

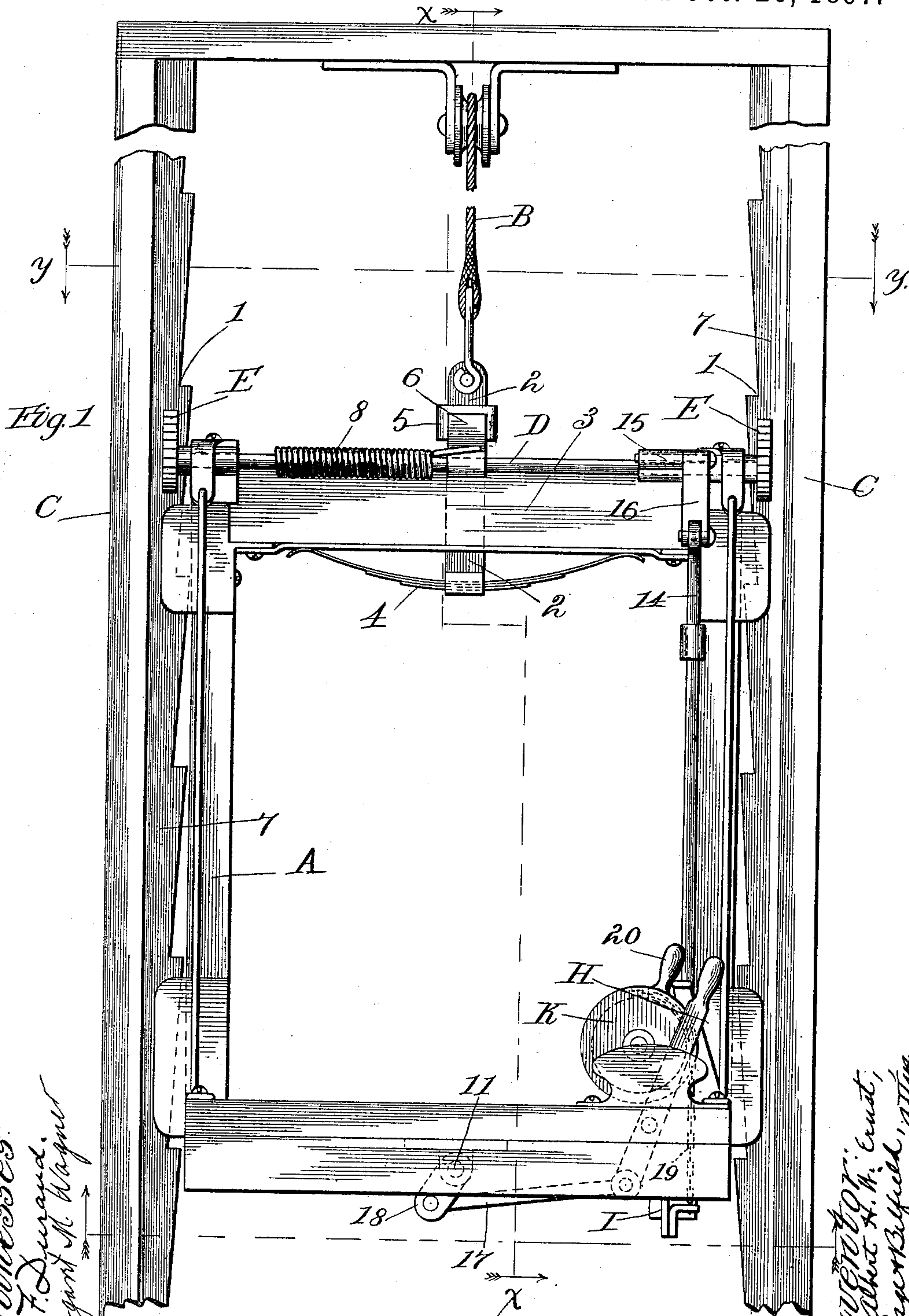
(No Model.)

4 Sheets—Sheet 1.

A. H. W. ERNST.
ELEVATOR SAFETY DEVICE.

No. 592,541.

Patented Oct. 26, 1897.



Witness:
A. F. Durand,
Margaret M. Wagner

Inventor:
Albert H. W. Ernst,
by Robert B. Gifford, atty.

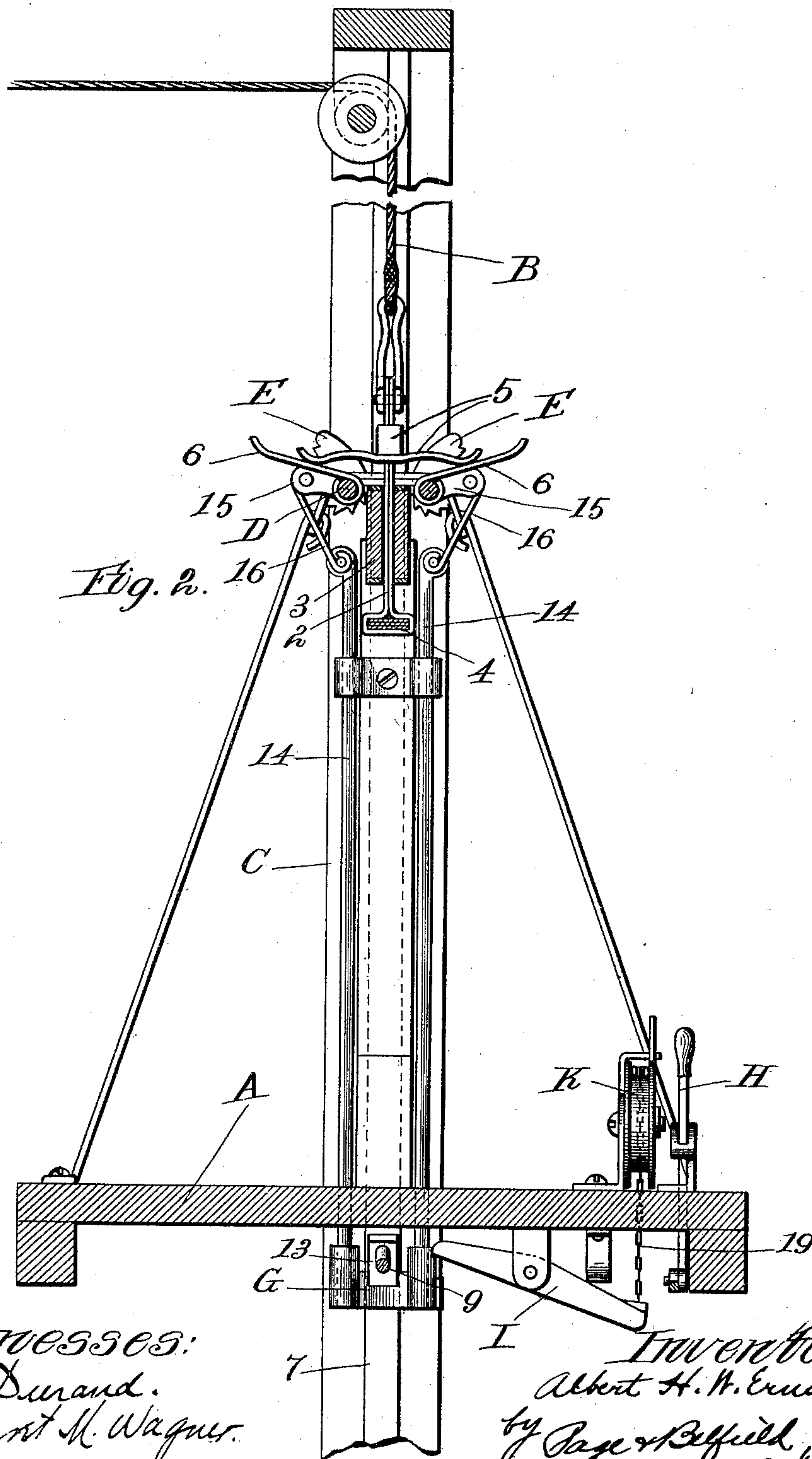
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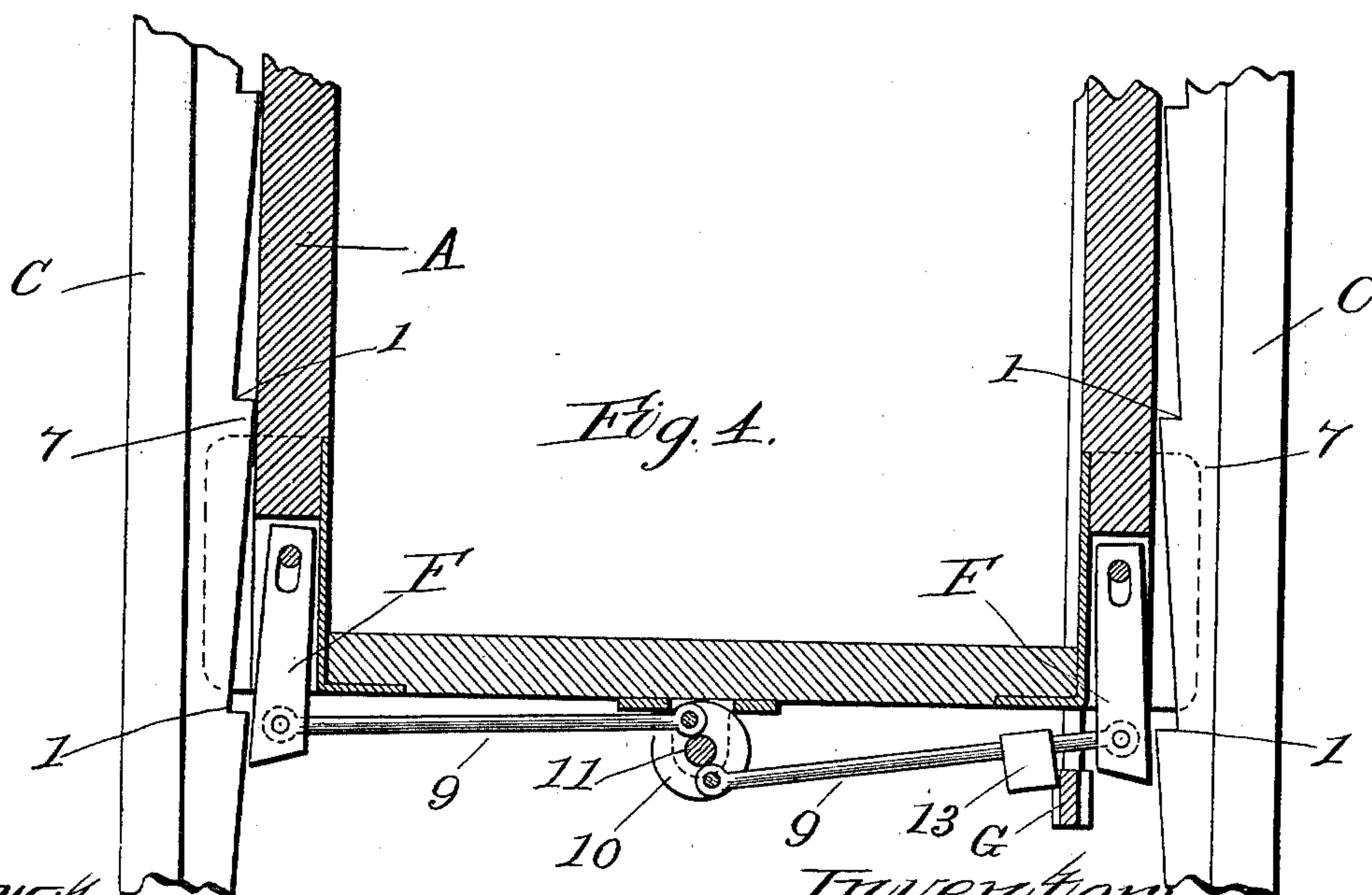
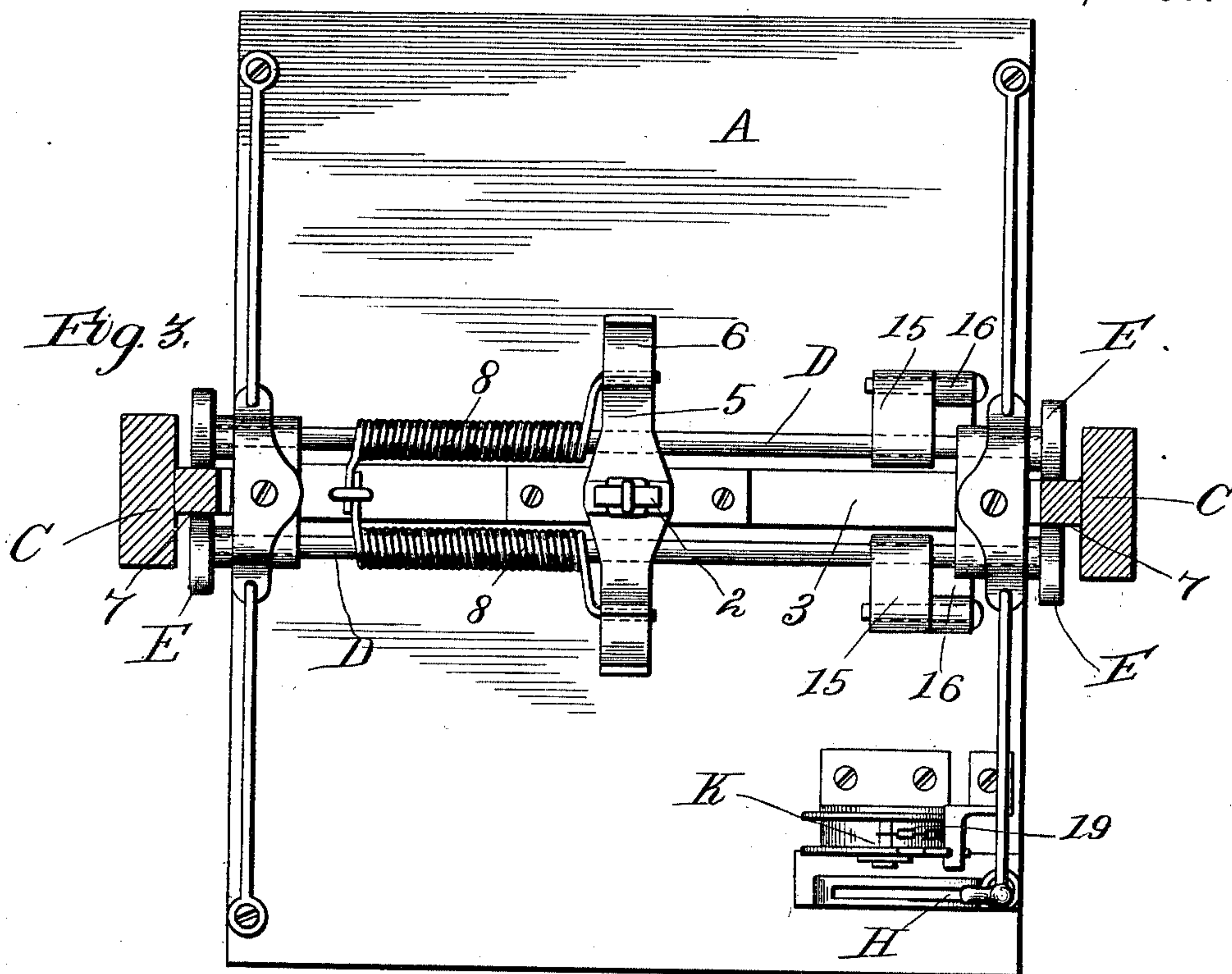
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Witnesses:
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UNITED STATES PATENT OFFICE.

ALBERT HEINRICH WILHELM ERNST, OF CHICAGO, ILLINOIS, ASSIGNOR OF
ONE-HALF TO JOHN C. F. A. SCHMIDT, OF SAME PLACE.

ELEVATOR SAFETY DEVICE.

SPECIFICATION forming part of Letters Patent No. 592,541, dated October 26, 1897.

Application filed May 17, 1897. Serial No. 636,901. (No model.)

To all whom it may concern:

Be it known that I, ALBERT HEINRICH WILHELM ERNST, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Elevator Safety Devices, of which the following is a specification.

My invention relates to a construction of elevator safety device by means of which the elevator car or cage is automatically brought to a standstill in the elevator-well when the hoisting rope or cable breaks by the release-ment of a spring serving as a medium of connection between the cable and car and held normally in tension by the weight of the latter.

Prominent objects of my invention are to secure great certainty and reliability of action in stopping the car as a result of the breaking of the hoisting-cable, to arrange for the stopping or locking of the car at the will of the attendant, and to provide simple, reliable, and easily-operated devices for procuring such results.

To the attainment of the foregoing and other useful ends my invention contemplates arranging for the automatic engagement of faces of the elevator-well guides by toothed cams or dogs and also for the simultaneous and automatic projection of latches or the like into position to engage notches with which said guides are provided by the breakage of the hoisting rope or cable.

It also contemplates arranging for the locking of the car by hand while the rope is intact by permitting the projection at will of the said latches into position to engage the notches of the vertical elevator-well guides.

In the accompanying drawings, Figure 1 is a view illustrating an elevator-car arranged in an elevator-well and provided with a safety device embodying my invention. Fig. 2 is a vertical section taken on line $x x$ in Fig. 1. Fig. 3 is a horizontal section taken on line $y y$ in Fig. 1. Fig. 4 is a view illustrating the lower portion of the car in vertical section, taken on a plane extending between the oppositely-arranged guides of the elevator-well. Fig. 5 is a view of the bottom of the car, looking upward; and Fig. 6 is a view illustrating

a portion of one of said elevator-well guides in vertical section and devices of the elevator-car for engaging the same in elevation.

The elevator car or cage A is suspended by a hoisting cable or rope B and works in an elevator-well between a couple of vertical side guides C, having notches 1.

The cable B is attached to a vertically-movable slide 2, which extends through the top cross-beam 3 of the car A and is attached at its lower end to a bow-spring 4. The bow-spring 4 is conveniently arranged below the said cross-beam 3 and is held normally in tension by the weight of the car, so that when the hoisting rope or cable breaks the slide 2 is drawn down by the bow-spring 4.

The upper end of the slide 2 has a cross-bar or transversely-arranged head 5, whose opposite ends, respectively, are situated above and bear upon lateral arms 6, with which the middle portions of a couple of rock-shafts D, mounted so as to extend along the upper edges of the beam 3, are respectively provided. Each rock-shaft D is provided at its ends with toothed segment-shaped dogs E, adapted for engaging the sides 7 of the vertical guides C, and is surrounded by a coil-spring 8, which is arranged to normally maintain the rock-shaft it incloses in position to keep the dogs E thereof away from the guide-faces or sides 7, but which are less powerful than the spring 4. By such arrangement when the hoisting-rope is intact the toothed dogs E are maintained normally away from the guide-faces 7; but when the rope breaks the bow-spring 4 acts to forcibly draw down the slide 2, and the cross-head 5 of the latter makes contact with and presses down upon the lateral arms 6 of the rock-shafts D, so as to turn the latter and throw the toothed dogs E into engagement with the guide-faces 7, and thereby cause a stoppage or partial stoppage of the car A. As an arrangement, however, for insuring the stoppage of the car A in case the toothed dogs E should fail to operate, and also for positively holding and locking the car in position in addition to the locking by said toothed dogs E, the lower part of the car A is provided with a pair of swinging latches F, Fig. 4, which are held normally in inoperative position, but which are arranged

to be automatically thrown outward and into engagement with the notches 1 of the guides C also by the breakage of the hoisting rope or cable B. To such end the lower ends of the latches F are connected to links 9, which latter are attached to crank-pins on an oscillatory disk 10, mounted on a rock-shaft 11, arranged below the floor of the car, so that when the rock-shaft 11 is turned the lower ends of the latches F will be simultaneously projected outward and into engagement with the notches 1 of the guides C. The rock-shaft 11 is surrounded by a coil-spring 12, Fig. 5, which tends to move said shaft, so as to cause the latches F to be thrown outward and into engagement with the guide-notches 1. The said latches F are, however, normally held back by a vertically-slidable catch G, which is normally in position between one of the latches F and a stop 13, Fig. 4, mounted on one of the links 9. This catch G is attached at its ends to the lower ends of a couple of vertically-sliding rods 14 14, Fig. 2, which are arranged on one side of the car and have their upper ends connected by means of links 16 with crank-arms 15, with which one pair of ends of the upper rock-shafts D are provided. By such arrangement when the cross-bar 5 on the slide 2 is not in engagement with and pressing down upon the arms 6 of the upper rock-shafts D the latter will be in a position both to maintain the upper toothed dogs E away from the guide-faces 7 and to allow the arms 15 on said rock-shafts D and the rods 14, attached thereto, to be sufficiently raised to maintain the catch G in position to engage the stop 13, and thereby hold back the latches F. When, however, the hoisting-rope breaks and the slide 2 is drawn down by the bow-spring 4, so as to cause its cross-bar 5 to depress the arms 6 on the upper rock-shafts D, and thereby throw the toothed dogs E into engagement with the guide-faces 7, the crank-arms 15, also on the upper rock-shafts D, will also be depressed, the slide-rods 14 lowered, and the catch G moved out of engagement with the stop 13, whereupon the spring 12 will operate the lower rock-shaft 11, and thereby project the latches F outward, so as to permit of their coming into engagement with the notches 1 of the guides C.

The above general arrangement is particularly advantageous by providing two automatically-operated locking devices each of which is adapted to stop the car of itself, and so as to form a safety-check on the other, and by permitting the positive locking of the car by the latches engaging the notches in the guides, while it at the same time causes the car to be slowed up before such positive locking, so as to prevent a sudden shock by the same by the engagement of the toothed dogs with the guide-faces. Also the construction shown for such purpose is simple, convenient, efficient, and reliable.

In order to set back the latches F, a hand-lever H, Fig. 1, is pivotally connected to the floor of the car and connected by a link 17 with a crank-arm 18 on rock-shaft 11. By operating this lever the lower ends of the latches F can be drawn inward until the catch G rises and comes between the stop 13 and one of the latches F, it being observed that the springs 8, coiled upon the rock-shafts D, tend to thus lift the catch G into position between the stop 13 and the dog F, as well as to hold the toothed dogs E in position out of engagement with guide-faces 7. As a means of locking the cage in position in the elevator-well should it be desired to do so while the rope is still intact a lever I is pivoted on the under side of the car A and arranged to engage the vertically-sliding catches G. This lever I has one end connected by a chain 19 with a pulley or drum K, having an operating-handle 20. By turning thus the drum or pulley K the lever I can be tilted in a direction to cause it to bear down on and depress the catch G, so that the latter will release the stop 13, and thereby allow the latches F to move outward into position to engage the notches 1 of the guides C.

What I claim is—

1. The combination, with the notched elevator-guides, the elevator-car working between the same, and with the hoisting-rope therefor, of a spring interposed between the rope and the car and normally held in tension by the latter; a couple of rock-shafts provided at their ends with toothed dogs for engaging the guide-faces; a pair of latches adapted for engaging the guide-notches; means for maintaining the rock-shafts in position to hold the toothed dogs in inoperative position and also for holding the latches in inoperative position; and means for throwing both the same into operative position upon the releasement of said hoisting-rope spring by the breakage of the hoisting-rope, as set forth.

2. The combination, with the notched elevator-guides, the elevator-car working between the same, and with the hoisting-rope for said car, of a vertically-movable slide attached to the end of the hoisting-rope; a spring engaged by the lower end of said slide and held normally in tension by the weight of the car; a couple of rock-shafts provided at their ends with toothed dogs for engaging the guide-faces; and arranged to be turned by the slide when the same descends upon the releasement of the hoisting-rope spring; springs tending to hold said rock-shafts in position in which the toothed dogs thereof are inoperative; a couple of latches capable of outward projection into position to engage the guide-notches; mechanism for projecting outward said latches; means tending to normally operate said mechanism; and a catch adapted to hold said latches in inoperative position and connected with said rock-shafts

so as to release the latches at a time when the rock-shafts are turned by the releasement of the hoisting-rope spring, as set forth.

3. The combination, with the notched guides, the elevator-car working between the same, and with the hoisting-rope therefor, of a spring interposed between the rope and the car and held normally in tension by the weight of the latter; toothed dogs for engaging the guide-faces; mechanism for throwing said dogs into engagement with the guide-faces upon the releasement of the hoisting-rope spring by the breakage of the hoisting-rope; springs for holding the dogs normally out of engagement with said guide-faces; a couple of latches adapted for projection into position to engage the guide-notches; a rock-shaft connected for projecting said latches; a spring tending to turn said rock-shaft; and a catch adapted to hold said latches in inoperative position and connected with the mechanism for operating the toothed dogs so as to release the latches at a time when the dogs are released so as to be thrown into engagement with the guide-faces, as set forth.

4. The combination with the elevator-hoisting rope, of a vertically-movable slide attached thereto, and provided near its upper end with a transverse head or cross-bar; a spring engaged by the movable slide and held in tension by the weight of the car; a couple of rock-shafts provided at their ends with toothed dogs for engaging the guide-faces, and provided also with lateral arms extending below the cross-head of said slide and adapted to be engaged by said cross-head so as to turn the rock-shafts and thereby throw the toothed dogs thereof into engagement with the guide-faces, upon the releasement of the hoisting-rope spring by the breakage of the hoisting-rope, and the consequent descent of the movable slide; and springs tending to normally hold said rock-shafts in position to maintain the toothed dogs thereof out of engagement with the guide-faces, as set forth.

5. The combination with the notched guide-ways, the elevator-car working between the same, and a hoisting rope or cable for the latter, of a spring interposed between the cable and the car and held normally in tension by the latter; a couple of latches adapted and arranged for projection from the sides of the car into position to engage the guide-notches; mechanism for actuating said latches; spring means tending to operate said mechanism; and a catch adapted to hold the latches in inoperative position and arranged to release the same upon the releasement of the hoisting-rope spring by the breakage of the hoisting-rope, as set forth.

6. The combination, with the notched guides, the elevator-car working between the same, and with the hoisting-rope for the car, of a vertically-movable slide attached to the hoisting-rope; a spring engaged by said slide and normally held in tension by the weight of the car; a couple of latches adapted and ar-

ranged for projection outward from the sides of the car into position to engage the guide-notches; a rock-shaft for projecting said latches; a spring tending to operate the rock-shaft so as to project the latches outward; a catch adapted for holding the rock-shaft inoperative; and mechanism for actuating the catch so as to release the rock-shaft upon the releasement of the hoisting-rope spring by the breakage of the hoisting-rope, as set forth.

7. The combination, with the notched elevator-well guides, the elevator-car working between the same, and with the hoisting-rope for the car, of a spring interposed between the hoisting-rope and the car and held normally in tension by the weight of the latter; a couple of latches arranged for projection outward into position to engage said guide-notches; mechanism for operating said latches; a spring tending to actuate said mechanism; a spring-controlled catch adapted, and normally tending to hold said mechanism inoperative; means for withdrawing the catch upon the releasement of the hoisting-rope spring by the breaking of the hoisting-rope; and hand-controlled means for withdrawing said catch at will, as set forth.

8. In an elevator-car, the combination with the hoisting rope or cable, of a pair of vertically-arranged swinging latches having their upper ends pivotally connected to the car, and their lower ends arranged for outward projection from the sides thereof; a rock-shaft arranged below and substantially parallel to the car-floor, and connected with the latches so as to permit of their being swung inwardly and outwardly by a rocking or turning of the rock-shaft; a spring tending to normally turn the rock-shaft in a direction to swing the latches outwardly; a catch adapted to hold the rock-shaft inoperative; and means for withdrawing the catch so as to permit the spring to turn the rock-shaft and thereby swing the latches outwardly, upon the breakage of the hoisting rope or cable, as set forth.

9. In an elevator-car, the combination with the hoisting rope or cable, of a pair of swinging vertically-arranged latches having their upper ends pivotally connected to the car, and their lower ends arranged for projection outwardly from the sides thereof; a rock-shaft extending below the car-floor, and having connections with the latches whereby the latter can be swung inwardly and outwardly by turning the rock-shaft; a spring normally tending to turn the rock-shaft in a direction to swing the latches outwardly; a catch adapted to hold the rock-shaft inoperative; means for withdrawing the catch so as to permit the spring to turn the rock-shaft and thereby swing the latches outwardly, upon the breakage of the hoisting rope or cable; and hand-operated means for turning the rock-shaft so as to swing the latches inwardly into inoperative position as set forth.

10. In an elevator, the combination of a pair of vertically-arranged swinging latches

having their upper ends pivotally connected
with the car, and their lower ends adapted
for outward projection from the sides thereof;
a rock-shaft extending below the car-floor;
5 links attached eccentrically to the rock-shaft
and connected with the latches so as to per-
mit the latter to be swung inwardly and out-
wardly by turning the rock-shaft; a spring
normally tending to turn the rock-shaft in a
10 direction to swing the latches outwardly; a
catch adapted to engage a stop or abutment

on one of said links so as to hold the rock-
shaft inoperative; a spring normally tending
to hold the catch in engagement with said
stop or abutment; and hand-operated means 15
for drawing the catch out of engagement with
the stop or abutment, as set forth.

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