(No Model.) 2 Sheets—Sheet 1.

L. M. KELLOGG.

SAFETY ATTACHMENT FOR ELEVATORS.

No. 477,371. Patented June 21, 1892.

Fig. 1.

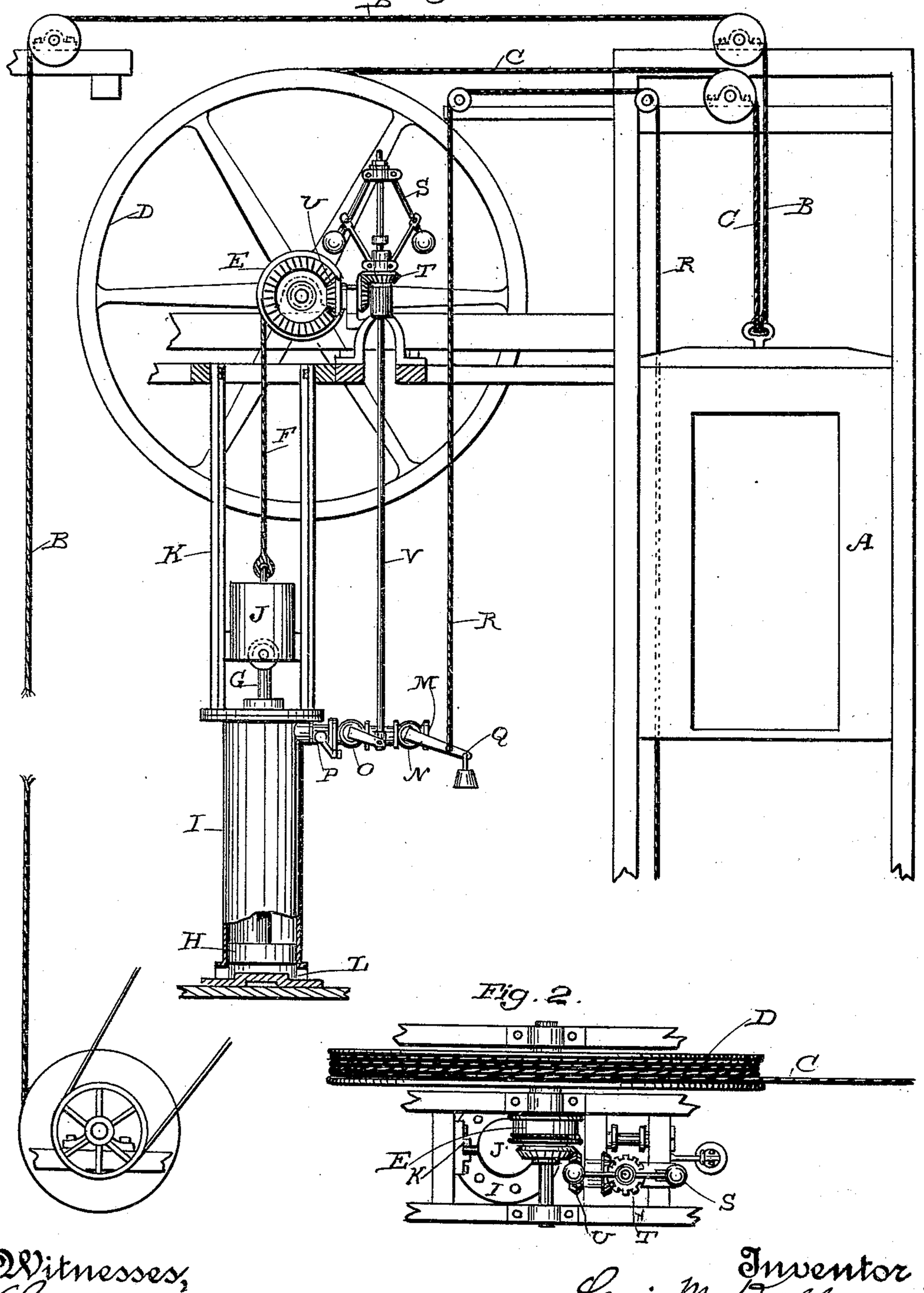

Fig. 2.

Witnesses,
J. A. Louise
J. A. Bayless

Inventor,
Levi M. Kellogg.
By Dewey & Co.
Attys.

(No Model.) 2 Sheets—Sheet 2.

L. M. KELLOGG.

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Fig. 4.

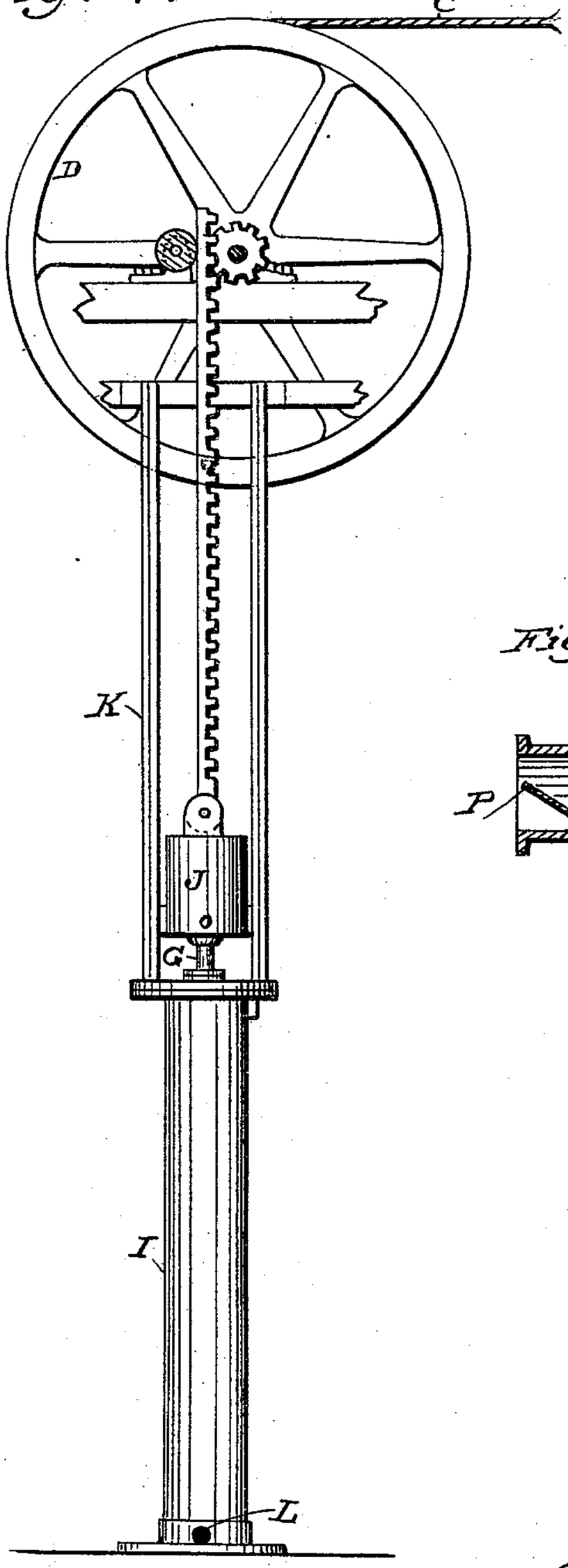
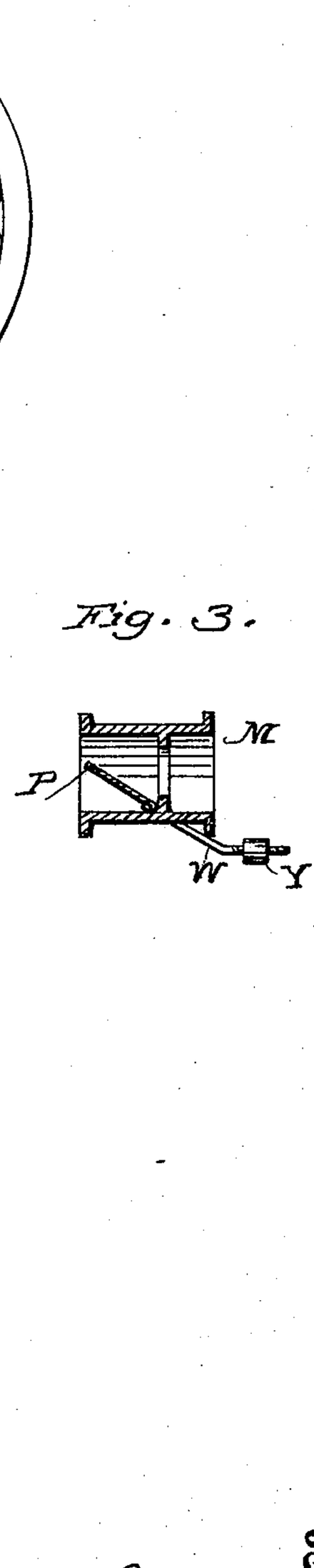


Fig. 3.



Witnesses,
L. A. Serrell
J. A. Bayless

Inventor,
Levi M. Kellogg.
By Dewey & Co.
Attys

UNITED STATES PATENT OFFICE.

LEVI MERRIAM KELLOGG, OF SAN FRANCISCO, CALIFORNIA.

SAFETY ATTACHMENT FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 477,371, dated June 21, 1892.

Application filed March 16, 1892. Serial No. 425,169. (No model.)

To all whom it may concern:

Be it known that I, LEVI MERRIAM KELLOGG, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Safety Attachments for Elevators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a safety attachment for elevators.

It consists, essentially, of a short air-cylinder with an air-tight piston connected with the hoisting mechanism of an elevator and of valves by which the flow of air from the cylinder is regulated or arrested, so as to check or stop the downward movement of the cage in case of accident, and in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a general view of my invention. Fig. 2 is a top view of mechanism. Fig. 3 is a longitudinal vertical section of the pipe M. Fig. 4 is a modified form of the invention.

The object of my present invention is to provide a series of checks by which the downward movement of an elevator-cage may be retarded or altogether arrested either automatically or at will, these checks being operated entirely independent of each other.

A represents an elevator-cage of any suitable or desired description having the hoisting-rope B leading over suitable guide-pulleys, and thence to any mechanism by which it is wound and unwound, so as to raise or lower the elevator-cage, this mechanism not being shown in the present case, as my device is intended to be attached to any elevator, whether already in use or to be constructed.

C is a second safety-rope connected with the top of the cage, passing over a guide-pulley, and thence around a drum D of considerable size, upon which this rope is wound and unwound as the cage is raised or lowered by the hoisting-rope B.

Upon the shaft of the drum B is a smaller drum E, about which a rope F coils. This rope is connected with the piston-rod G of the piston H, which moves within a short vertical air-cylinder I. This cylinder is so bored and the piston so packed as to make the piston air-tight.

A weighted cross-head J, intended as a counterpoise for the cage, is adapted to travel between the guides K, so that as the rope F is unwound from its drum the weight will cause the piston to descend within its cylinder. The cylinder is made of such length that the piston will be at the bottom of the cylinder when the elevator-cage is at the top of the shaft and the piston will be at the top of the cylinder when the cage is at the bottom of the shaft.

Although I have here described a small drum E with the rope coiling upon it, it will be manifest that a pinion might be secured to the shaft of the drum D, and a straight rack-bar connecting with the piston within the cylinder and having its teeth engage with those of the pinion, as shown in Fig. 4, would produce the same result as that here shown; or I might use multiplying pulleys and ropes, either of which devices would do, the object being to interpose some speed-reducing device between the large winding-drum D and the cylinder I, which will allow the use of a short cylinder. The lower end of the cylinder has an opening, as shown at L, and from the upper end a discharge pipe or passage leads, as shown at M. This pipe or passage has three controlling-valves N, O, and P, and each of these valves is operated in a different manner and independently of the others. The first valve N may be of any suitable description, although a sliding valve would be preferable. In the present case it is shown as a rotary valve having a crank-arm Q connected with it, and this has connected with it a rope R, passing over suitable guide-pulleys, and thence down through the cage to the bottom of the well in which the cage travels. Holes are made in the floor and roof of the cage, so that the latter moves freely upon the rope; but the occupant can close the valve N at any time by pulling upon the rope and raising the weighted crank-arm Q. This will close the valve and prevent all escape of air from the upper part of the cylinder, and thus stop the descent of the cage, or by allowing the air to escape slowly the cage would be allowed to descend gradually until it reached the bottom,

if desired. Ordinarily the weighted crank-arm Q holds the valve N open.

S is a governor rotating upon a vertical spindle and driven by beveled gears T and U directly from the shaft of the drums D E. The movable collar of the governor is connected by a rod V with the crank-arm of the valve O, as shown. Now if the hoisting-rope or hoisting machinery should break, or by other accident the cage commence to descend too rapidly and from loss of presence of mind the occupants of the cage neglect to pull on the rope R, so as to close the valve N, the governor would commence to run at a rate of speed depending on the rapidity of the rotation of the drum D and its shaft. This action would cause the governor-balls to spread apart, and by pulling upward on the rod V would act through the crank-arm to close the valve O and check the descent of the cage by cutting off entirely the escape of the air through the pipe M. As the piston H and cylinder I are made air-tight, enough air would be retained and compressed in the cylinder to prevent the piston going up to the top of the cylinder, and consequently the cage could never reach the bottom of the shaft.

The third valve P is entirely automatic. It consists of what is known as a "butterfly" valve fitted into the escape pipe or passage M, and having the stem or axle about which it turns projecting through the side of the escape-pipe M, with the crank-arm W attached to it. The outer end of this arm is screw-threaded, as shown, and the weight Y is adapted to screw upon this end until it is in a position to just counterbalance the valve P and hold it partially open, so that when the elevator is running at its normal speed the air will escape without moving the valve P. When the elevator rises and the piston H moves downward within its cylinder, air will be drawn in freely through the passage M, as all the valves will be opened. If the elevator-cage should move downward more rapidly than was desirable, the air within the cylinder I would be expelled with such velocity through the passage M that it would close the valve P automatically and make the cylinder air-tight, and thus prevent any further descent of the elevator-cage, this valve operating independently of the valves N and O.

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

1. The combination, with a vertically-moving elevator and its hoisting-rope, of a second rope connected with the elevator-cage, a drum upon which the second rope is coiled, an air-cylinder having a tight-fitting piston moving therein and traveling the length of the cylinder while the cage travels its full distance, means by which the piston-rod is connected with the drum-shaft, so as to be operated simultaneously therewith, a counterpoise-weight attached to the piston-rod, said cylinder having an opening through which air is admitted freely into the lower part of the cylinder and having a discharge-opening from the upper part, and valves whereby said discharge-opening may be closed, so as to prevent the escape of air and check the downward movement of the cage, substantially as herein described.

2. The combination, with an elevator-cage and its hoisting-rope, of a supplemental rope connected with the cage, a drum around which it is coiled, a second drum of smaller diameter mounted upon the same shaft, having a rope coiled about it, a retarding-cylinder having air inlet and discharge openings in its lower and upper ends, respectively, a valve in the upper discharge-opening of said cylinder, a rope leading from said valve over suitable guide-pulleys and passing through the cage, and a piston in the retarding-cylinder, having its rod connected with the rope from the smaller drum, substantially as herein described.

3. The combination, with the elevator-cage and its hoisting-rope, of a supplemental safety-rope connected with the cage, a drum upon which said rope is coiled, a second drum of smaller diameter mounted upon the same shaft, a rope coiled upon this drum and connected with the piston which reciprocates in the short cylinder I, said cylinder having an opening in the bottom through which air is admitted and escapes freely and an opening in the top having valves O and P, and mechanism whereby each of said valves is operated automatically and independently of the other whenever the cage descends too rapidly, substantially as herein described.

4. The combination, with the elevator-cage and the hoisting-rope, a supplemental rope connected with the cage, and intermediate mechanism connecting the supplemental rope with a piston-rod and piston, of a short air-cylinder so adapted in length to the height the elevator-cage is to be hoisted that the piston will be at the bottom of the cylinder when the cage is at the top of the shaft and at the top of the cylinder when the cage is at the bottom of the shaft, said cylinder having an opening in the bottom for the free admission of air and an escape-passage at the top, and automatically-acting valves O and P in the discharge-passage, by which said passage is closed by the too rapid descent of the cage and the air in the cylinder above the piston confined to act as a cushion and stop, substantially as herein described.

In witness whereof I have hereunto set my hand.

LEVI MERRIAM KELLOGG.

Witnesses:
H. C. CONVERSE,
FRANK J. BAKER.