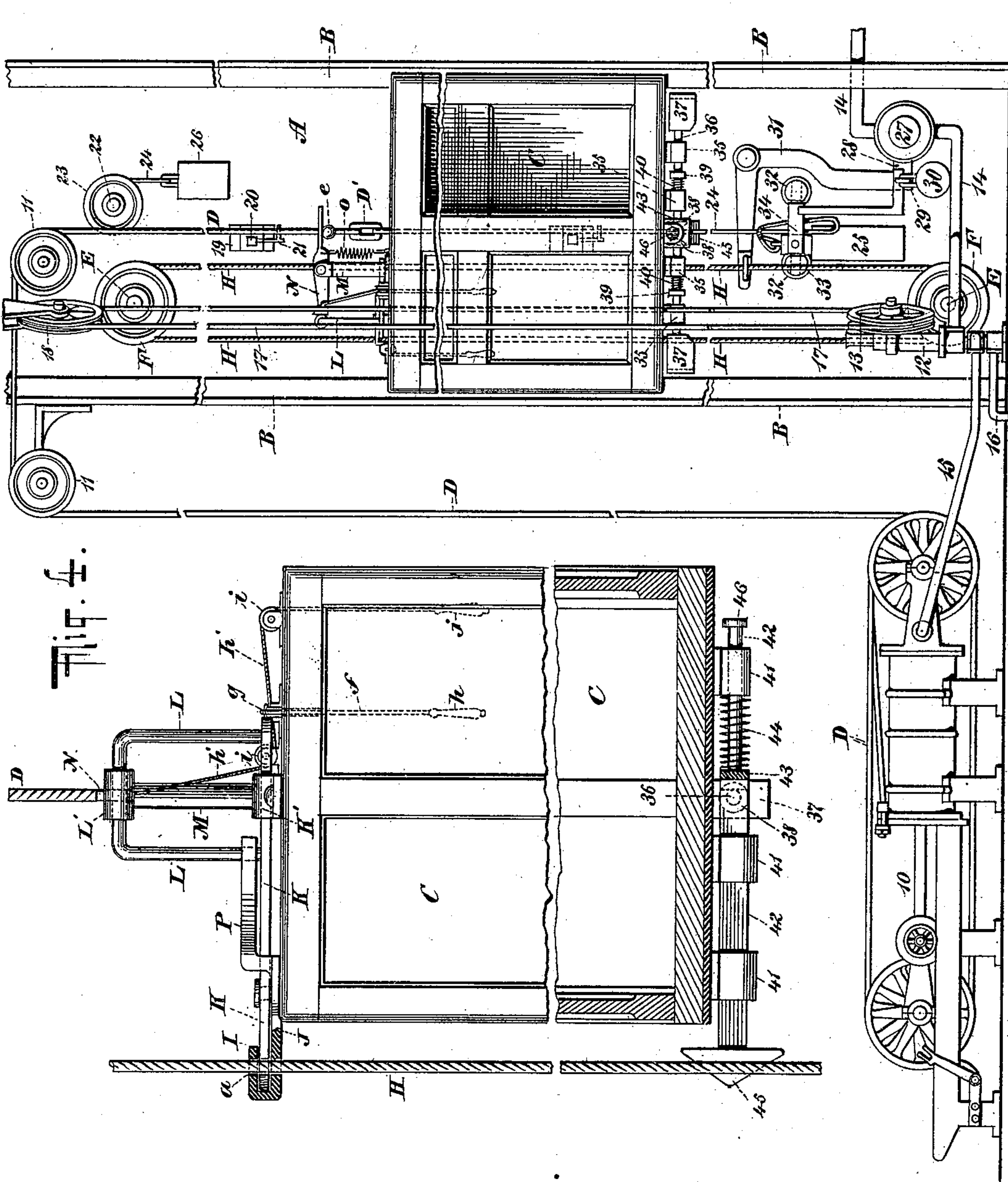
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3 Sheets—Sheet 3.



WITNESSES:

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Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANK MERRILL BELL, OF NEW YORK, N. Y.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 621,597, dated March 21, 1899.

Application filed May 31, 1898. Serial No. 682,109. (No model.)

To all whom it may concern:

Be it known that I, FRANK MERRILL BELL, a citizen of the United States, residing at the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Safety Devices for Elevators, of which the following is a full, clear, and exact specification.

My invention relates to improvements in hoisting apparatus, and has for its object more particularly to provide a simple and efficient apparatus whereby the means provided within the shaft for shutting off the power and arresting the movement of the car may be operated at any time by hand or caused to operate automatically when the hoisting-cable attached to the car breaks, stretches, or slackens. These objects above set forth I am enabled to attain by means of my invention, which consists in the novel details of construction and in the combination, connection, and arrangement of parts hereinafter more fully described and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, wherein like letters and numerals of reference indicate like parts, Figure 1 is a front view of a portion of an elevator-shaft and car adapted to work therein constructed according to and embodying my invention. Fig. 2 is a section, on an enlarged scale, of a portion of the car and guides, said section being taken on the line 2 2 of Fig. 3. Fig. 3 is a similar section taken on the line 3 3 of Fig. 2. Fig. 4 is a diagrammatic view showing an elevator shaft and car, means for operating the same, and my invention applied thereto; and Fig. 5 is an enlarged side view, partly in section, of the car, showing the grip mechanism carried thereby.

In said drawings, A designates a shaft provided at its sides with customary car-guides B B. C denotes the car, adapted to work within said shaft A, and D denotes the hoisting-cable, having one end secured to a link D' at the top of the car C and its other end secured to the drum of the hoisting engine or motor. Arranged upon the rear wall of the shaft, near the top and bottom thereof, are short shafts E E, having mounted upon their ends pulleys F F, over which passes an endless cable H, which is connected near the base of the shaft

with the mechanism for shutting off the power for operating the car, as shown, described, and claimed in Letters Patent granted to me May 24, 1898, and numbered 604,360 and 604,361.

In this application I have shown the invention in connection with the apparatus shown and described in Letters Patent No. 604,361 above mentioned, wherein is arranged adjacent to the base of the shaft A the means for operating the car, comprising a hydraulic elevator-engine 10 and a hoisting-cable D, having one end secured to said elevator-engine 10 and its other end passed upward over pulleys 11, provided at the top of the shaft A, and secured to the link D' at the top of the car C.

12 denotes a valve arranged at the base of the shaft, having a projecting stem and a sheave 13 for raising and lowering said stem, the operating fluid being received from the pipe 14 and entering the cylinder of the engine 10 through said valve 12 and pipe 15 and discharged from the cylinder through the pipe 15, valve 12, and pipe 16, and 17 denotes an endless cable passing through the car C and over the sheave 13 of the valve 12 and a sheave 18, arranged at the top of the shaft.

At intervals upon the rear wall of the elevator-shaft are arranged tripping devices 19 for actuating the clutch mechanism carried by the car, said tripping devices each comprising a bolt 20, normally out of the path of the car, and a bell-crank 21, pivotally supported and having one end connected with the rear end of the bolt 20 and its other end secured to the cable 24.

Arranged upon the rear wall of the elevator-shaft, near the top thereof and projecting outward therefrom, is a short shaft 22, having a pulley 23 mounted upon its outer end, over which pulley passes a cable 24, which extends downward and is provided at its lower end with a weight 25 and at its upper end with a counterweight 26. Also upon the rear wall of the elevator-shaft is arranged the means for operating the cut-out mechanism comprising the short shafts E E, provided near the top and base of the shaft, having pulleys F F mounted upon the outer ends thereof, over which passes an endless cable H, ex-

tending through the grip member I, carried by the car, and at the base of the elevator-shaft is provided the cut-out mechanism for controlling the supply of power to the hoisting-engine, said cut-out mechanism comprising a valve 27, arranged in the pipe 14, connecting the cylinder of the hoisting-engine with the source of water-supply, said valve 27 having a stem 28, provided with an arm 29, extending through said valve-stem 28 and having a short projecting portion at the rear thereof.

30 denotes a weight arranged upon the end of the arm 29, 31 a bell-crank pivotally supported upon the rear wall of the elevator-shaft above the valve 27, having the end of its horizontal member secured to the endless cable H and the end of its vertical member provided with a toe, against the under side of which the short rearwardly-projecting portion of the valve-stem arm 28 is adapted to rest to maintain the valve 27 open, and 32 denotes bearings having a rod 33, supported at its ends thereby, upon which is mounted the means for holding the valve 27 open and supporting the weight 25, said holding and supporting means comprising the bell-crank 34, pivotally supported upon the rod 33 and adapted to receive and support at its horizontal member the weight 25, while the end of its vertical member is adapted to lock against a spring-actuated catch (not seen) in the valve-stem arm 28.

Upon the underside of the car C is arranged the clutch mechanism comprising the bearings 35, within which are supported the rods 36, having clutches 37 at their outer ends, conical heads 38 at their inner opposing ends, collars 39, intermediate said bearings 35, and springs 40, disposed upon said rods 36, intermediate the collars 39 and bearings 35, and arranged at right angles to the bearings 35 are bearings 41, whereby the clutch-holding mechanism is supported, said mechanism comprising a rod 42, adapted to work within the bearings 41 and projecting partly beyond the car C at its back, a double detent 43, secured upon the rod 42, adapted to engage the conical heads 38 of the clutch-rods 36, a spring 44, disposed upon said rod 42, intermediate the bearing 41, supporting the forward end of said rod 42 and the double detent 43, a shoe 45, carried upon the projecting end of the rod 42, and a stop 46, arranged upon the forward end of the rod 42 to limit the outward movement of said rod 42.

I denotes a grip mechanism which is arranged upon the top of the car and extends rearwardly beyond the outline thereof and comprises a tongue J, secured to the car, having its outer end turned upward and forward, the turned-over end of said tongue J and the portion of the tongue directly below the turned-over portion being provided with apertures *a*, and a movable member K, pivotally secured near its rear end to the tongue J and its forward end extending through a bail K',

secured to the top of the car, which serves to limit the movement of the said movable member K. Near its rear end said movable member K is provided at one side with a recess or indentation *c*, which registers with the apertures *a* in the tongue J, and near its forward end said movable member is provided with a staple L, the ends of which are secured thereto to each side of the bail K', and the horizontal portion of the staple L provided with an anti-friction-roller L'.

From the top of the car intermediate the bail K' and the hoisting-cable D projects upwardly a standard M, the upper end of which is forked to receive a lever N, which is pivotally supported therein upon a pin *d*, said lever having one of its ends bent at right angles to the main portion thereof and forked to receive the hoisting-cable D, while the other end of said lever N is adapted to contact with the horizontal portion of the staple L of the movable grip member K, and O denotes a spiral spring having one end secured to the top of the car and its other end secured to the forked end of the lever N, whereby to maintain said forked end in contact with and bearing upon the supporting device or button *e* on the cable D.

P denotes a flat spring having one end secured to the top of the car and its free end in contact with one leg of the staple L to maintain the horizontal portion of said staple in contact with the end of the lever N.

To the extreme forward end of the lever K is secured a rope *f*, the free end of which is passed over a pulley or roller *g* and into the car and provided with a handle *h*, whereby the lever K may be drawn back to its initial position when the grip mechanism is to be reset, and to one end of the lever N is secured a rope *h'*, having one end passed over rollers *i i* into the car and provided with a handle *j*.

The operation of the apparatus is as follows: If we assume the apparatus to be in the position indicated by full lines in the figures the grip mechanism will be free of the cable H and the car permitted to ride up and down within the shaft without disturbing any portion of the apparatus. However, as soon as the cable D breaks the link D' and the section of the cable D, secured thereto, will fall. The supporting device *e*, supporting the forked end of the lever N, being no longer in position, the forked end of said lever N will be drawn toward the top of the car by the spring O, the opposite end of said lever N released of its engagement with the horizontal portion of the staple L, and cause the forward end of the movable grip member K to be forced by the action of the spring P toward the center of the car and the rear end of said movable grip member K into engagement with the endless cable H, as indicated by dotted line at Fig. 3, and move the same, which will in turn release the short rearwardly-projecting portion of the valve-stem arm 28, cause the weight 30 to drop, and close the

valve 27. Simultaneously herewith the vertical end of the bell-crank 34 will be released of its engagement with the spring-actuated catch (not seen) in the valve-stem arm 29, the weight 25 caused to drop and operate the tripping devices 19 to project the bolts 20 thereof and hold the same locked to their projected positions. Thereupon as soon as the shoe 45, carried by the car, comes into contact with the first tripping device in its path the shoe will be forced inward, the double detent 43 released of its engagement with the heads 38 of the clutch-rods, and the clutches 37 projected by the action of the springs 40 into engagement with the guides B B and arrest all further movement of the car. However, should the cable D simply stretch and the supporting device *e* be moved thereby farther from the top of the car it will cause the forked end of the lever N to rise and its opposite end to be depressed, and thus be released of its engagement with the staple L and accomplish the same result as above described. To operate the apparatus by hand, it simply becomes necessary to pull the rope *h'* and release the lever N to accomplish the same result. As soon as the cable has been repaired it simply becomes necessary to draw back the lever K by means of the rope *f*, extending into the car, reset the lever N, then secure the button *e* in proper position below the forked end thereof, and reset the clutch and cut-out mechanisms, as indicated at Fig. 4, and the car will be again free to travel within the shaft.

Without limiting myself to the details of construction, which may be varied within the scope of the invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of an elevator-shaft, a car therein provided with a hoisting-cable and clutch mechanism, means for operating said car, cut-out mechanism interposed between the source of power and the means for operating the car, and means arranged within the shaft adapted to operate said cut-out, and clutch mechanisms with an engaging mechanism and means for actuating said engaging mechanism to engage the means arranged within the shaft whereby to operate the interposed cut-out mechanism to shut off the power, and the clutch mechanism to arrest the movement of the car when the hoisting-cable assumes an abnormal condition, substantially as specified.

2. The combination of an elevator-shaft, a car therein provided with a hoisting-cable and clutch mechanism, means for operating said car, cut-out mechanism interposed between the source of power and the means for operating the car, and means arranged within the shaft adapted to operate said cut-out and clutch mechanisms with an engaging mechanism, holding means for maintaining the engaging mechanism in position to permit of the free movement of the elevator-car, and means for releasing said holding means to

actuate the engaging mechanism to engage the means arranged within the shaft whereby to operate the interposed cut-out mechanism to shut off the power, and the clutch mechanism to arrest the movement of the car when the hoisting-cable assumes an abnormal position, substantially as specified.

3. The combination of an elevator-shaft, a car therein provided with a hoisting-cable and clutch mechanism, means for operating said car, cut-out mechanism interposed between the source of power and the means for operating the car, and a cable arranged within the shaft adapted to operate said cut-out and clutch mechanisms with a grip mechanism adapted to engage said cable, holding means for maintaining said grip mechanism normally out of engagement with said cable, and means for releasing said holding means to cause the grip mechanism to engage said cable to operate the interposed cut-out mechanism to shut off the power, and the clutch mechanism to arrest the movement of the car when the hoisting-cable assumes an abnormal condition, substantially as specified.

4. The combination of an elevator-shaft, a car therein provided with a hoisting-cable and clutch mechanism, means for operating said car, cut-out mechanism interposed between the source of power and the means for operating the car, and an endless cable arranged within the shaft adapted to operate said cut-out and clutch mechanisms with a grip mechanism adapted to engage said endless cable, holding means arranged intermediate the grip mechanism and hoisting-cable adapted to maintain the grip mechanism normally out of engagement with said endless cable, and means for tripping said holding means to cause the grip mechanism to engage said endless cable to operate the interposed cut-out mechanism to shut off the power, and the clutch mechanism to arrest the movement of the car when the hoisting-cable assumes an abnormal condition, substantially as specified.

5. The combination of an elevator-shaft, a car therein provided with a hoisting-cable and clutch mechanism, means for operating said car, cut-out mechanism interposed between the source of power and the means for operating the car, and an endless cable arranged within the shaft adapted to operate said cut-out and clutch mechanisms with a grip mechanism adapted to engage said endless cable, holding means arranged intermediate the grip mechanism and hoisting-cable and in contact therewith and adapted to maintain the grip mechanism normally out of engagement with said endless cable, and means for tripping said holding means to cause the grip mechanism to engage said endless cable to operate the interposed cut-out mechanism to shut off the power, and the clutch mechanism to arrest the movement of the car when the hoisting-cable assumes an abnormal condition, substantially as specified.

6. The combination of an elevator-shaft, a car therein provided with a hoisting-cable and clutch mechanism, means for operating said car, cut-out mechanism interposed between the source of power and the means for operating the car, and an endless cable arranged within the shaft adapted to operate said cut-out and clutch mechanisms with a grip mechanism comprising a rigid member and a movable member, holding means arranged intermediate one end of the movable grip member and the hoisting-cable whereby to maintain said grip mechanism normally disengaged from said endless cable, means for tripping said holding means when the hoisting-cable assumes an abnormal condition, and spring means for projecting said movable grip member, when released, into engagement with said endless cable to operate the interposed cut-out mechanism to shut off the power, and the clutch mechanism to arrest the movement of the car, substantially as specified.

7. In a safety device for elevators, the combination of an elevator-car and hoisting-cable having a supporting device secured thereon adjacent to the top of the car with a grip mechanism secured to and projecting beyond the car and adapted to engage a cable, said grip mechanism comprising a rigid member, a movable member pivotally secured thereto provided at its forward end with an upwardly-projecting member, and a spring for projecting said movable grip member having one end secured to the car and its free end in contact with the upwardly-projecting member of said movable grip member, an upright secured to the car-top intermediate the forward end of the movable grip member and the hoisting-cable, a lever pivotally supported in the upper end of said upright, having one of its ends forked and disposed above the supporting device secured to the hoisting-cable, and its other end in contact with the upwardly-projecting member of the movable grip member, and a spring having one end secured to

the top of the car and its other end to the forked end of the aforesaid lever whereby to maintain said forked end in contact with the supporting device secured to the hoisting-cable, substantially as specified.

8. In a safety device for elevators, the combination of an elevator-car having a link thereon and hoisting-cable secured to said link having a supporting device thereon above said link with a grip mechanism secured to and projecting beyond the car and adapted to engage a cable, said grip mechanism comprising a rigid member, a movable member pivotally secured thereto provided at its forward end with an upwardly-projecting member, and a spring for projecting said movable grip member having one end secured to the car and its free end in contact with the upwardly-projecting member of the movable grip member, means arranged within the car for returning said movable grip member to its initial position, after projection, an upright secured to the top of the car intermediate the forward end of the movable grip member and the hoisting-cable, a lever pivotally supported in the upper end of said upright, having one of its ends forked and disposed above the supporting device on the hoisting-cable, and its other end in contact with the upwardly-projecting member of the movable grip member, means arranged within the car for tripping said lever to project the movable grip member, and a spring having one end secured to the top of the car, and its other end to the forked end of the aforesaid lever whereby to maintain said forked end normally in contact with the supporting device on the hoisting-cable, substantially as specified.

Signed at the city of New York, in the county and State of New York, this 28th day of May, 1898.

FRANK MERRILL BELL.

Witnesses:

WILLIAM L. POLLOCK,
GUSTAVE DIETERICH.