

(No Model.)

2 Sheets—Sheet 1.

J. HATCH.
SAFETY DEVICE FOR ELEVATORS.

No. 439,081.

Patented Oct. 21, 1890.

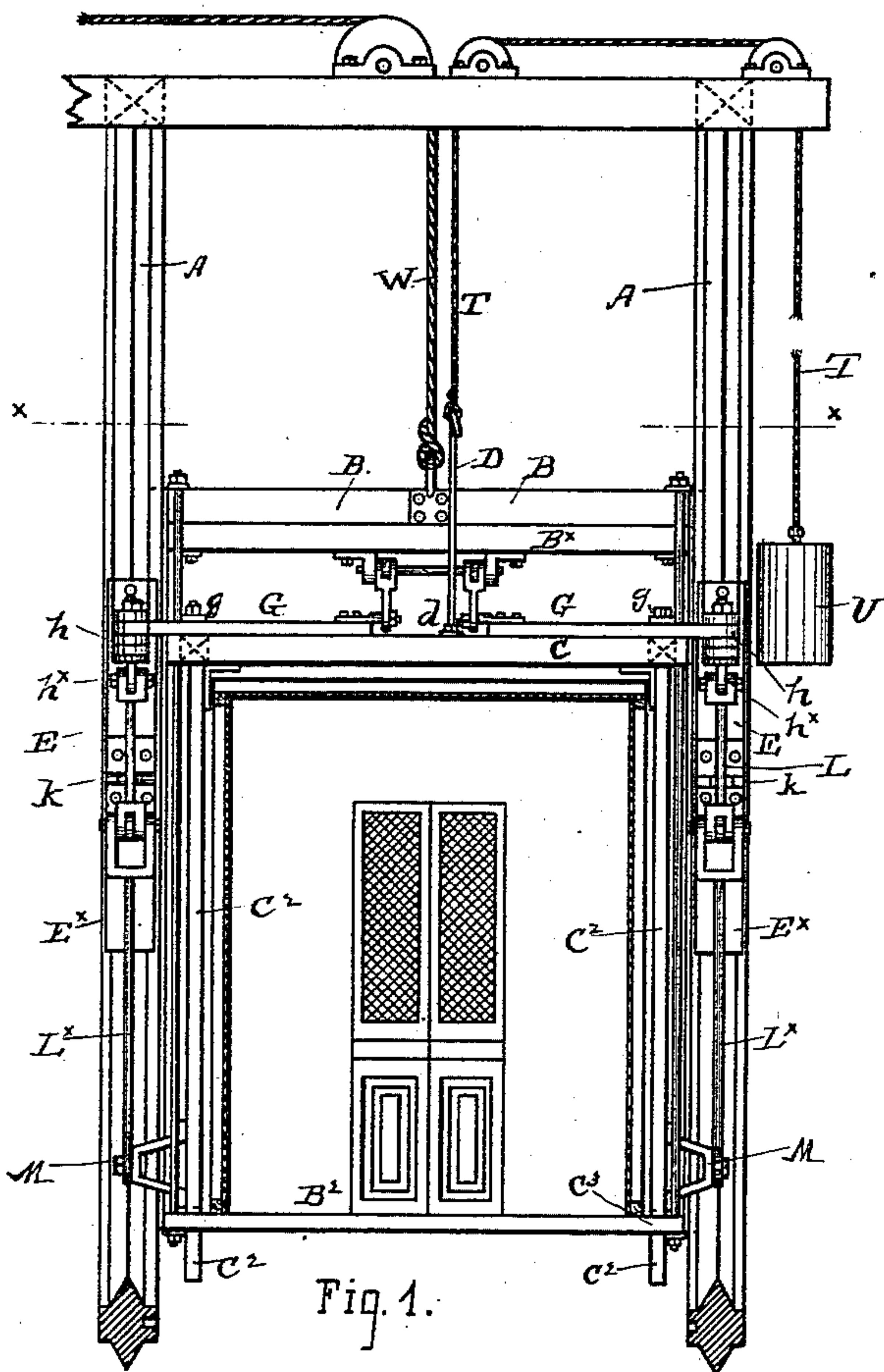


Fig. 1.

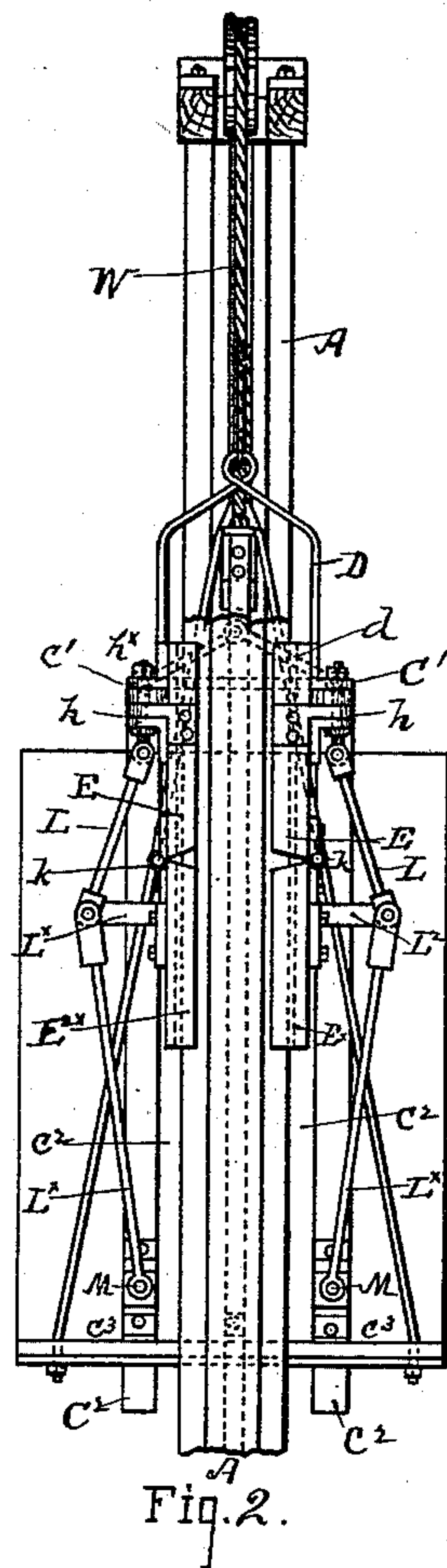


Fig. 2.

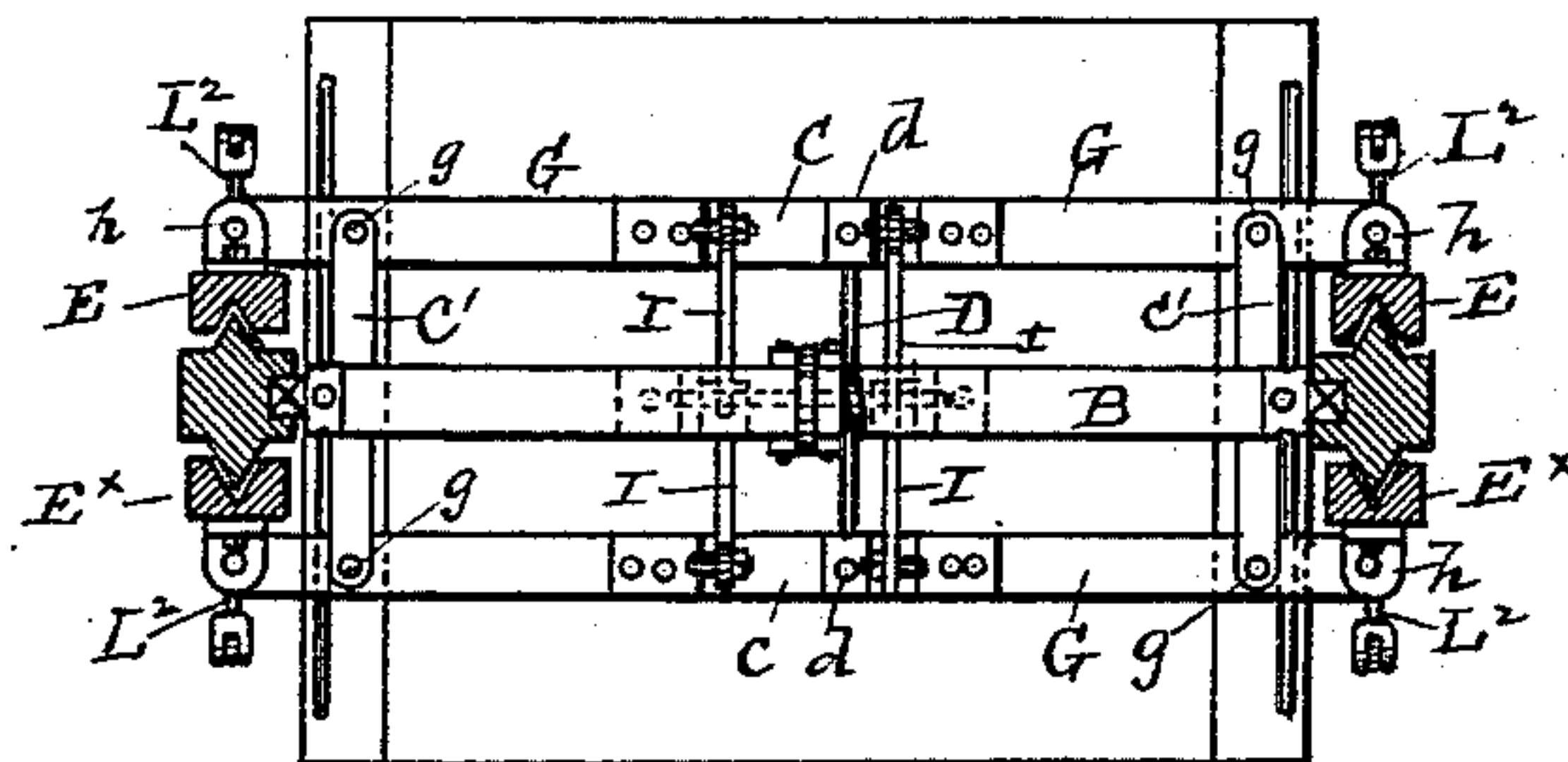


Fig. 3.

Witnesses:

Wm. Mayer.
A. Charlot.

Inventor:

John Hatch.
By Smith & Osborn
his Attys.

(No Model.)

2 Sheets—Sheet 2.

J. HATCH.
SAFETY DEVICE FOR ELEVATORS.

No. 439,081.

Patented Oct. 21, 1890.

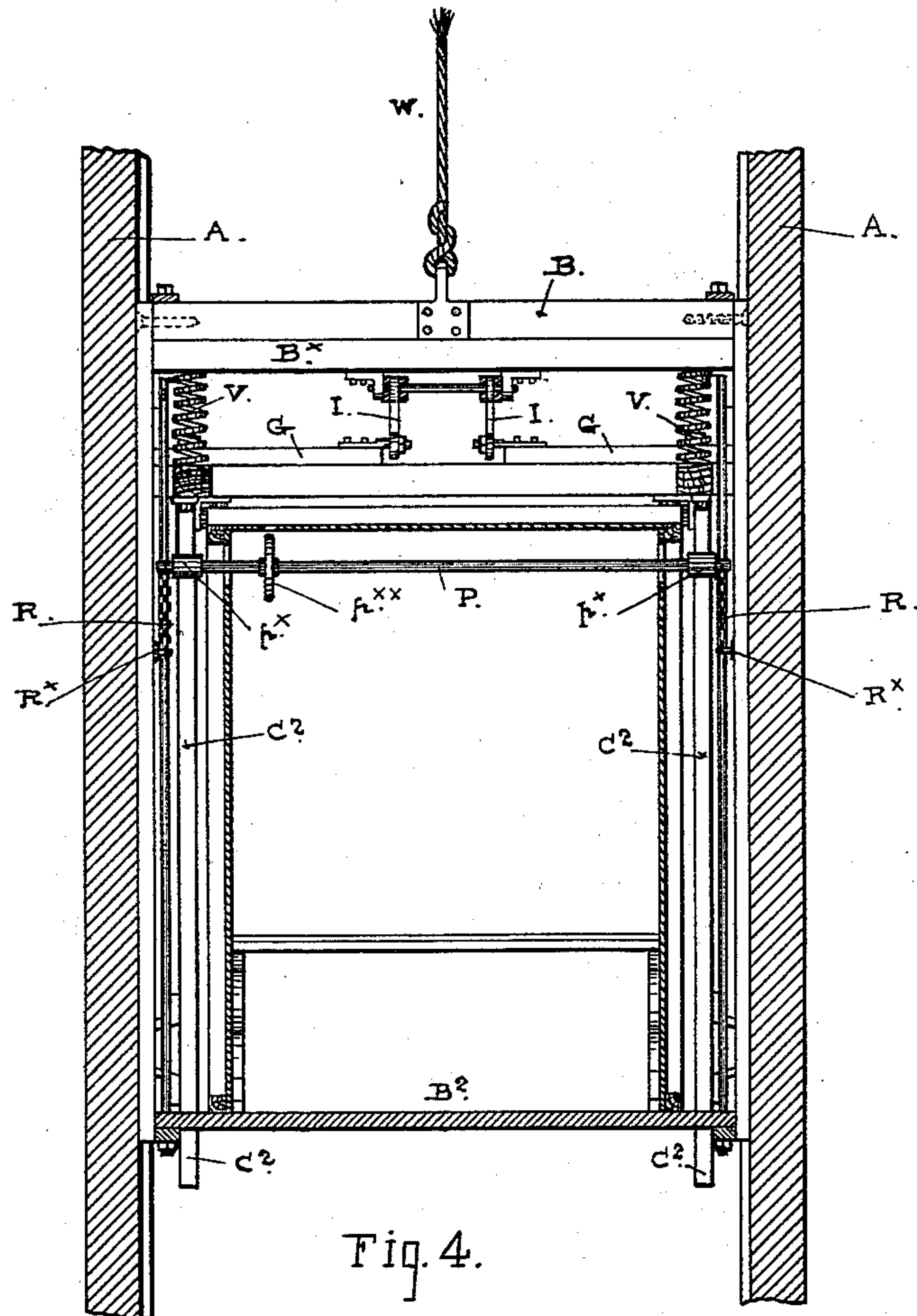


Fig. 4.

Witnesses:

Wm. Mayer
J. O. Freeman

Inventor:

John Hatch
By Smith & Osborn
his Att'y's.

UNITED STATES PATENT OFFICE.

JOHN HATCH, OF SAN FRANCISCO, CALIFORNIA.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 439,081, dated October 21, 1890.

Application filed March 25, 1890. Serial No. 345,197. (No model.)

To all whom it may concern:

Be it known that I, JOHN HATCH, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Safety-Clutches for Elevators, of which the following is a specification.

Certain features in this improved mechanism are to be found in the Letters Patent of the United States which were granted and issued to me on the 26th day of November, 1889, No. 416,000, and in several respects the present invention is an improvement on the devices described and covered in that patent.

The nature of these improvements consists in placing the friction-blocks and their operating mechanism upon a frame that is separate from the cage or platform of the elevator and is capable of independent movement to a limited extent, but always traveling with the cage. This separate frame, being counterbalanced or supported by suitable means, is adjusted to move regularly with the cage under ordinary conditions of speed; but when the hoisting-rope breaks or from other causes the cage is no longer under control of the hoisting machinery, the sudden drop or movement of the cage operates on the friction-block levers that are mounted on the frame and brings the blocks into action, as hereinafter more fully described.

The improvements also include certain novel construction and arrangement of double friction-blocks and toggle-levers in combination with a separate carrying-frame on which the clutch mechanism is mounted, and also a releasing device to throw off the friction-blocks by hand and allow the elevator to descend at slow rate of speed at any time after the safety device shall have been thrown into action.

The said improvements and the manner in which I proceed to construct and apply the same are fully explained in the following description, in which the accompanying drawings are referred to by letters.

Figure 1 represents in elevation a passenger-elevator and part of the upright stationary guides with the friction-blocks and their carrying-frame and other parts of the present improvements applied to the elevator. Fig. 2 is

an end view of the same parts. Fig. 3 is a horizontal cross-section through the same figures at the line *xx*. Fig. 4 illustrates another mode of suspending the separate frame as a substitute for the rope and counterbalance in Fig. 1 in cases where that means of supporting the frame cannot readily be used.

A A indicate fixed guide-timbers extending along the opposite sides of the elevator-shaft, B B* B² the parts of the elevator cage or platform, and C C' C² the parts constituting the separate frame on which the safety clutches or grips are mounted.

The cross-head B is a part of the elevator cage or platform, and to it is made fast the end of the hoisting-rope W. Suitable grooves in the faces of the upright guides are provided to take the ends of the cross-head in the usual manner to steady the cage, and the sides of the guides furnish gripping-surfaces for the clutches to engage with. The horizontal top bars C of the separate frame extend across the top of the cage and are connected together by the cross-bars C', while the upright bars C², being joined to the bars C at the ends, are made sufficiently long to extend down outside of the cage and through slots *c*³ cut for them in the platform or bottom of the elevator. These upright bars keep the top frame true and in level position, and also carry the lower ends of the toggle-levers that work the bottom clutches. The weight of this frame is supported either by a rope and counter-weight T U or by springs V V, attached to the elevator cross-head and to the top bars of the frame. In cases where the first-mentioned construction is not applicable, as in the shaft of a mine-hoist, I suspend the clutch-frame from the elevator cross-head by springs, as illustrated in Fig. 4. The rope T is attached to the loop or yoke D that is secured at the ends *d d*, Fig. 3, to the top bars of the separate frame.

E E and E^x E^x are two sets of clutches, formed of friction-blocks having V-shaped faces to engage the sides of the upright guides, which are of corresponding shape. Such form of bearing-surfaces is employed for the purpose of increasing the amount of frictional surface; but I do not limit the construction to that particular form of bearing-

surface, as other forms can be employed. The wedge form of sliding block and stationary rail or gripping-surface, as represented in the drawings, is probably the best, however, for general purposes.

G G are horizontal levers, having points of attachment at g g to the top frame and carrying at their outer ends the blocks E E. On the points g as pivots the levers have limited movement in horizontal arcs, by which the blocks E E are pressed against the gripping-surfaces A A, or are set clear of those surfaces, according to the direction in which the inner ends of the levers are moved, whether inward or outward. The shorter members of the levers are connected to the blocks by hinge-joints, that are formed of knuckles h on the back of the block, and an eye on the end of the lever, with a pivot-bolt h^x passing through the parts. From the pivots g the levers extend toward the center of the top frame and are connected at the inner ends by links or short rods I I to the cross-head or overhead bar, to which the hoisting-rope is applied, and which, as before described, is a part of the elevator. The links have eyes on both ends and are of greater length than the vertical distance between the levers and the overhead cross-bar, so that, being attached to this bar under its center and to the ends of the levers, these links will stand outward and form a toggle-connection between the levers and the cross-bar above them of such character that when the lever-carrying frame and the overhead cross-piece of the elevator are moved toward each other the levers will be spread apart at the lower ends. By such movement the friction-blocks connected to the outer ends of the levers will be pressed against the uprights A, while by a contrary movement, or as long as the separate carrying-frame and the cross-head above it are kept apart, the friction-blocks will set clear of the uprights. Under ordinary conditions, when the elevator is working properly the separate frame travels regularly with the cage and preserves that position in which the levers hold the blocks away from the uprights, the frame being counterbalanced either by the rope and counter-weight applied as represented in Fig. 1 or being suspended at proper distance below the springs, as illustrated in Fig. 4.

Beneath and in line with the friction-blocks E are applied blocks E^x of similar shape for the purpose of furnishing additional holding-power. Each of these blocks is attached by a hinge-joint k to the corresponding block above, and each one is also connected to the angle of a toggle-lever formed of links L L^x and so coupled to the principal levers of the blocks E, and also attached to the lower ends to fixed points, that the inward movement of the outer ends of the levers by which the upper blocks are set operates on the toggle to bring its two members toward a straight line, and thereby press the blocks E^x against the stationary upright. The links L or the up-

per members of the toggle are attached to the ends of the bolts h^* , which are formed with eyes for that purpose, and the lower members L^x are secured to the fixed points M on the upright bars C^2 of the lever-carrying frame.

The coupled ends of the two links of each toggle are joined together by knuckles and are connected to a post L^2 , standing out from the back of the friction-block. By such form of connection the lower friction-block will be pressed against the stationary upright at the same time as the horizontal lever above throws the upper block into action, and thus a much longer frictional block can be used, because the pressure or force to work the block is applied at two points in the length, both at the upper end and near the lower end of the whole length of the friction-piece.

In connection with this safety device it is necessary to provide some means for releasing the grip of the friction-blocks on the uprights whenever it is desired to lower the cage after the clutches have been brought into action and the fall of the cage has been arrested, and such a means to be operated by hand from the inside of the cage is illustrated in Fig. 4. It is formed of a shaft P, having supports in bearings p^x p^x on the upright bars c^2 of the separate frame and provided with a hand-wheel p^{xx} for turning it. To the ends of the shaft outside the bearings are attached chains R R, that have their ends fastened to the frames of the elevator at points R^x R^x below the line of the shaft, the connection being such that by winding up the chains on the shaft the separate frame and the elevator-frame or cross-head will be drawn apart, and thereby caused to draw up the links I and move the longer members of the horizontal levers inward. This takes the pressure from the friction-blocks to a greater or less degree, but should not take off the friction altogether. The amount of such reduction in pressure against the uprights is regulated by turning the hand-wheel slowly until the elevator begins to move slowly of its own weight, it being understood that at such time the hoisting-rope has become detached from the elevator by accident or is not available to control the cage.

An important feature in this present improvement consists in providing a cross-head formed of two separate beams B B^x , the upper one of which has the hoisting-rope attached to it, while the lower one is employed to carry the link-connections by which the levers of the safety-clutches are attached to the cross-head. Both beams are united to the uprights of the cage or elevator-frame, but are not fastened to each other, so that if the top beam or principal part of the cross-head should be torn from its place or be broken in an accident the mechanism on which depends the certain and prompt action of the friction-clutches will not be broken. This construction of double cross-head is an important addition to the above described

safety mechanism in preventing possible danger of the clutch-levers being detached from the cross-head of the elevator in time of accident, and thereby becoming inoperative.

5 When springs are substituted for the rope and counter-weight to suspend the lever-carrying frame under the cross-head, the strength of the springs to be employed is determined by the weight of the frame and must be of
10 such character that the frame sets at such distance from the cross-head during the ordinary travel of the cage up and down the elevator-shaft that the blocks are held out of frictional contact with the stationary up-
15 rights. When the hoisting-rope breaks or no longer controls the cage, the cross-head drops with the weight of the cage and its load independently of the traveling frame, and the amount of such movement that is necessary
20 to throw the levers being comparatively very small the blocks immediately act upon the stationary uprights. The friction thus set up acts first upon the separate frame, so that the frame and cross-head are brought closer to-
25 gether and the levers pressed out to their greatest extent of movement.

The traveling frame can be so regulated that a greater or less amount or variation in the regular movement of the cage over that
30 of the frame will throw out the levers and bring the friction-blocks against the upright guides.

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

1. In combination with an elevator cage or platform having a cross-head to which is attached the hoisting-rope, a separate traveling frame counterbalanced and suspended to
40 travel with the cage, but to have limited movement independent of the cage, the levers pivoted on the top of said frame, having on their outer ends friction-blocks which are adapted to engage stationary frictional sur-
45 faces against the sides of the elevator-shaft in the run of the cage, and their inner ends connected by links to the cross-head of the cage, the friction-blocks each composed of two shoes connected together by a hinge-
50 joint, the toggle-levers attached to a common

point on the lower block and at the top and bottom, respectively, to fixed points on the traveling frame below the blocks and to the outer ends of the levers above, whereby a sudden drop or downward movement of the cross-head
55 operates on the inner ends of the levers to throw their outer ends inward toward the stationary surfaces at the sides of the elevator-shaft and press the friction-blocks against such surfaces, constructed and applied for
60 operation substantially as hereinbefore set forth.

2. In combination with the separately suspended frame adapted to travel with and to have limited movement independently of the
65 elevator-cage or platform, and having levers with friction blocks or shoes on their outer ends to engage stationary frictional surfaces on the sides of the elevator-shaft, and their inner ends connected to the cross-head of the
70 cage above the frame, as described, the winding-shaft mounted on the traveling frame, and the chains attached to the ends of the winding-shaft and to the sides of the cage at points below the shaft, for the purpose set
75 forth.

3. In an automatic safety-clutch for elevators, the separate traveling frame composed of the bars C, C', and C², mounted on but having independent movement of the cage to a
80 limited extent in a vertical direction, in combination with the horizontal levers pivoted on the top of said frame, having their inner ends connected to the cross-head of the cage above by inclined links and their outer ends
85 connected to friction-blocks or shoes, between which the stationary guides on the sides of the elevator-shaft are arranged, as described, and the rods or bars forming toggle-levers and connected at the upper ends to the outer
90 ends of said levers and at the lower ends to fixed points below the blocks on the side bars of the traveling frame, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I
95 have hereunto set my hand and seal.

JOHN HATCH. [L. S.]

Witnesses:

EDWARD E. OSBORN,
CHAS. E. KELLY.