(No Model.) 2 Sheets—Sheet 1.

C. W. BALDWIN.

ELEVATOR.

No. 390,053. Patented Sept. 25, 1888.

Fig. 1.

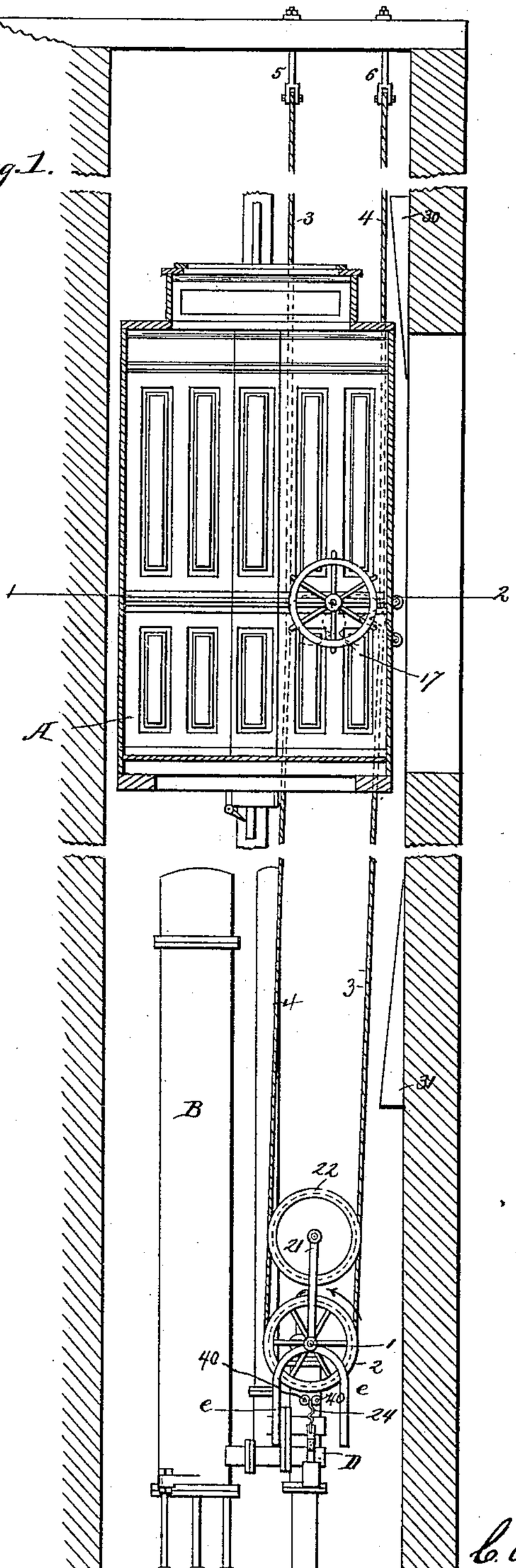

Fig. 4.

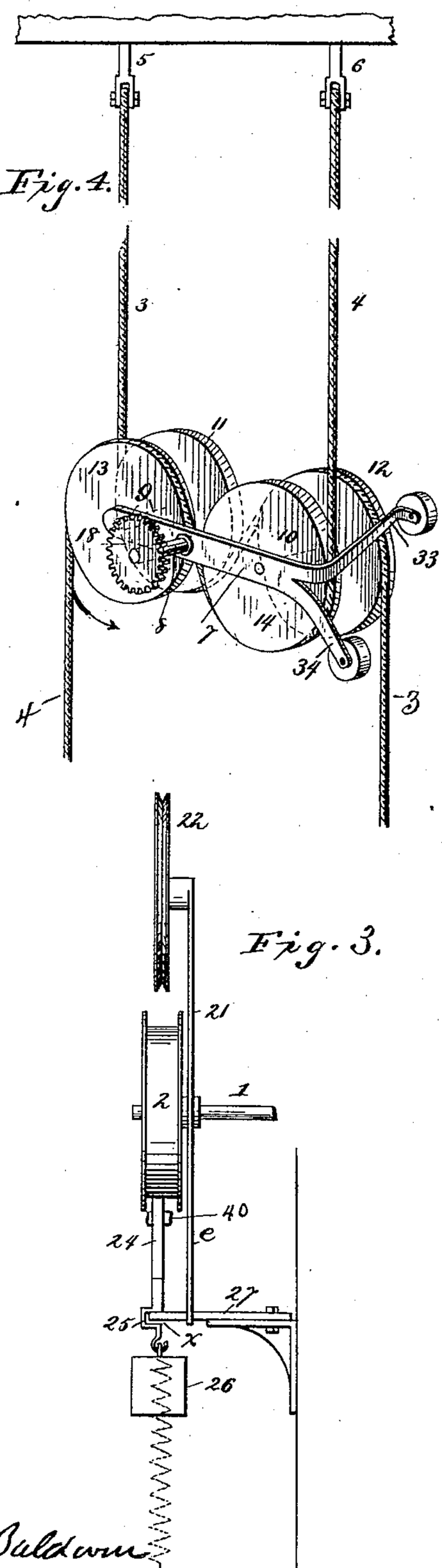

Fig. 3.

Witnesses.
Chas. R. Burr.
A. G. Fanmann.

C. W. Baldwin
Inventor.
By Foster & Freeman
Attorneys.

(No Model.) 2 Sheets—Sheet 2.

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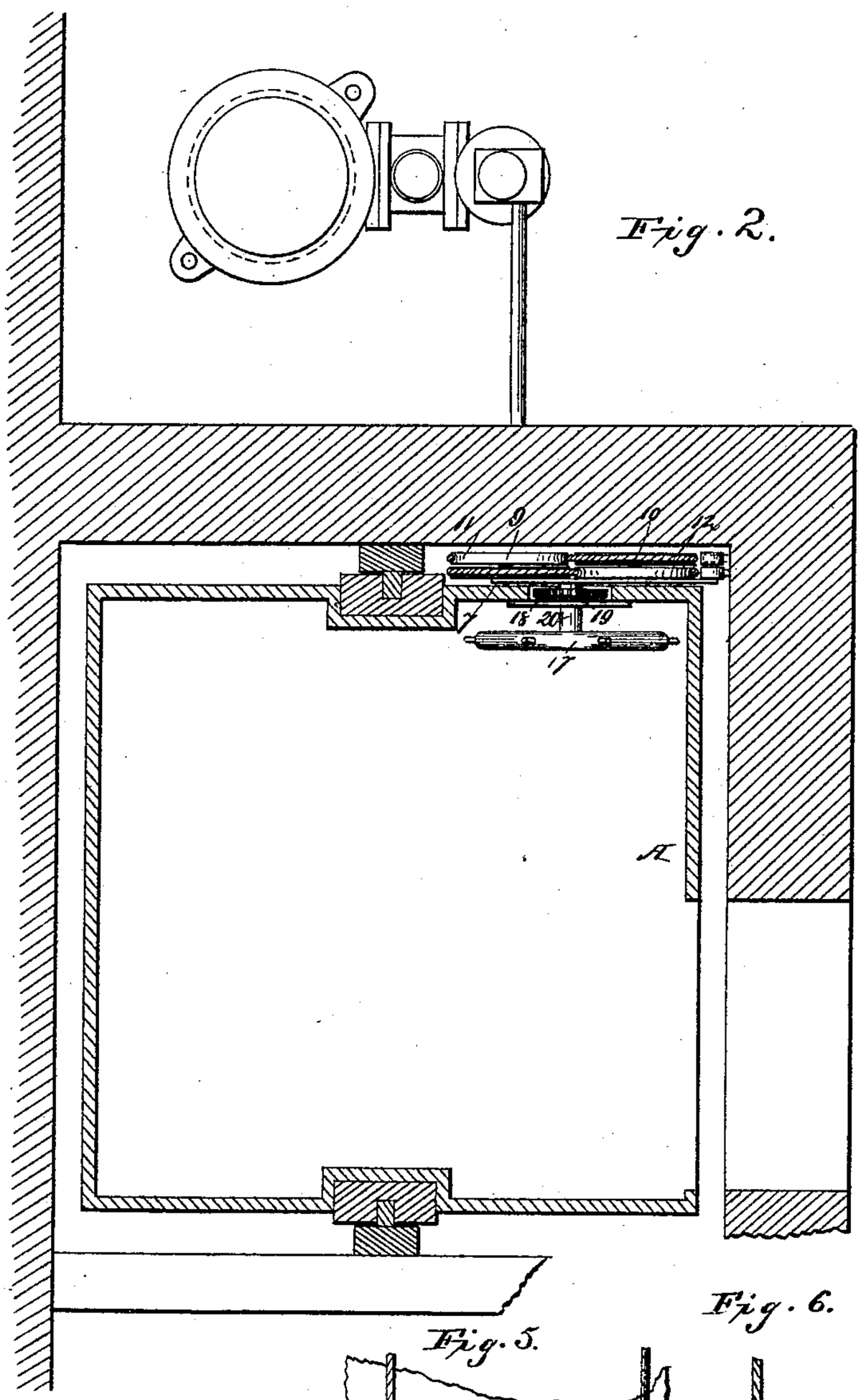

Fig. 2.

Fig. 5.

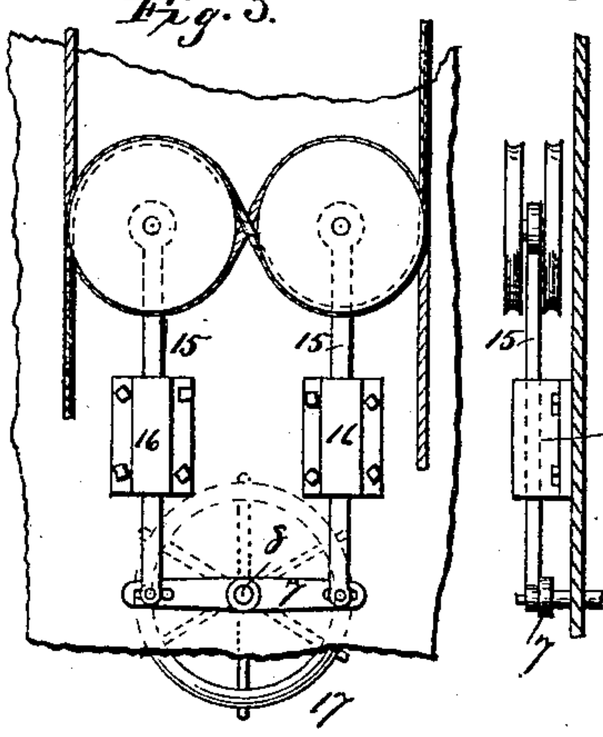

Fig. 6.

Witnesses
Chas. R. Burr.
A. E. Fansmann.

C. W. Baldwin
Inventor.
By Foster & Freeman
Attorneys.

UNITED STATES PATENT OFFICE.

CYRUS W. BALDWIN, OF YONKERS, NEW YORK, ASSIGNOR TO THE HYDRAULIC ELEVATOR COMPANY, OF CHICAGO, ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 390,053, dated September 25, 1888.

Application filed June 22, 1886. Serial No. 205,919. (No model.)

To all whom it may concern:

Be it known that I, CYRUS W. BALDWIN, a citizen of the United States, and a resident of Yonkers, Westchester county, New York, have invented a new and useful Improvement in Elevators, of which the following is a specification.

My invention relates to means for operating the stopping and starting device of an elevator from the traveling cage thereof; and it consists of certain appliances fully set forth hereinafter, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of sufficient of a hydraulic elevator to illustrate my invention. Fig. 2 is a sectional plan on the line 1 2, Fig. 1. Fig. 3 is an edge view, enlarged, of the safety arrangement shown in side elevation, Fig. 1. Fig. 4 is a perspective view showing the frame and pulleys for operating the shifting-rope, the pulleys being separated. Fig. 5 is a side view of a modified pulley-operating frame. Fig. 6 is an edge view of Fig. 5.

For the purpose of illustrating my invention I have shown it in connection with what is known as the "Baldwin" hydraulic elevator, in which the car A is operated through the medium of flexible suspensories by the movement of a piston in a cylinder, B, the flow of water to and from the cylinder being regulated by a valve in a casing, D, which valve is operated by the rotation of a shaft, 1, in opposite directions. The shaft 1 is provided with a pulley, 2, round which the lower ends of two ropes, 3 4, are wound in opposite directions, the upper ends of said ropes being connected to eyebolts 5 6 at the top of the well. Instead of two ropes a single rope may be used having the ends of its two sections connected to the eyebolts and its central portion wound round the pulley 2. In either case the tightening of one section or portion, 3 or 4, of the rope and simultaneous loosening or slackening of the other would result in a rotation of the pulley 2 and a movement of the valve in the casing D.

In order to effect the rotation of the pulley 2 from the cage by the simultaneous equal tightening and slackening of the two sections of the rope, I move each rope or each section of the rope by the reverse movements of two pairs of pulleys mounted upon a bar or frame in such manner as to permit them to be simultaneously rocked upon the pivot of the bar or frame. Thus a bar, 7, is secured centrally to a shaft, 8, extending through the side of the cage, and carries upon projecting studs 9 10 a pair of pulleys, 11 12, round which the portion 3 of the rope or cable passes, first under the pulley 11 and then over the pulley 12, and upon the same studs turn the two other pulleys, 13 14, the portion 4 of the cable passing beneath the pulley 14 and over the pulley 13, and the cable is of such length that both sections will be taut and the valve will be in its central position when the axes of the pulleys are upon a horizontal plane.

It will be seen that when the frame or bar 7 is swung in the direction of the arrow, Fig. 4, the portion 3 of the cable will be contracted and the portion 4 will be simultaneously slackened, thereby imparting rotation to the pulley 2 in direction of its arrow, Fig. 1, and moving the valve, and that by swinging the bar 7 in the opposite direction the portion 4 of the cable will be tightened and the portion 3 slackened, reversing the movement of the valve.

The horizontal arrangement of the pulleys when the valve is in mid-position is important, because the swinging of the frame in either direction from a horizontal line or plane draws upon one section of the cable to precisely the same extent as it pays out or slackens the other, while any other arrangement of the pulleys would result in paying out one portion of the cable to a greater extent than the other is drawn upon, so that the slackened portion is liable to slip from the pulleys as the cage travels up and down past the suspended cable.

The vibrating frame for supporting the pulleys may be constructed in different ways. I prefer, however, to make it in the form of a bar provided with studs, as this arrangement is compact and occupies but little room beyond the outside of the cage.

It is not essential that the pulleys be carried in circular paths, as they may be moved upon vertical lines in opposite directions. For instance, the adjacent pulleys of each pair may

turn upon studs projecting from a slide, 15, moving in a guide, 16, at the side of the cage, and the two slides may be moved vertically in opposite directions by being connected to the cross-bar 7, secured to the shaft 8, extending inside of the cage.

The operating wheel or lever 17 may be connected directly to the end of the shaft 8. I prefer, however, to provide the latter with a toothed wheel, 18, gearing with a small pinion, 19, upon the shaft 20, carrying the hand-wheel or lever 17, so as to increase the leverage and prevent too abrupt a movement of the frame or carrier supporting the pulleys.

In order to insure an instant arrest of the cage should either portion of the hand-rope break, I use a detent arranged to support a weight in an elevated position or resist the action of the spring, which weight or spring when released will act upon the valve-operating devices to bring the valve to its mid-position and arrest the movement of the cage. I have illustrated in the drawings one form in which such a safety device may be embodied, the said form being especially adapted for use in the hydraulic elevating apparatus illustrated and described.

A forked bar, 21, is hung loosely to the shaft 1, and carries at its upper end a grooved pulley, 22, of such width that the two portions 3 4 of the cable pass in contact with the opposite edges of the pulley and sustain the latter in a nearly vertical position above the shaft 1.

To the periphery of the pulley 2, and to the lowest part of the periphery when the valve is in its mid-position, is secured a flexible strap or band, 24, carrying at the lower end a block, 25, having a notch, *x*, and provided with a hook for attachment to a counter-balance—such as a weight or spring, 26.

To the frame of the lifting-machine is pivoted to swing horizontally a detent-arm, 27, which extends between the forks *e e* of the bar 21, and when the weight or spring 26 is lifted may be brought into the notch *x* of the block 25, so as to leave the belt 24 slack and permit the pulley 2 to rotate freely in each direction to the extent necessary to operate the valve.

So long as the shifting or hand rope or cable is intact the parts will maintain the position shown in Figs. 1 and 3; but should either portion of the cable break, the pulley 22 will no longer have any lateral support and will fall to one side, vibrating the forked bar 21 and bringing one of the forks against the detent-arm 27 and throwing it out of the notch *x*, so that the weight or spring draws taut the strap 24 and pulls it downward until the pulley 2 is brought to such position as to close the valve and stop the movement of the cage.

To prevent the pulley 2 from being carried by momentum beyond its central position, I conduct the strap 24 between two studs or rollers, 40 40, so that after the attached end of the strap reaches the point above the rollers any further movement would result in lifting the weight, which therefore resists such further movement.

As the valve-operating cable is suspended from stationary supports, the valve cannot be automatically closed by the contact of the cage with stops upon the cable, as usual. I therefore provide means whereby the pulley-supporting frame or other pulley-operating device may be automatically moved to shift the valve as the cage approaches the limit of its movement in each direction. Thus I arrange at the top of the well a stop block or plate, 30, having an inclined face arranged to make contact with a friction-roller upon an arm, 33, extending from the bar or frame 7, and thereby tilt the latter to close the valve as the cage reaches the limit of its upward movement, and I place another contact-plate, 31, similar to the plate 30, but in a reversed position, near the bottom of the well, in a vertical plane a little to one side of that of the plate 30, in position to make contact with a friction-roller upon an arm, 34, of the frame 7.

The arms 33 and 34 are set at such an angle to the frame 7 that their contacting-points will be nearly level with the center of vibration of the frame when the latter is tilted up or down to its maximum extent, so that there will be no tendency to thrust back from the bearing-point toward the axis of the frame, which might result if the said bearing was at the end of an arm in line with the bar or frame 7, so that the bearing-point would be above or below the axis of the frame at the time of contact. By placing the plates 30 31 upon different planes or offsetting them each plate only makes contact with the arm with which it is to operate, the other arm passing the plate at one side.

I do not here claim the combination of the suspended cables connected with the stopping and starting devices and the pulley-carrying frame and contact-plates for automatically shifting the frame by contact with the same or with the arms thereof, as this forms the subject of a separate application for Letters Patent, Serial No. 279,246, filed July 7, 1888.

I am aware that a cage having connected therewith two double-grooved adjustable pulleys round which the two sections of a suspended cable are passed is described in Letters Patent No. 359,551, granted to N. C. Bassett March 15, 1887, and I do not claim such construction in my improved apparatus, as there is a pair of independent pulleys for each cable-section, whereby the pulleys round which one cable-section passes can move independently of those round which the other section passes, so that any slacking or tightening of either section will not cause any slip of either section in respect to its guiding-pulleys.

While for the purpose of illustrating my invention I have shown it in connection with a hydraulic elevating apparatus in which the valve is the stopping and starting device, it will be evident that it may be used in connec-

tion with other forms of elevators—as, for instance, with what are termed "mechanical elevators," where a belt-shifting bar is the stopping and starting device, or with electric elevators, where the switch in some instances is the stopping and starting device.

It will be evident that a cross-bar or lever secured to the shaft 1 and having the two sections 3 4 of the cable connected to its ends would be an equivalent of the pulley 2.

I do not claim as my invention two fixed suspended ropes connected to the stopping and starting device, and both operated by one device carried by the cage; neither do I claim a device for operating the stopping and starting device of an elevator, consisting of two fixed suspended cable-sections connected with the stopping and starting device, and a single cable-tightener carried by the cage and bearing upon both sections to tighten and slacken the same alternately.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination, with the cage and stopping and starting device of an elevator, of a cable consisting of two suspended sections within the well, connected at their lower ends with the stopping and starting device, and two pairs of pulleys supported side by side, and adjusting mechanism extending within the cage for simultaneously raising or lowering the adjacent pulleys of both pairs, the two sections of the cable being passed in opposite directions round the pulleys, substantially as set forth.

2. The combination, with a vibrating frame carrying pulleys around which pass the suspended cable-sections, of a toothed wheel upon the shaft of said frame and a hand-wheel within the cage upon a shaft having a pinion gearing with said toothed wheel, substantially as set forth.

3. The combination, with the stopping and starting device of an elevator, of a counter-balance connected thereto to hold the same in its mid-position, a detent for holding said counter-balance out of action, a pulley arranged to bear against the operating-cable for shifting the stopping and starting device, and an arm or bar arranged to release the detent when the pulley moves from contact with the cable, substantially as set forth.

4. The combination, with the shifting-cable, stopping and starting device, a counter-balance connected to hold the latter in its mid-position, and detent for holding said counter-balance out of action, of a pulley arranged between the two sections of the cable, and a pivoted forked bar supporting the pulley and arranged with its forked ends on opposite sides of the detent, substantially as and for the purpose set forth.

5. The combination of the shifting-cable, pulley 2, around which the shifting-cable passes, a counter-balance connected to said pulley by a flexible strap, a detent for holding the said counter-balance, a pivoted forked bar having its prongs extending on opposite sides of the detent, and a pulley carried by said bar and normally occupying a position between the two sections of the shifting-cable, substantially as set forth.

6. The combination, with the operating-cable and stopping and starting device of an elevator, of a counter-balance whereby to bring the stopping and starting device into position to arrest the cage, a detent for holding the said counter-balance out of action, and an arm bearing on the operating-cable, and connections between the arm and detent whereby the latter is shifted when the arm moves on the breaking or displacement of the cable, substantially as described.

7. The combination of the stopping and starting device, the pulley 2, the cable, the strap and weight, the rollers 40, the detent, and an automatic device for moving the detent when the shifting-cable breaks, substantially as described.

8. The combination, in an elevator, of a cage, a stopping and starting device, two cable-sections suspended from fixed points within the well and connected at their lower ends with said device, and two pairs of grooved pulleys carried by the cage and connected with a single operating device within the cage, each cable-section passing beneath one pulley of one pair and over the adjacent pulley of the other pair, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CYRUS W. BALDWIN.

Witnesses:
WM. H. SWENY,
JOHN T. GAWRY.