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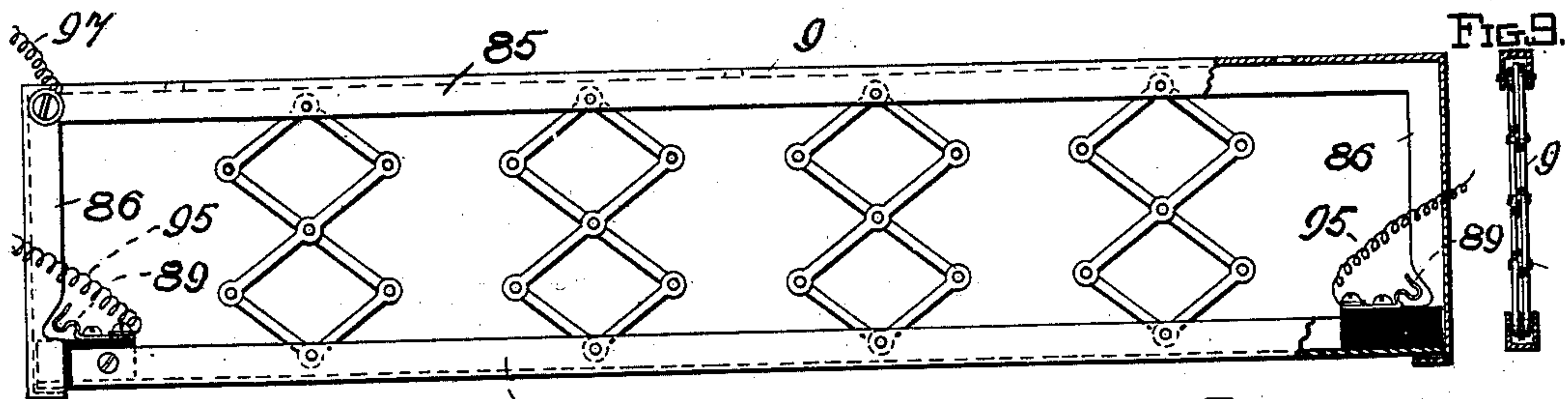
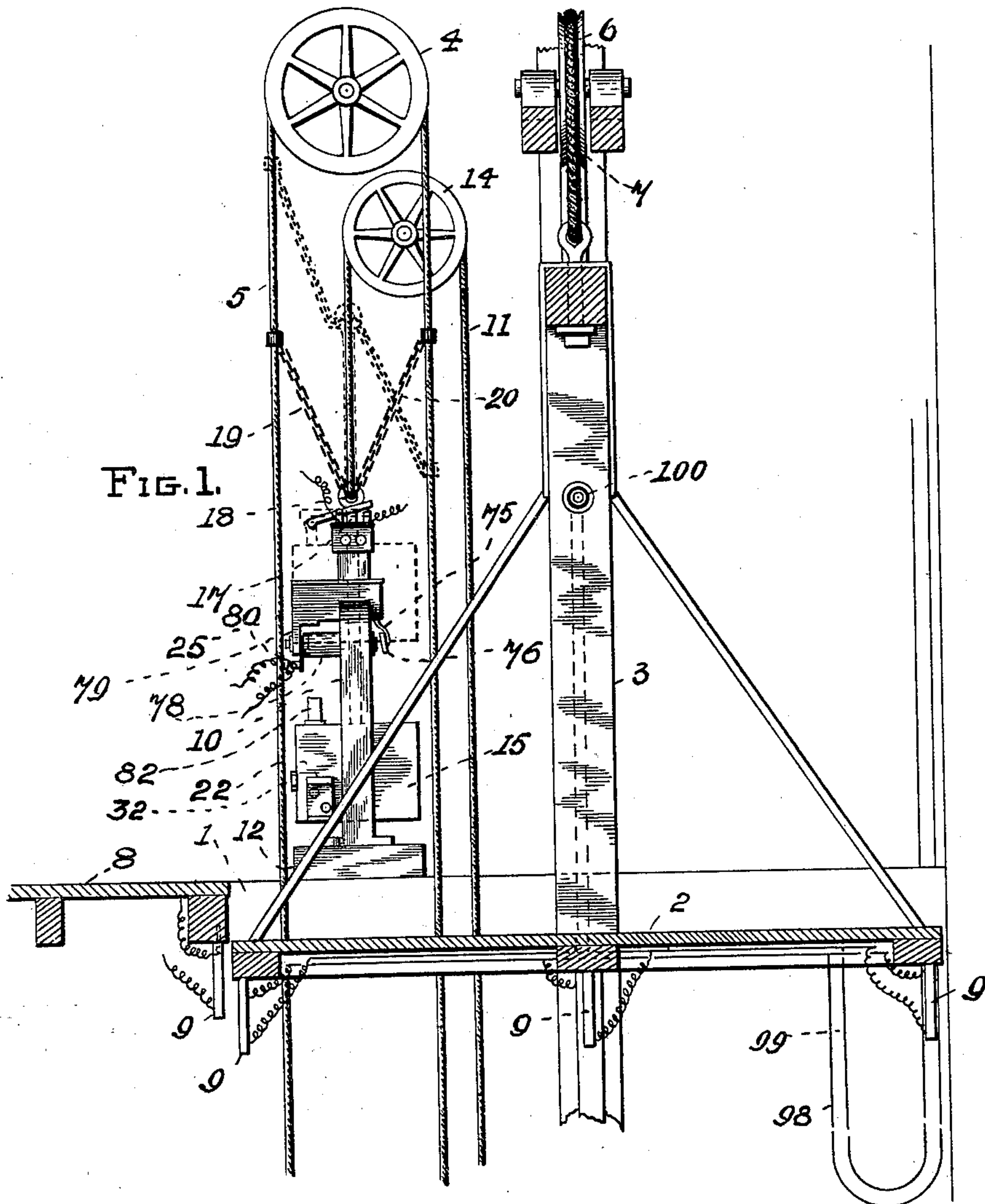
Patented Apr. 2, 1901.

R. BROOKS & A. A. ROTH.
SAFETY APPLIANCE FOR ELEVATORS.

(Application filed Nov. 8, 1900.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:— 84

FIG. 2.

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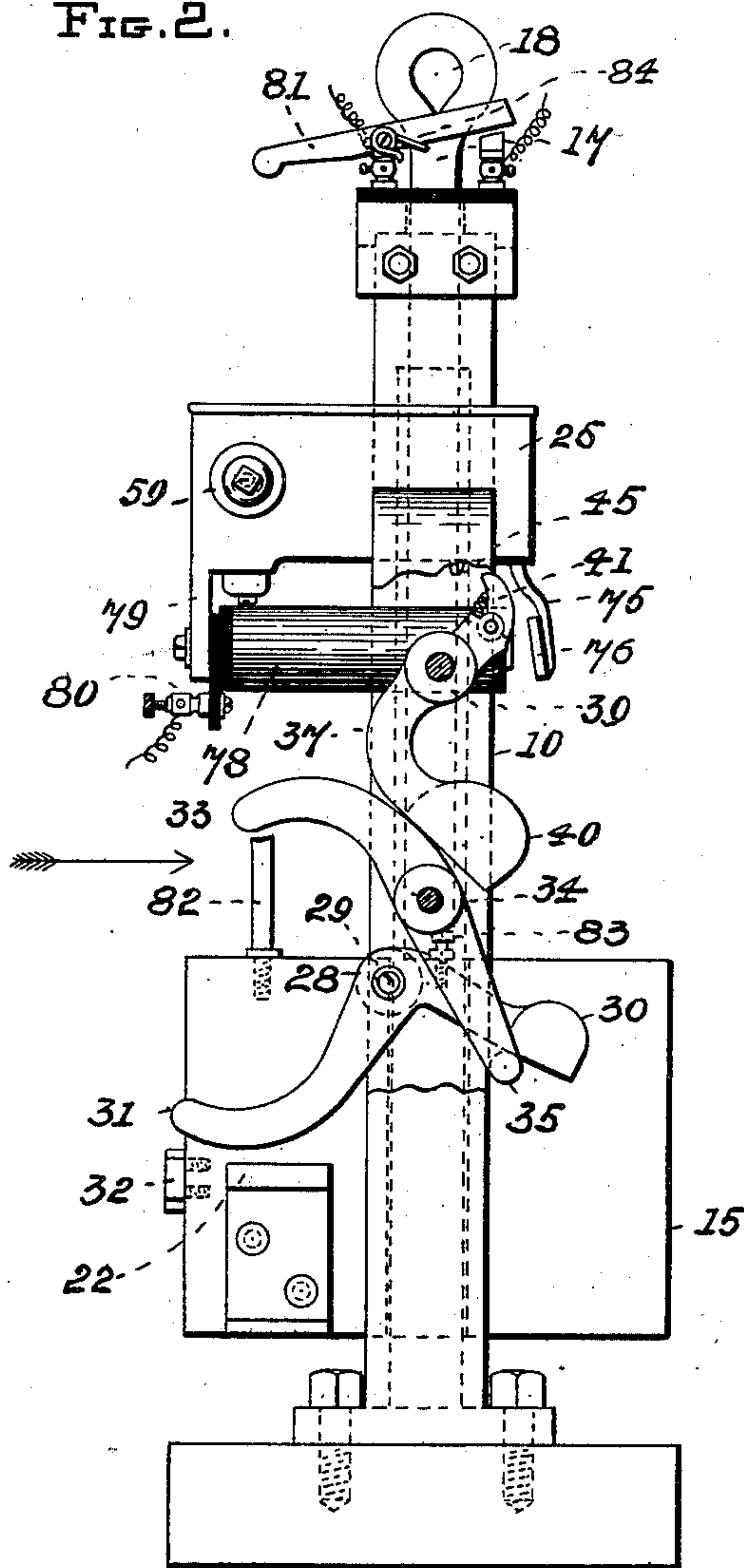
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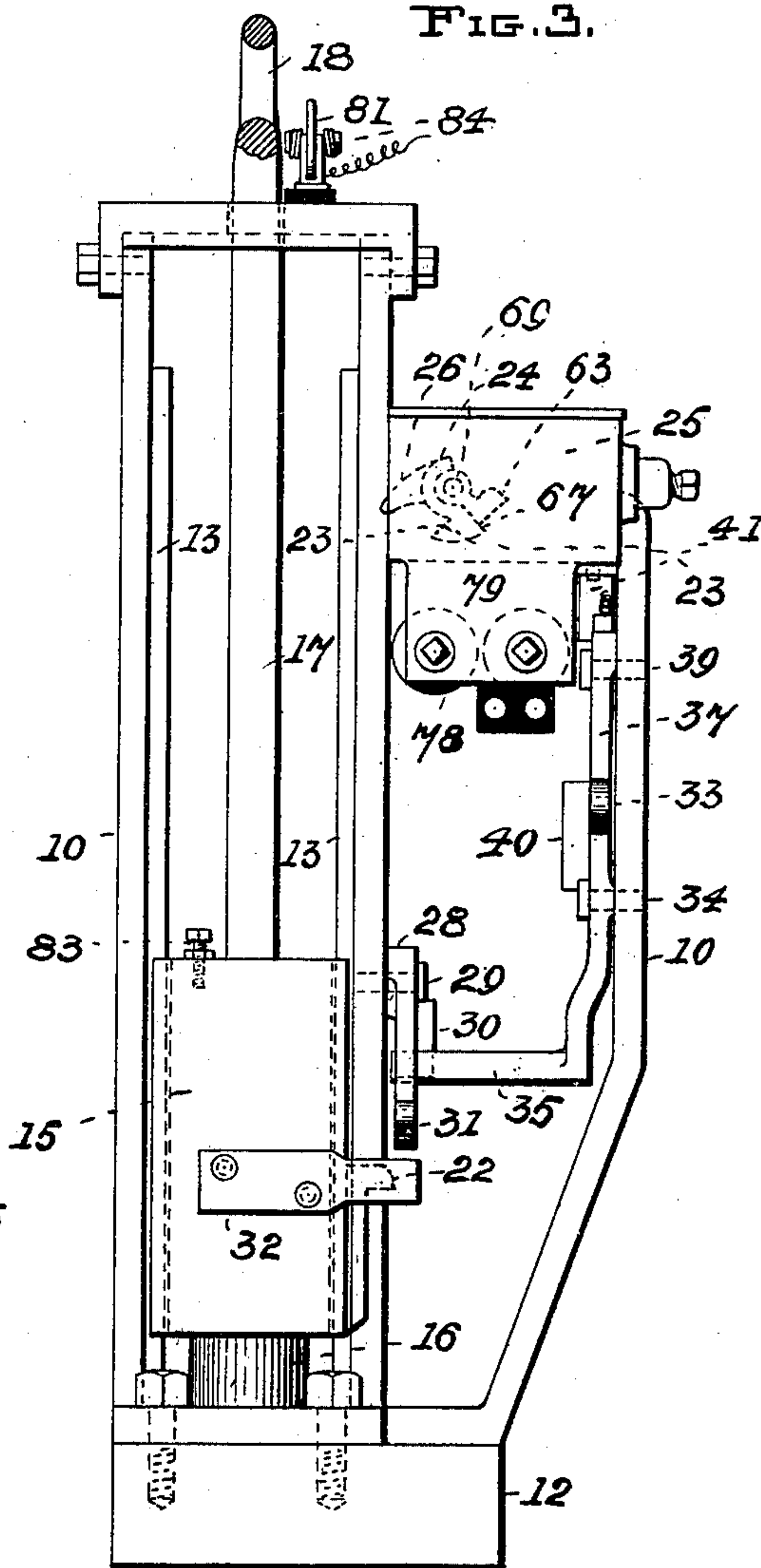
FIG. 2.



WITNESSES:— 12

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FIG. 3.



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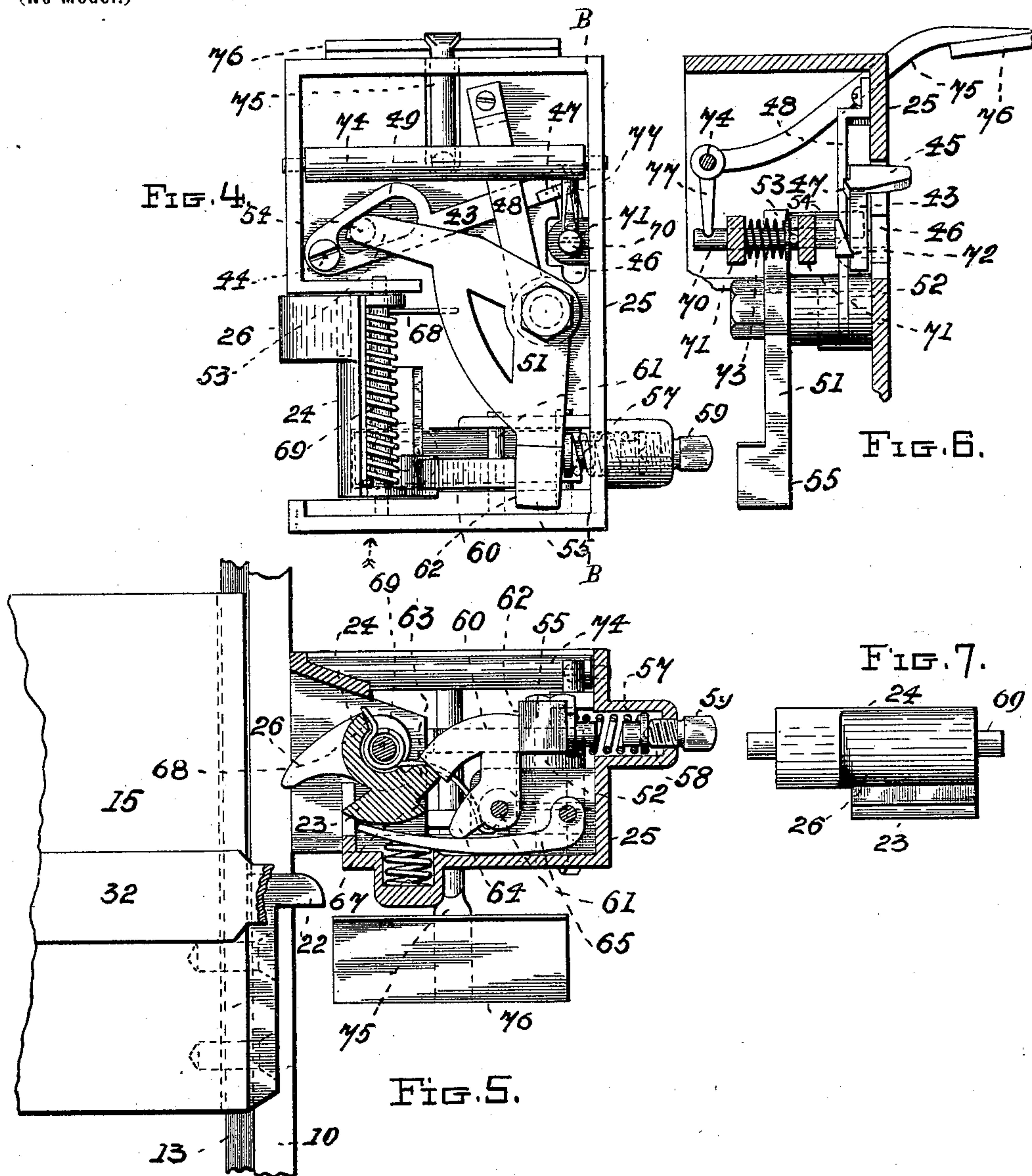
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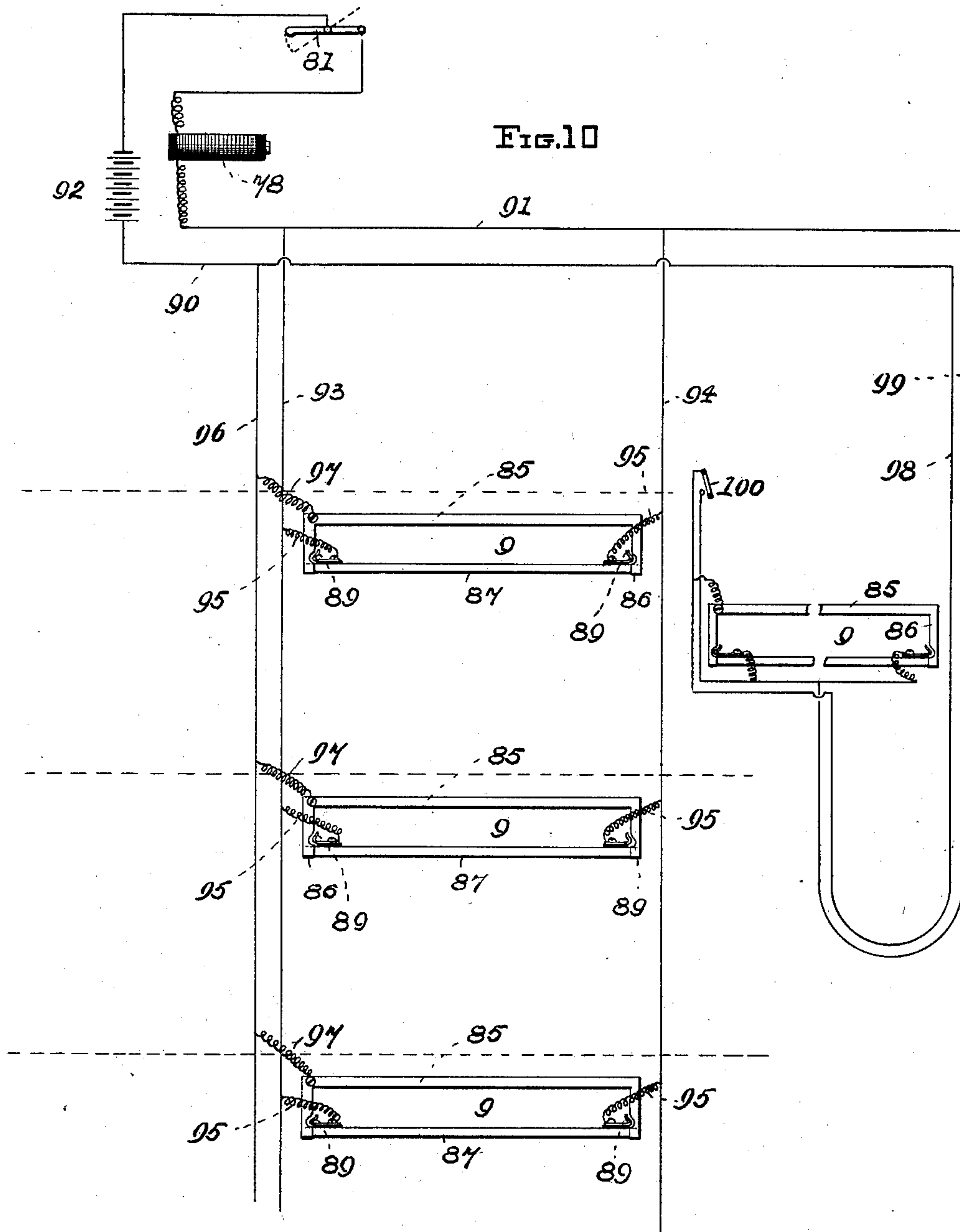
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

ROBERT BROOKS AND AUGUST A. ROTH, OF BALTIMORE, MARYLAND, ASSIGNORS TO THE NATIONAL ELEVATOR SAFETY DEVICE COMPANY, OF SAME PLACE.

SAFETY APPLIANCE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 671,411, dated April 2, 1901.

Application filed November 8, 1900. Serial No. 35,791. (No model.)

To all whom it may concern:

Be it known that we, ROBERT BROOKS and AUGUST A. ROTH, of the city of Baltimore, in the State of Maryland, have invented certain Improvements in Safety Appliances for Elevators, of which the following is a specification.

This invention relates to a safety appliance consisting of a weight adapted for suspension in proximity to an elevator-shaft and flexibly connected to the two runs of the actuating-rope, whereby the elevator cab or platform is started and stopped, combined with means, preferably electrical, situated in or adjacent to the path of the elevator cab or platform, with which a person entering or leaving the said cab or platform while the same is in motion or a person or object projecting into the said elevator-shaft and in the path of the elevator cab or platform will collide, the collision effecting the detachment of the said weight from its support, so that it will fall and in falling will draw down the run of the actuating-rope, the movement of which in a downward direction is required to stop the said cab or platform whether the same is moving in an upward or downward direction, as will hereinafter fully appear.

In the further description of the said invention which follows reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a partly-sectional elevation of an elevator-shaft, the elevator-platform, and the safety appliances. Fig. 2 is an enlarged view of the weight-supporting and certain other appliances seen in Fig. 1 and shown partly in section. Fig. 3 is an exterior view of Fig. 2 as seen from the direction indicated by the arrow. Fig. 4 is a top view of the weight-supporting mechanism with the lid of the box containing it removed. Fig. 5 is a view of Fig. 4 with certain parts thereof shown in section and looking in the direction indicated by the dotted arrow, together with parts of the actuating-weight and certain of its attachments. Fig. 6 is a section of certain parts of Fig. 4, taken on the dotted line B B. Fig. 7 is a detail of the apparatus. Fig. 8 is a front view, partly in section, of the circuit-closing devices, whereby the weight is ultimately detached from its support. Fig. 9 is a vertical section of Fig. 8. Fig. 10 is diagrammatic view illustrating the electric circuits employed in the invention.

Referring now to the drawings, 1 is the elevator-shaft, and 2 the platform, of an ordinary freight-elevator. The upright portions of the elevator-platform are denoted by 3.

4 is a sheave around which extends the starting and stopping rope 5. This actuating-rope is shown in Fig. 1 as in the position which it occupies when the platform 2 of the elevator is at rest.

To start the elevator, the run of the rope 5 to the left of the drawings is drawn down, and when the platform is ascending the same is stopped by pulling down the run of the said rope. (Shown to the right of the drawings.)

The rope 6 (shown only in Fig. 1 and represented as passing over the sheave 7) is the one whereby the elevator-platform is suspended.

In Fig. 1 the platform is shown as nearing the top floor 8 of the building.

9 is a circuit-closing device. (Shown on an enlarged scale in Figs. 8 and 9.) Several of these appliances are used, as hereinafter stated. By reference to Fig. 1 it will be seen that the under side of the elevator-platform is provided with three of the said circuit-closers and the joist at one side of the elevator-shaft with one. The collapsing of these circuit-closing devices by the contact of their lower edge with an object will serve to stop the elevator at any time, as hereinafter fully described.

10 is a frame (see particularly Figs. 1, 2, and 3) secured to a block 12, which in turn is fastened to the floor 8 of the building. On the inner side of the upright portions of the frame 10 are the guides 13 for the vertically-moving weight 15, which when in its lowest position rests on the bumper or cushion 16, preferably of rubber. The said weight is provided with a lifting-bar 17, having an eye 18 at its upper end, and it is elevated by means of a cord 11, which passes over a sheave 14 and extends downward through the elevator-shaft.

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19 and 20 are chains connecting the eye 18 of the lifting-bar 17 with the left and right runs of the rope 5, respectively, and when the weight is down, as indicated in Figs. 1, 2, and 3, the said rope is in the position shown in Fig. 1, the points of connection between the chains and the actuating-rope being in the same horizontal plane.

22 is a lug bolted on the face of the weight 15 and adapted to engage with the hook 23 of the pivoted tumbler 24, which is situated in a box 25, secured to one of the uprights of the frame 10, (see Fig. 3,) in which the said hook is shown in dotted lines. The tumbler 24 has also a finger 26, situated above the hook 23, which in the ascent of the weight 15 is struck by the lug 22 and the tumbler thereby turned, so as to bring the hook 23 under and in contact with the said lug, and so hold the weight in an elevated position; but in view of the gravity of the weight 15 considerable force is required to detach the hook 23 of the tumbler 24 from the lug 22 and more force than could be obtained from a battery of the character which we desire to employ. We therefore use certain appliances as intermediary between the tumbler and the armature of the magnet, which not only serve to actuate the tumbler in a manner to detach the hook 23 from the lug 22, but also to prepare the way for the action of the tumbler in the attachment of its hook to the said lug, and these appliances we shall now proceed to describe.

28 is a bell-crank pivoted at 29 to the frame 10, one arm 30 of which is weighted and the other, 31, curved and arranged to extend over a lug 32, fastened to one side of the weight 15. (See Figs. 2 and 3.)

33 is a cross-lever fulcrumed at 34 to a part of the frame 10, (see Figs. 2 and 3,) with its upper arm curved toward the left, as shown in Fig. 2, and its lower arm provided with a horizontally-extending bar 35, which passes under the weighted arm 30 of the bell-crank 28, as shown in Figs. 2 and 3.

37 is an irregularly-shaped cross-lever pivoted at 39 to the frame 10, the lower arm 40 of which is weighted and rests on the upper or curved arm of the lever 33. The upper arm of the lever 37 is furnished with a spring-supported rule-jointed pawl 41 to operate certain mechanism hereinafter described.

43 is a lever pivoted at 44 to the inner surface of the bottom of the box 25, which box is fastened in any suitable manner to the frame 10. The free end of the lever 43 has a downward projection 45, which passes through a curved slot 46 in the bottom of the box 25.

47 is a ratchet-tooth on the top of the lever 43 and situated directly over the projection 45 before referred to. (See Figs. 4 and 6.)

48 is a holder placed over the lever 43 to prevent an upward movement of its outer end.

49 is a slot in the lever 43 for a purpose hereinafter described.

51 is a bell-crank pivoted on the stud 52,

projecting upwardly from the bottom of the box 25, having a cylindrical projection 54 on its arm 53. One edge of the other arm 55 of the bell-crank 51 bears against a coiled spring 57, situated in a pocket 58 in one of the side walls of the box 25. The pressure of the coiled spring 57 may be increased by means of the tightening-screw 59. (See particularly Figs. 4 and 5.)

60 is a vertical segmental lever fulcrumed at 61 within the box 25, one edge of which lever rests against the edge 62 of the bell-crank 51. The other edge of the segmental lever 60 is in contact with a projection 63 on the tumbler 24, hereinbefore alluded to, when the said tumbler is in the position shown in Figs. 4 and 5. On the segmental lever 60 is a toe 64, which bears on a spring-supported and pivoted pawl 65. (See Fig. 5.) The point of the pawl 65 under certain circumstances, hereinafter described, engages with a shoulder 67 on the tumbler 24.

68 is a spiral spring coiled about the pivotal bolt 69 of the tumbler 24, with one of its ends bearing on the bottom of the box and the other against a portion of the tumbler. The function of this spring is to throw the tumbler into the position shown in Fig. 5.

70 is a vertical bolt adapted to have an endwise movement in the bearings 71. (See Figs. 4 and 6.) At the lower end of the bolt 70 is a ratchet-tooth 72, adapted to engage with the tooth 47 on the free end of the lever 43.

The bolt 70 is yieldingly held down by a wire spring 73, coiled about it and confined endwise between the upper bearing 71 and a pin extending transversely through the bolt and shown in Fig. 6.

74 is a shaft journaled in the side walls of the box 25, having the downwardly-projecting arm 75, carrying at its inner end the armature 76. The shaft has also another and horizontal arm 77, the point of which enters a notch in and near the upper end of the bolt 70. (See Fig. 6.)

78 represents a pair of horizontally-placed electromagnets secured to a downward projection 79 on the box 25 (see Figs. 2 and 3) to cooperate with the armature 76 before referred to and in a manner hereinafter described. Electric connection with the magnets is through the medium of the binding-posts 80.

81 is an electric switch situated on and insulated from the cap portion of the frame 10. The switch consists of a pivoted blade, which to break connection is drawn from between the jaws of one of the binding-posts by means of a spring 84.

82 is a stud on the top of the weight 15 to come in contact with and close the switch 81 when the said weight has reached its highest position. The upward movement of the weight 15 is limited by the end of the screw 83 coming in contact with the under side of the cap-piece of the frame 10.

The circuit-closing devices 9, hereinbefore

alluded to, consist of a horizontal metallic bar 85, with side bars 86. These bars, as seen in cross-section, have a channel form.

87 is a straight bar similar in character to the one 85, the ends of which are adapted to slide vertically in the side bars 86. At the ends of the bars 87 are the insulated contacts 89, adapted to form an electrical connection with the side bars 86 should the bar 87 be raised. The bar 85 and the side bars 86 form a part of an electric circuit and are of the same polarity, and the contacts 89 on the bar 87, while insulated from each other and from the bar 87, are of like polarity, but opposite to that of the bars 85 and 86.

Referring now to Fig. 10, which is a diagrammatic view of the electric circuits, 90 and 91 represent the main wires of an electric circuit which includes the battery 92, the normally-closed switch 81, and the magnets 78. 93 and 94 are branch wires leading from the main 91 down the elevator-shaft and situated at opposite sides thereof. 95 95 are connections between the main branches 93 and 94 and the contacts 89 on the bars 87 of the circuit-closing devices 9, fastened under the floors of the building. A main branch 96 leads from the other main 90 down through the elevator-shaft and has connections 97 with the bars 85 on the said circuit-closing devices just referred to. The main wires 90 and 91 have respectively the flexible branches 98 and 99, leading to the elevator-platform. The branch 99 is connected with the bar 85 of the circuit-closer 9, situated under the elevator-platform, and the one 98 with the contacts on the bars 87 of the same device. The wires 98 and 99 are continued up the side of one of the uprights of the elevator-platform and terminate in the normally-closed circuit-closer or push-button 100, (shown on the said upright in Fig. 1.)

The operation of the invention is as follows: To prepare the apparatus for use, the weight 15 is drawn up by a person on the elevator-platform by means of the rope 11, which leads from the eye of the bar 17 over a sheave 14 and down through the elevator-shaft until the said weight occupies the position shown in dotted lines in Fig. 1 and becomes locked thereat, as hereinafter described. In this movement of the weight the chains 19 and 20 become slack and have no effect upon the rope 5, which may be operated to start the elevator in an upward or downward direction without affecting the safety appliances. The lug 32 on the weight 15 in coming in contact with the end of the lever 28 tilts that device, whose arm 30 presses against the lower arm of the lever 33 through the medium of the projection 35. As this lever 33 is swung its upper arm tilts the irregularly-shaped lever 37 and causes the pawl 41 to engage with the downward projection 45 of the lever 43 in the box 25. In this operation the lever 43 is moved until the tooth 47 catches the ratchet-tooth 72 of the bolt 70, when the lever 43 becomes locked.

During the movement of the lever 43, just described, the bell-crank 51 is turned on its pivot through the medium of the projection 54 in the slot 49 of the lever 43, and its arm 55 compresses the spring 57, and in view of the lever 43 being locked, as before described, the lever 51 cannot return to its original position. As the bell-crank is moved in the direction described it allows the segmental lever 60 to turn and its toe 64 to be elevated through the medium of the spring-supported pawl 65, thereby adapting the point of the said pawl to engage with the shoulder 67 in an operation hereinafter described. In the further upward movement of the weight 15 the lug 22 strikes the projection 26 of the tumbler 24 and that device is turned on its pivot, which brings the tooth 23 under the lug 22 on the weight 15. At the same time the shoulder 67 of the tumbler passes beyond the point of the pawl 65, and the tumbler thereby becomes locked, and the weight 15 is held in its elevated position by the tooth 23 and the lug 22 of the weight. As the weight 15 approaches its highest point the stud 82 thereon strikes the blade of the switch 81 and closes the electric circuit. The apparatus is now in a condition to effect the stoppage of the elevator in case of accident. In the upward movement of the bar 87 of any circuit-closer 9, effected by design or by being brought accidentally into contact with a person or object, the contacts 89 strike the bars 86 of the circuit-closer and the electric circuit is closed. In the closing of the electric circuit as described the magnets 78 become energized and attract the armature 76, the movement of which causes the bolt 70, carrying the tooth 72, to rise, thereby releasing the tooth 47 of the lever 43 and the said lever. In the release of the lever 43 the coiled spring 57 forces the bell-crank into the position shown in Figs. 4 and 5, and at the same time the arm 55 of the bell-crank 51 acts upon the segmental lever 60, so as to depress the spring-supported pawl 65 through the medium of the toe 64, and causes the point of the said pawl to release the tumbler and allow of its return to its original position. (Shown in Fig. 5.) The weight being thus released falls by reason of its gravity, assisted by the resilience of the spring 68, and at the beginning of its descent the spring-operated switch 81 is opened and the electric circuit broken. In the continued downward movement of the weight one or other of the chains 19 and 20, attached thereto and to the rope 5, pulls the said rope to the stop position, or that shown in Fig. 1, and the cab or platform of the elevator is stopped and will remain at rest until the weight is again raised and the actuating-rope operated.

We claim as our invention—

1. In a safety appliance for an elevator, a cab or platform, an actuating-rope whereby the movement of the said cab or platform is controlled and stopped, combined with a

weight with means whereby it is flexibly attached to the two runs of the said actuating-rope, means to elevate the said weight and support it in an elevated position, and devices
5 to release the said weight from its support and thereby set in motion the actuating-rope to stop the elevator, during its ascent or descent, substantially as and for the purpose specified.

10 2. In a safety appliance for an elevator, the combination of a cab or platform, an actuating-rope to control the movement of the said cab or platform, a weight with means to elevate it, flexible connections to unite the said
15 weight with the two runs of the said actuating-rope, a locking mechanism to support the said weight in an elevated position, and the said flexible connections rendered slack and in such a condition as not to interfere with
20 the ordinary operation of the said actuating-rope, and devices whereby the locking mechanism is unlocked to release the weight and allow it to fall and in its fall to operate one run of the said operating-rope and thereby
25 stop the cab or platform, substantially as and for the purpose specified.

3. In a safety appliance for an elevator, the combination of a cab or platform and its actuating-rope whereby the ascent and descent
30 of the cab or platform are controlled, a weight, chains or cords which unite the weight to the two runs of the said actuating-rope, the said chains or cords having such length that the weight may have a vertical movement independently of the actuating-rope, a lug on the
35 said weight, a movable hook with which the lug on the weight is adapted to engage to hold the weight in its highest position, and means situated exteriorly of the cab or platform
40 whereby the hook of the said supporting device may be turned so as to release the said

lug of the weight, and allow the weight to fall, substantially as and for the purpose specified.

4. In a safety appliance for an elevator, the combination of a cab or platform, an actuating-rope whereby the movement of the said
45 cab or platform is controlled, a weight, chains or cords to connect the weight to the two runs of the actuating-rope, a rope to elevate the said weight, a locking mechanism whereby
50 the said weight is held in an elevated position, an electromagnet in an electric circuit, an armature to effect the unlocking of the supporting mechanism, and a circuit-closing
55 device to close the said electric circuit and energize the said magnet to effect the unlocking of the supporting devices and the detachment of the weight, substantially as and for the purpose specified.

5. In a safety appliance for an elevator, the combination of a cab or platform, an actuating-rope whereby the movement of the cab or
60 platform is controlled, a weight with cords or chains which connect it to the two runs of the actuating-rope, a lug on the said weight, a
65 tumbler adapted to engage with the said lug, having a hook and a projection which in the elevation of the weight comes in contact with and moves the said projection so as to turn
70 the tumbler and bring its hook into contact with the lug on the weight and thereby hold the said weight in an elevated position, and
75 circuit-closing devices whereby the tumbler-hook is restored to its original position and the weight released to stop the cab or platform, substantially as and for the purpose specified.

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Witnesses:

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