

(No Model.)

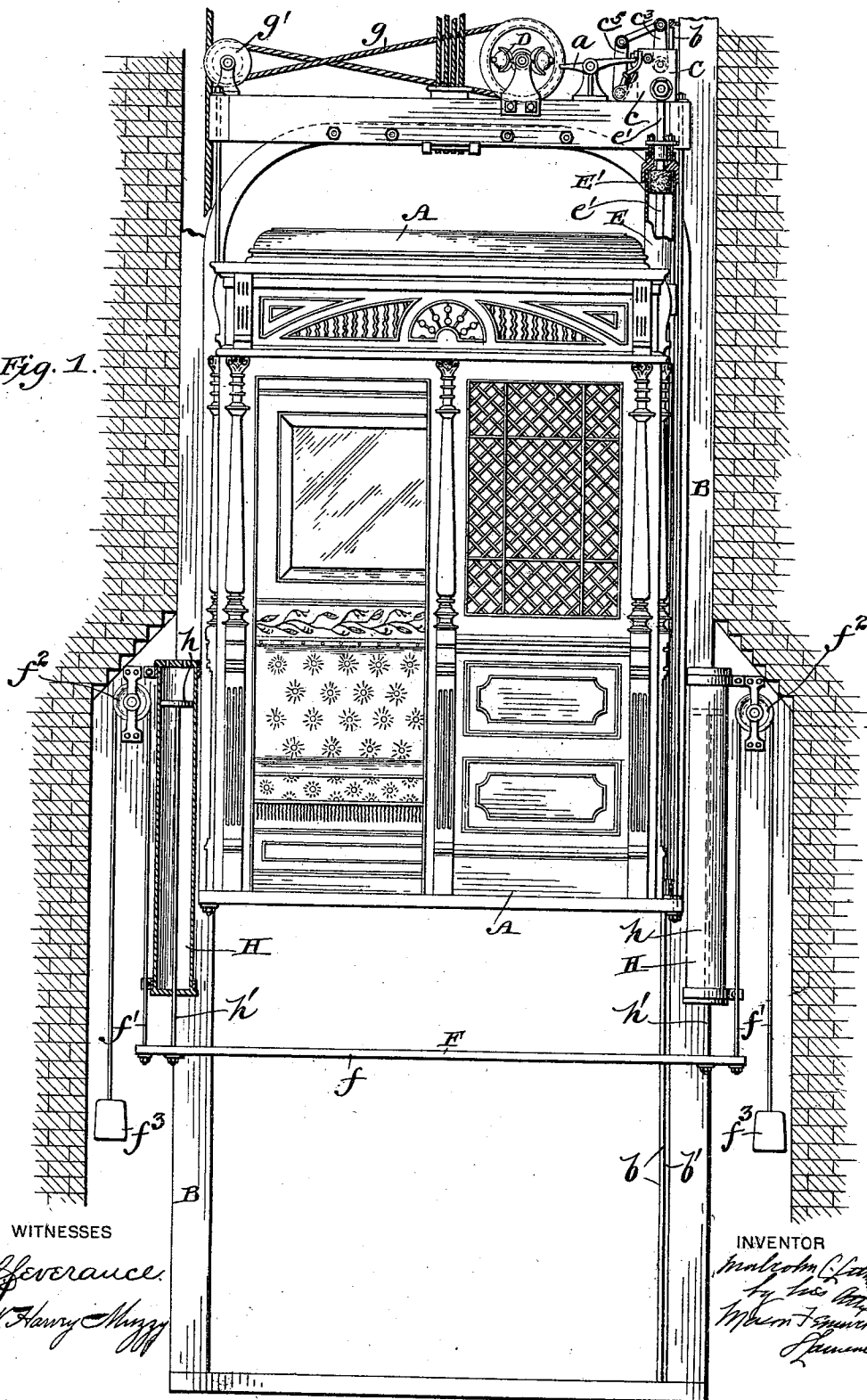
3 Sheets—Sheet 1.

M. C. LITTLEWORTH.
SAFETY DEVICE FOR ELEVATORS.

No. 555,456.

Patented Feb. 25, 1896.

Fig. 1.



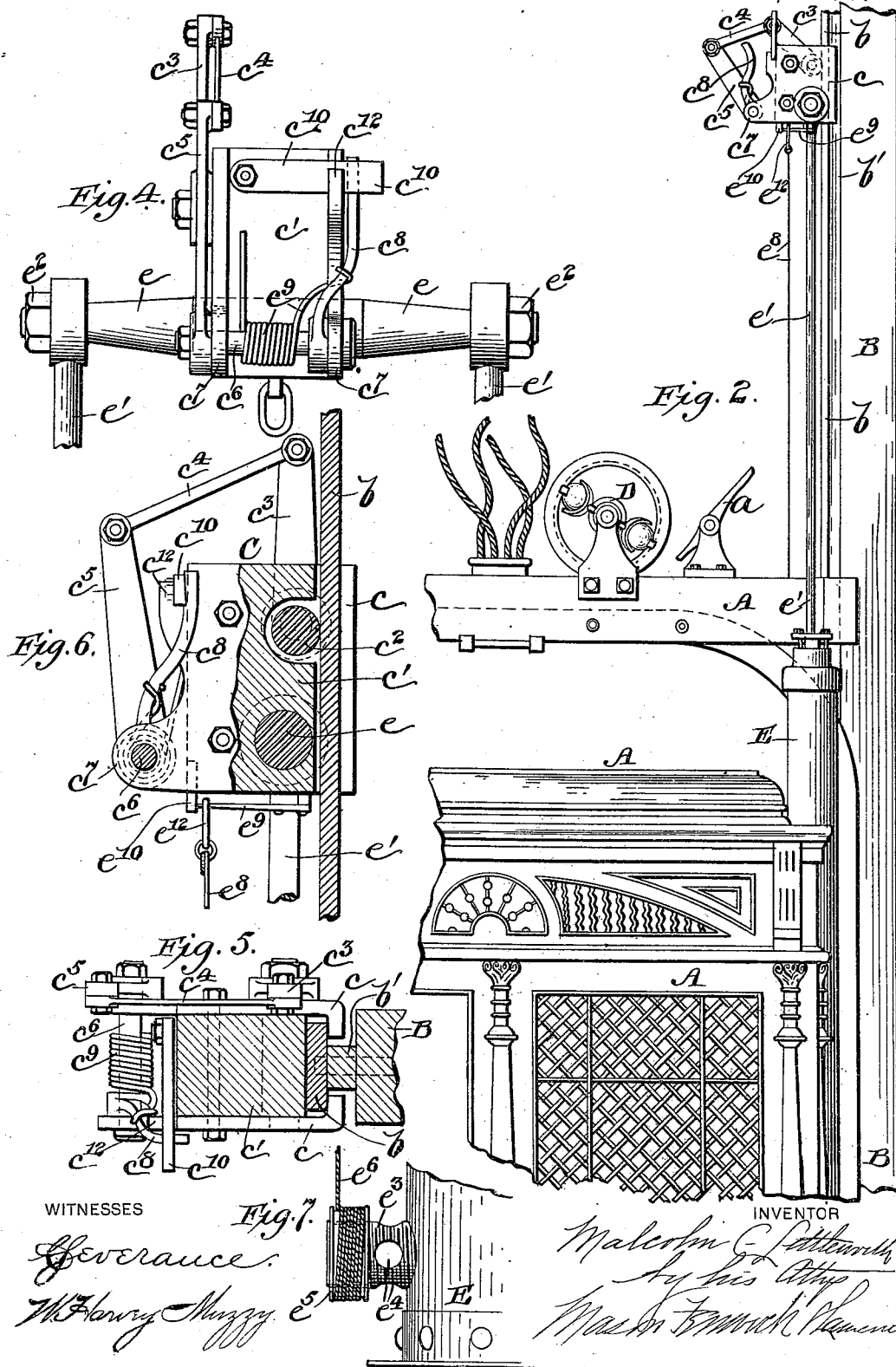
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3 Sheets—Sheet 2.

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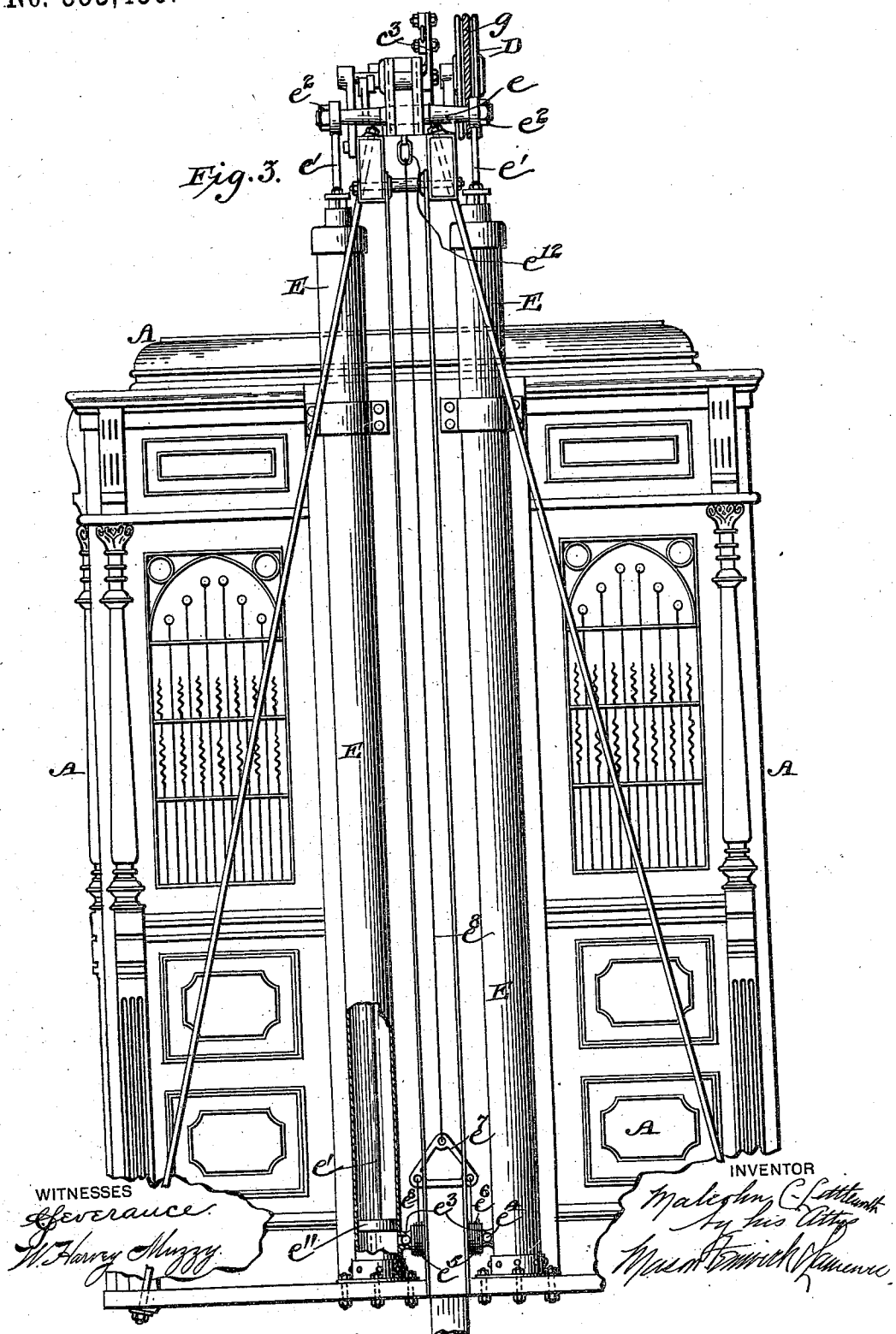
Patented Feb. 25, 1896.



3 Sheets—Sheet 3.

Patented Feb. 25, 1896.

No. 555,456.



UNITED STATES PATENT OFFICE.

MALCOLM C. LITTLEWORTH, OF DULUTH, MINNESOTA, ASSIGNOR OF FOUR-FIFTHS TO WESLEY C. GOULD, WILLARD A. GOULD, MATTIE A. GOULD, AND ELLA C. LAKE, OF SAME PLACE.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 555,456, dated February 25, 1896.

Application filed July 17, 1895. Serial No. 556,278. (No model.)

To all whom it may concern:

Be it known that I, MALCOLM C. LITTLEWORTH, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Safety Devices for Elevators, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in safety appliances for elevators and inclined railways, and is an improvement on my Letters Patent No. 540,865, dated June 11, 1895.

The invention consists of the combination with a car, rails for the same, gripping devices constructed to automatically engage one of the rails upon the car reaching an abnormal speed, air-cylinders mounted on the cars and carrying pistons connected to the gripping device, and valves in the lower portions of the cylinders arranged to be automatically closed when the gripping devices operate, whereby upon the movement of the pistons a vacuum is created behind them.

It also consists of certain other novel constructions, combinations, and arrangements of parts, all of which will be hereinafter more particularly set forth and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 represents a detail front elevation of a passenger-elevator with my invention applied thereto, my improved buffer being shown at the bottom of the shaft and the gripping device in its normal position. Fig. 2 represents a detail front elevation of said elevator with the gripping devices in operation. Fig. 3 represents a side elevation of said elevator. Fig. 4 represents a detail rear elevation of the gripping devices. Fig. 5 represents a top plan view of said devices applied to the rail. Fig. 6 represents a side elevation, partly in section, of said devices; and Fig. 7 represents a detail side elevation of the lower end of one of the air-cylinders with its valve attached.

A in the drawings represents the car; B, the guide-rails; C, the gripping device; D, the governor for actuating the same; E, the

air-cylinders, and F the buffer at the bottom of the elevator-shaft.

The car A and its guide-rails B are of any ordinary and suitable construction. One of the rails B has attached thereto a flange-rail *b* by means of a connecting-beam *b'*. This rail *b* is engaged by the inwardly-turned ends of guide-plates *c* of the gripping device. These plates are attached to the opposite sides of a block *c'*, which composes the body of the gripper. Said block is provided upon its inner face with a lateral groove or recess in which is mounted a cam *c²*, which has its ends journaled in the plates *c*. An operating-lever *c³* is rigidly attached to one of said journal ends, and has its outer free end connected by a link *c⁴* with a lever *c⁵*. This lever *c⁵* is rigidly mounted on a shaft *c⁶* journaled in inwardly-projecting lugs *c⁷* of the plates *c*. The shaft *c⁶* has rigidly mounted thereon an operating-lever *c⁸*, which is actuated by a coil-spring *c⁹*. This spring *c⁹* is mounted loosely on the shaft *c⁶*, and bears with one end against the rear of the block *c'*, and has the other end attached to the said lever *c⁸*, which tends to throw the said lever out away from the block when released from its catch *c¹⁰*, and thus operate the cam to jam it against the outer face of the rail *b* and thus clamp said rail between said cam and the inwardly-turned ends of the plate *c*, which will bring said gripping device to a standstill, and any further attempt at movement will only tighten said device by causing the cam to rotate and jam tighter against the rail *b*.

The lever *c⁸* is held out of its normal position by a pivoted catch *c¹⁰*, which operates within an angular lug *c¹²* attached to block *c'*, said lug preventing any lateral movement of said catch. The said catch is operated to release the lever *c⁸* when the speed of the elevator becomes abnormal by a pivoted trip-lever *a* which lifts the same and allows the said lever to spring forward. The said trip-lever *a* is operated by being struck by the balls of a centrifugal governor D mounted on the cross-beam of the elevator in proximity to said lever and operated by a stationary rope *g* which passes about the same and a sheave *g'* on said beam and up and down the

elevator-shaft, being secured at both top and bottom.

The block c' of the gripping device is also provided with a lateral shaft e whose ends protrude a considerable distance to each side of the same. The ends of the piston-rods e' carrying pistons e'' are journaled on the respective ends of this shaft and prevented from slipping laterally off the same by nuts e^2 . The air-cylinders E are secured rigidly to the side of the elevator-car, and are each provided at the lower end with a valve e^3 which consists of a hollow externally-screw-threaded plug having an opening e^4 communicating with its interior. An internally-screw-threaded drum e^5 is mounted on said plug, so that when it screws inward on the same it will completely cover the opening e^4 , and thus close the lower part of the cylinder and make it air-tight. Each of the drums has wound about it a cord or wire e^6 , and the outer free ends of said wires are connected by a triangular frame e^7 , which in turn is connected to the block c' by a cord e^8 . The cord is connected at its upper end to a link e^{12} mounted on the outer end of a spring e^9 , which is attached to said block c' and has its outer free end resting upon a block e^{10} , so as to prevent the said link from slipping therefrom while the spring is in its normal position.

Each of the cylinders E has an elastic buffer E' in its upper end, so that when the pistons reach the ends of the cylinders there will be no shock.

The buffer F is placed at the bottom of the shaft to lessen any shock that might occur from the car striking the ground. This buffer consists of a cross-piece f supported at each end by a cord f' , said cords passing upward over pulleys f^2 and being provided on their respective ends with weights f^3 .

Cylinders H H are mounted in the shaft above and in proximity to the ends of said cross-piece and are provided with pistons h and piston-rods h' , the latter having their lower ends connected to the respective ends of the said cross-piece. When the elevator strikes the said cross-piece it is forced downward and compresses the air in the air-cylinders, thus lessening the shock.

The operation of the gripping device is as follows: When upon the breaking of the rope or for any other reason the car moves faster than is desired for safety, the governor is so operated that the balls strike the strip a and release the catch c'' , which causes the cam c^2 to jam against the rail b and the whole of the gripping device to remain stationary. The car continues to descend after the gripping device is jammed until the air in the cylinders, by being compressed in front of the pistons, causes the car to gradually come to a stop. When the car descends after the gripping device has stopped, the drums e^5 are revolved by their connecting-cords until they completely cover the openings e^4 , when the cord e^8 tightens and pulls the link e^{12} downward

until the spring e^9 yields sufficiently to permit the said link to slip from the outer free end of the same. This action of the cord is necessary because after the clutch has become fixed to the side guide the distance between it and the elevator increases as the latter descends, and thus unless said cord was released after the lower cords have unwound from their respective drums, it would be broken upon the further descent of the elevator.

By closing the openings e^4 air is cut off from the lower ends of the cylinders E below the pistons, and thus any further movement of the pistons will not only compress the air before them but will also create a vacuum behind them which will, of course, retard their forward movement.

The operation of my automatic safety device does not in any way injure the guides or any other parts of the apparatus, and it requires a very short time to reset the clutch after it has been operated.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a car, rails for the same, gripping devices constructed to automatically engage one of the rails upon the car reaching an abnormal speed, air-cylinders mounted on the car and carrying pistons connected to the gripping device, valves in the lower ends of the cylinders and means for automatically closing said valves when the gripping devices operate, whereby upon the further movement of the pistons a vacuum is created behind them, substantially as described.

2. The combination with an elevator-shaft and car mounted therein, of a buffer at the bottom of said shaft comprising a cross-beam and air-cylinders connected to the same, substantially as described.

3. The combination with a car, rails for the same, gripping devices, air-cylinders mounted on said car and provided with pistons and piston-rods, the latter connecting said cylinders with said gripping devices, and a governor mounted on said car and adapted to operate the gripping devices, whereby they are operated when the speed of the car becomes abnormal, substantially as described.

4. The combination with a car, rails for the same, gripping devices constructed to automatically engage one of the rails upon the car reaching an abnormal speed, air-cylinders mounted on the car and carrying pistons connected to the gripping devices, hollow screw-threaded apertured studs in the lower portions of said cylinders, drums screwed upon the same, devices connecting the drums and the gripping device, whereby when the latter engages the rail the drums are operated to close the openings in the plugs, substantially as described.

5. The combination with an elevator-shaft and car mounted therein, of a buffer at the

bottom of said shaft comprising a cross-beam,
air-cylinders connected to the same, and
weights and cords connected to said beam,
whereby its normal position is up and it is
5 forced down against the action of the air-
cylinders by the car striking the same, sub-
stantially as described.

In testimony whereof I hereunto affix my
signature in presence of two witnesses.

MALCOLM C. LITTLEWORTH.

Witnesses:

J. D. TAYLOR,
H. J. EATON.