

No. 613,224.

Patented Oct. 25, 1898.

W. CHATER.

AUTOMATIC MEANS FOR OPENING, CLOSING, AND LOCKING ELEVATOR DOORS.

(No Model.)

(Application filed Oct. 7, 1897.)

3 Sheets—Sheet 1.

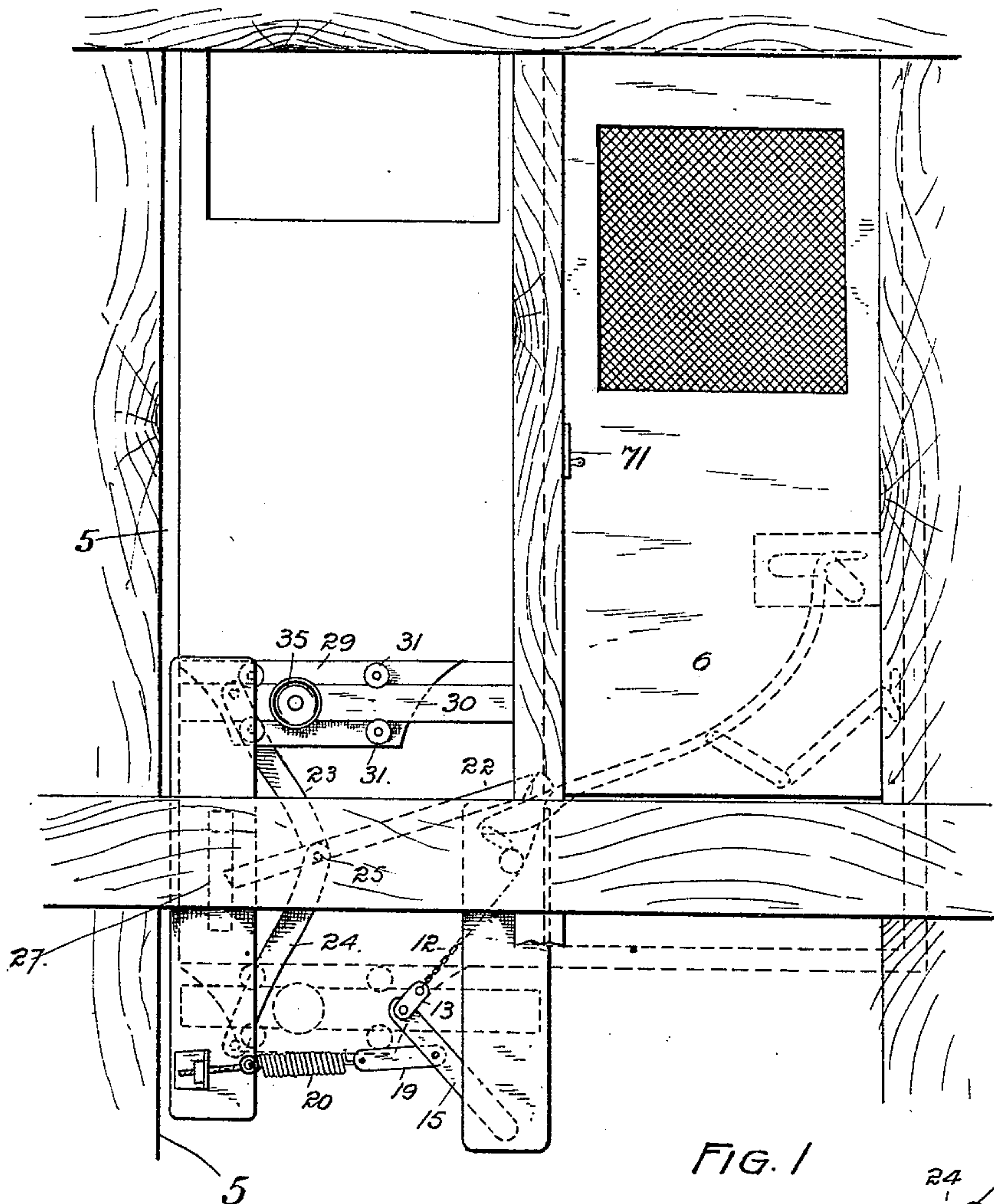


FIG. 1

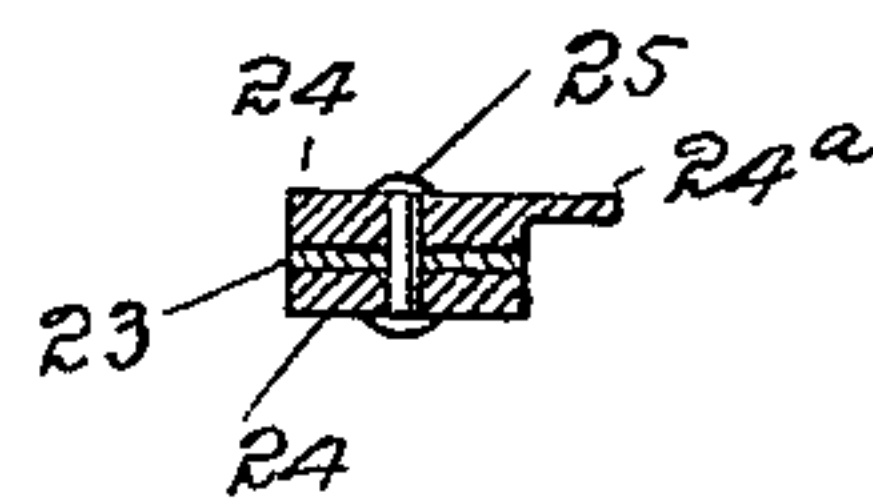


FIG. 15.

FIG. 2.

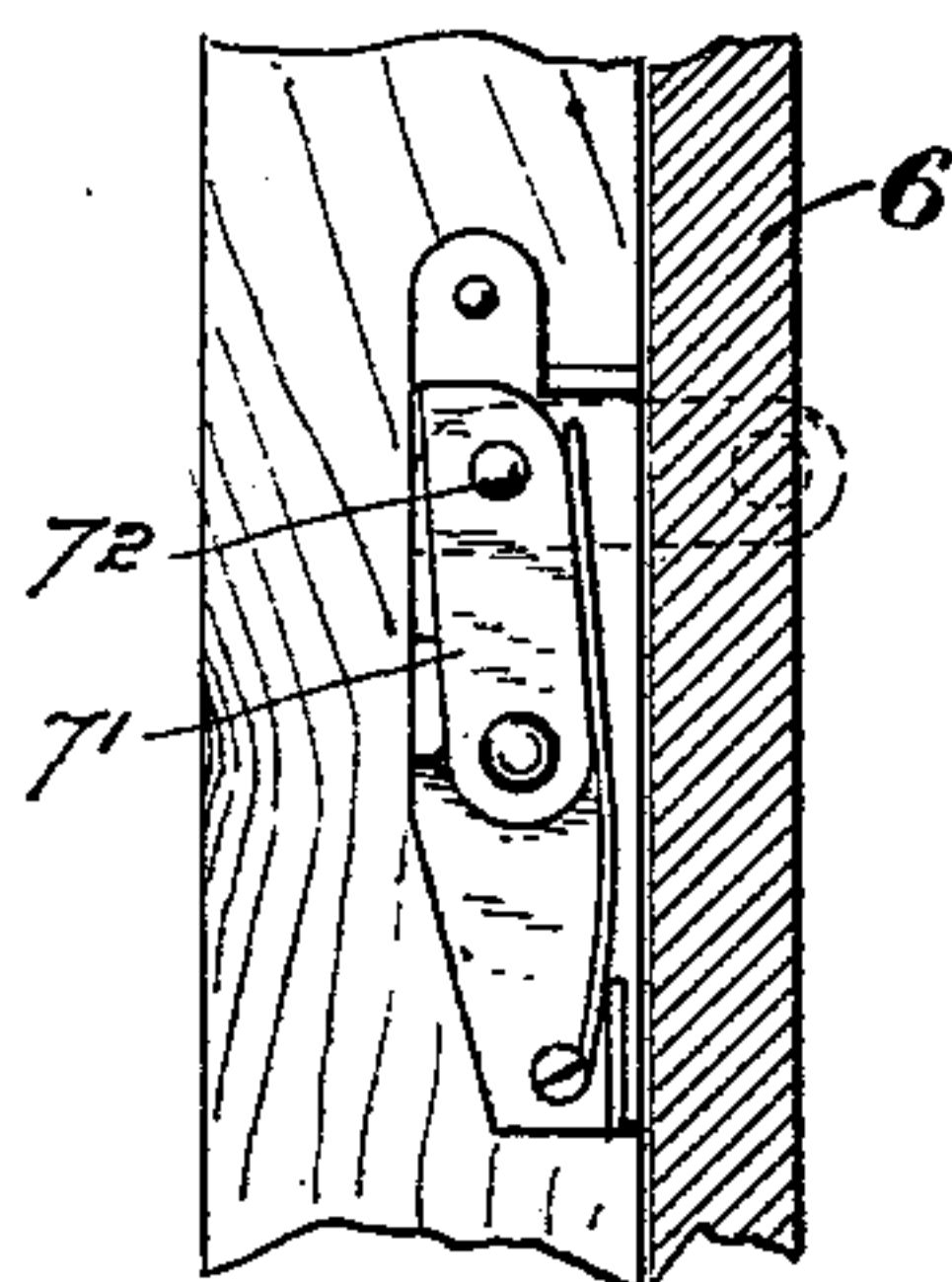
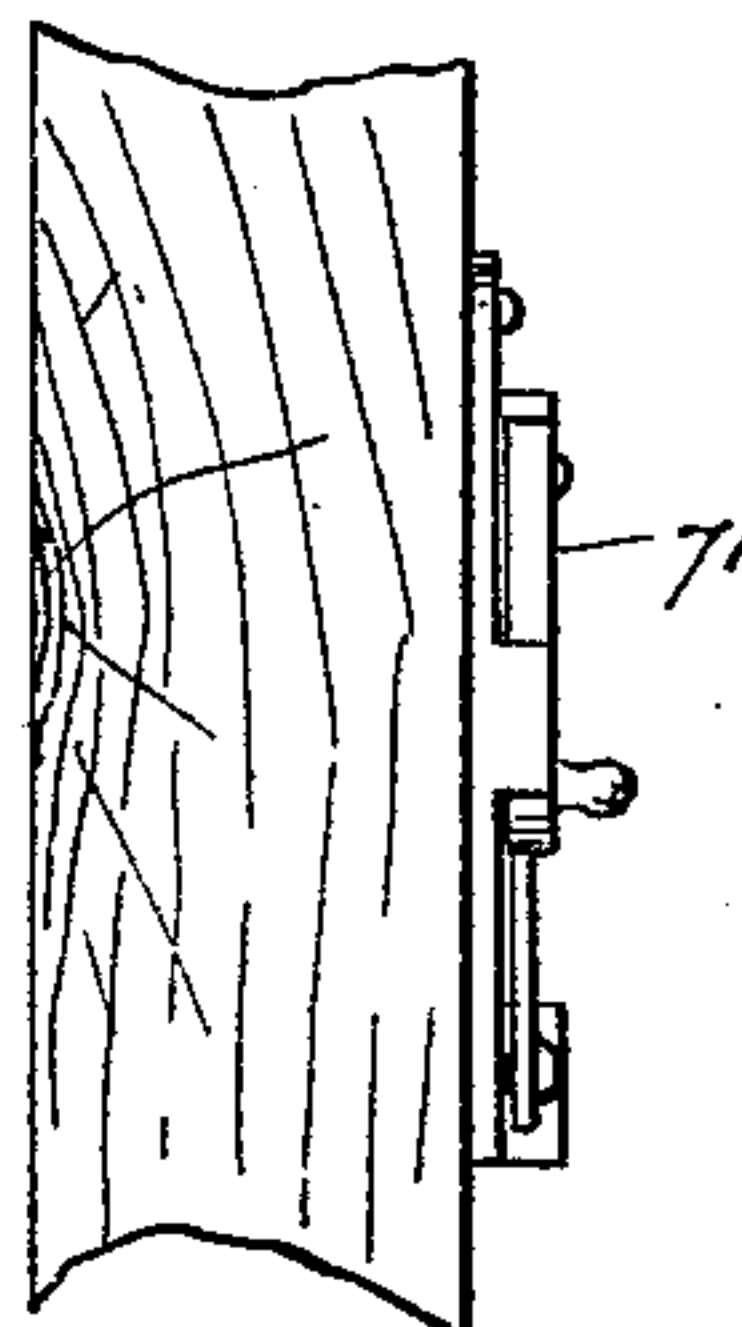


FIG. 3.



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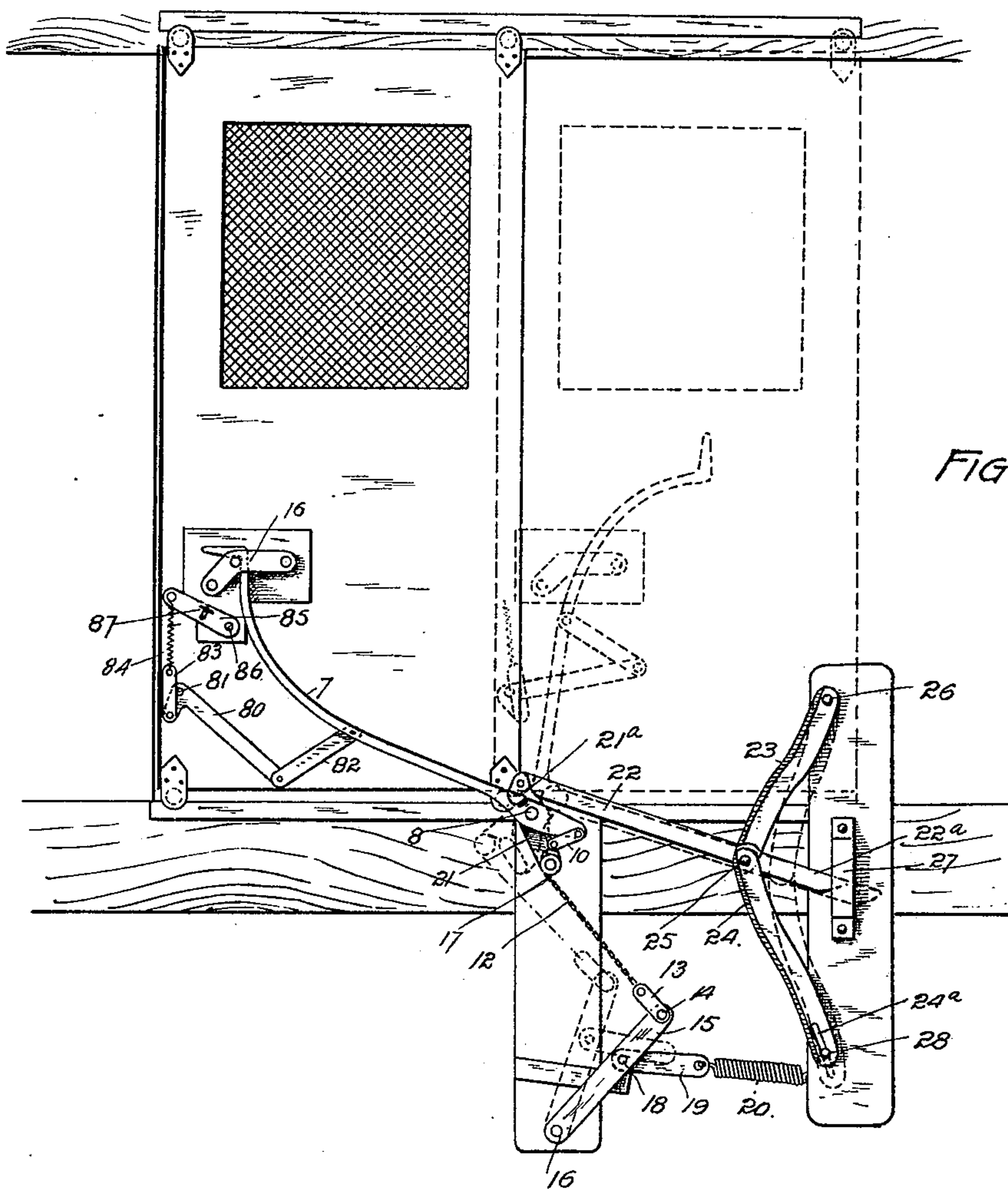


FIG. 4.

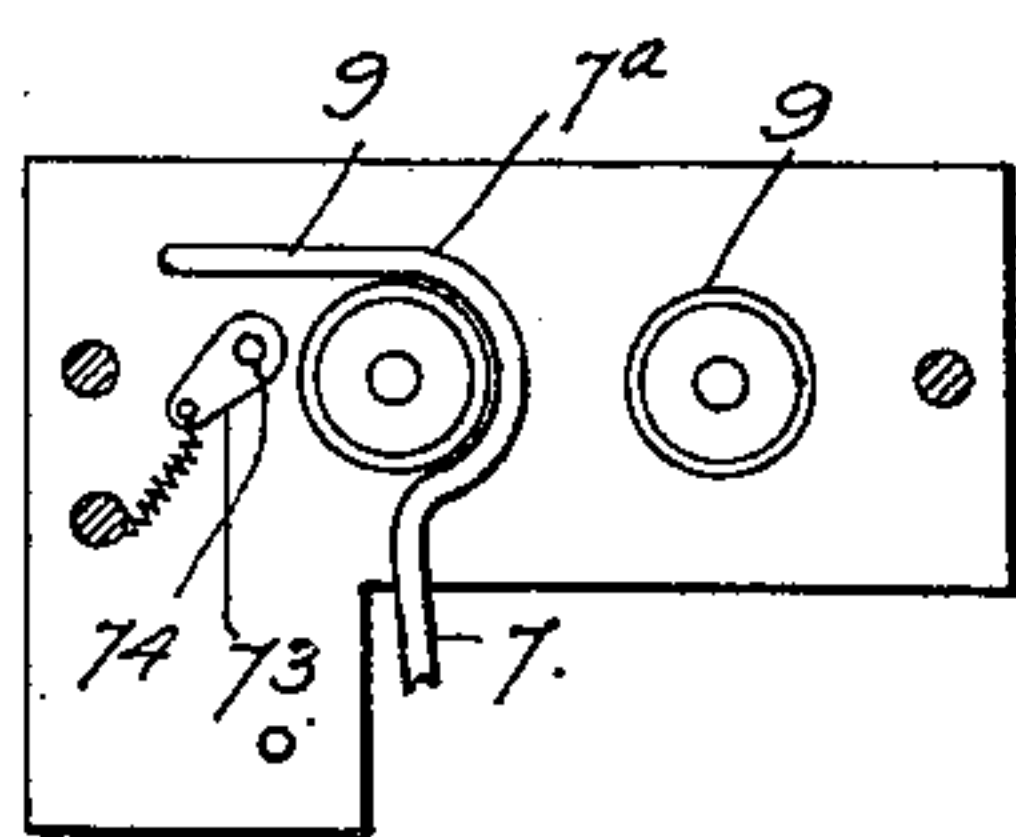


FIG. 5.

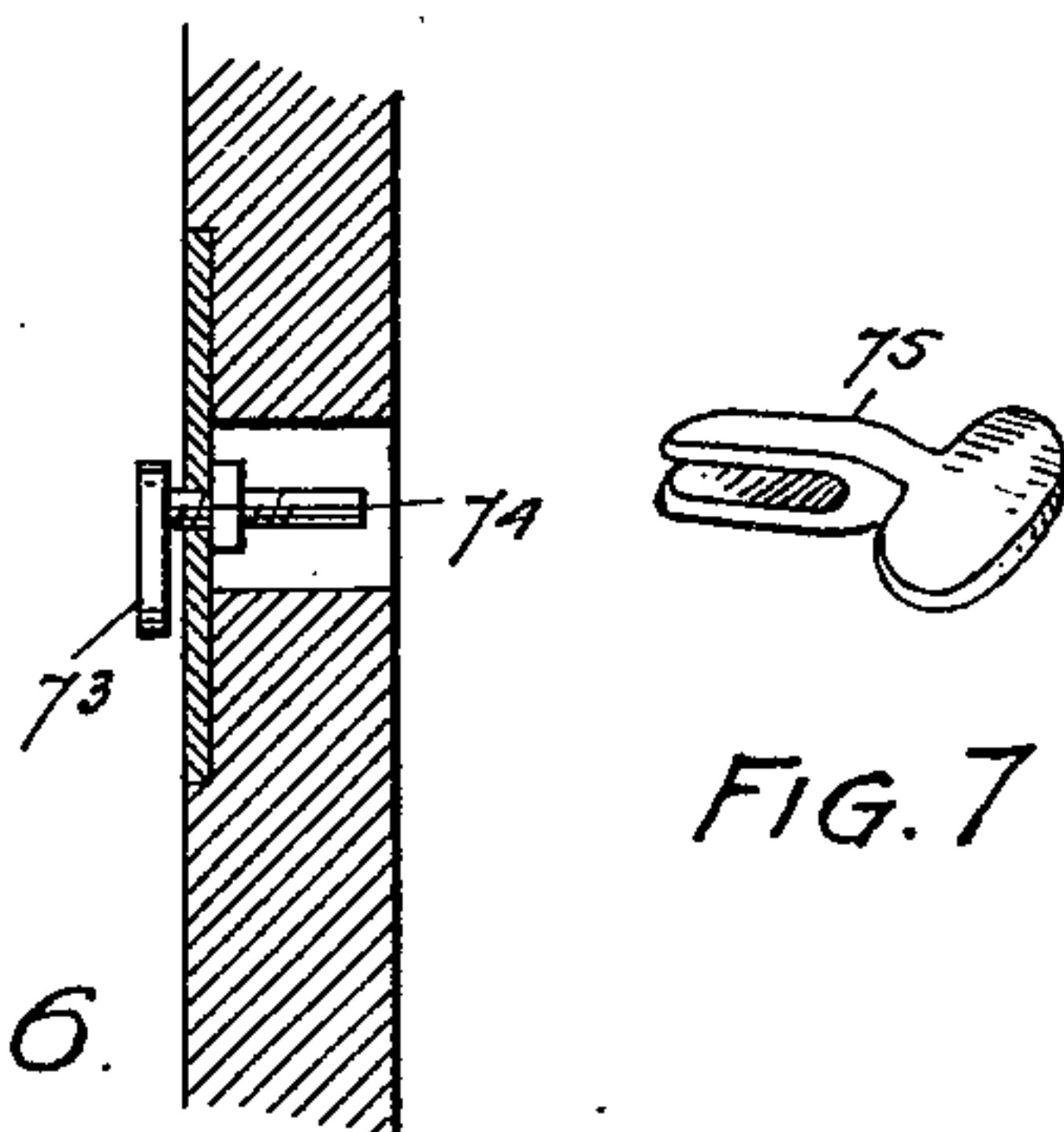


FIG. 7.

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3 Sheets—Sheet 3.

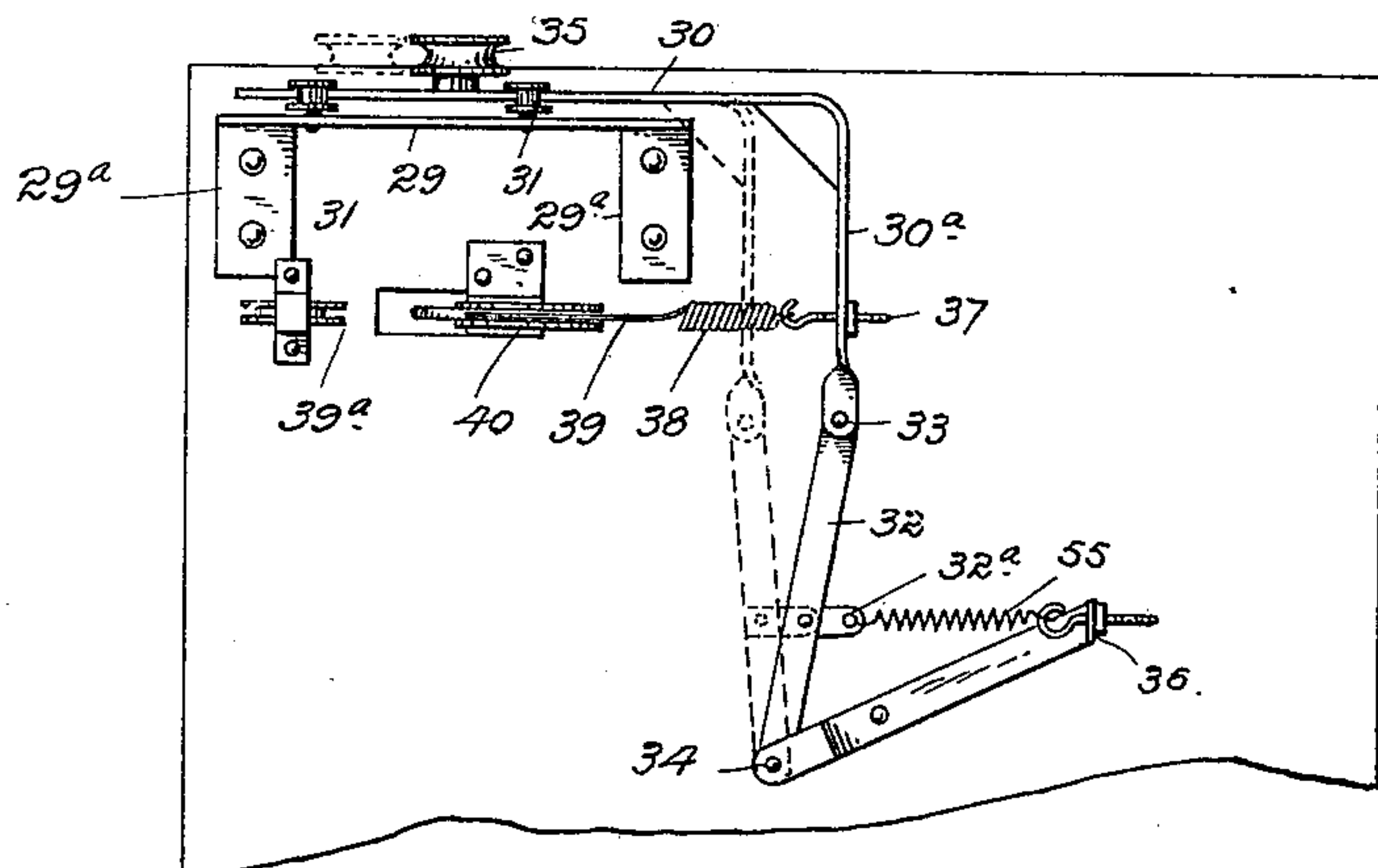


FIG. 8.

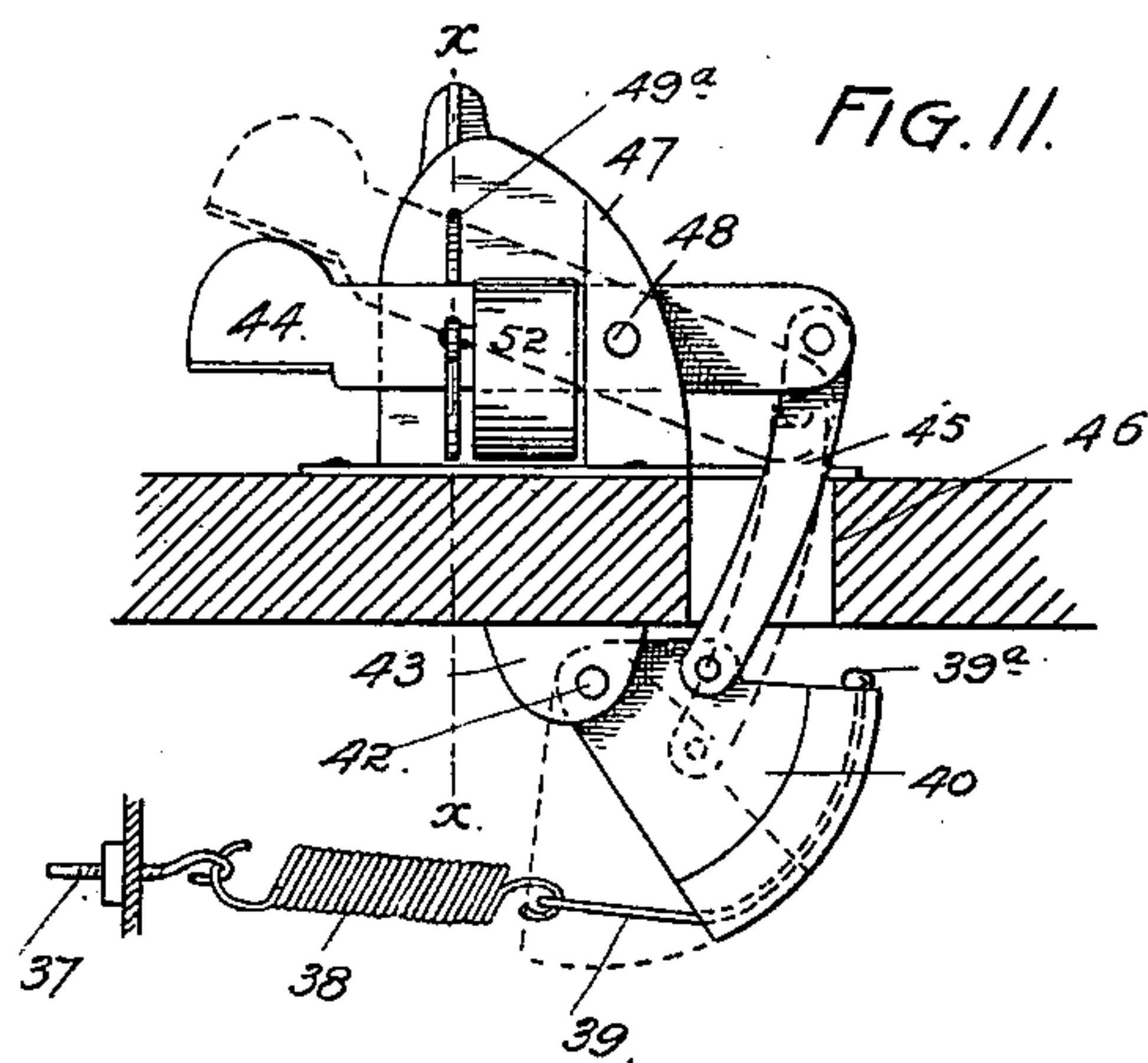


FIG. 11.

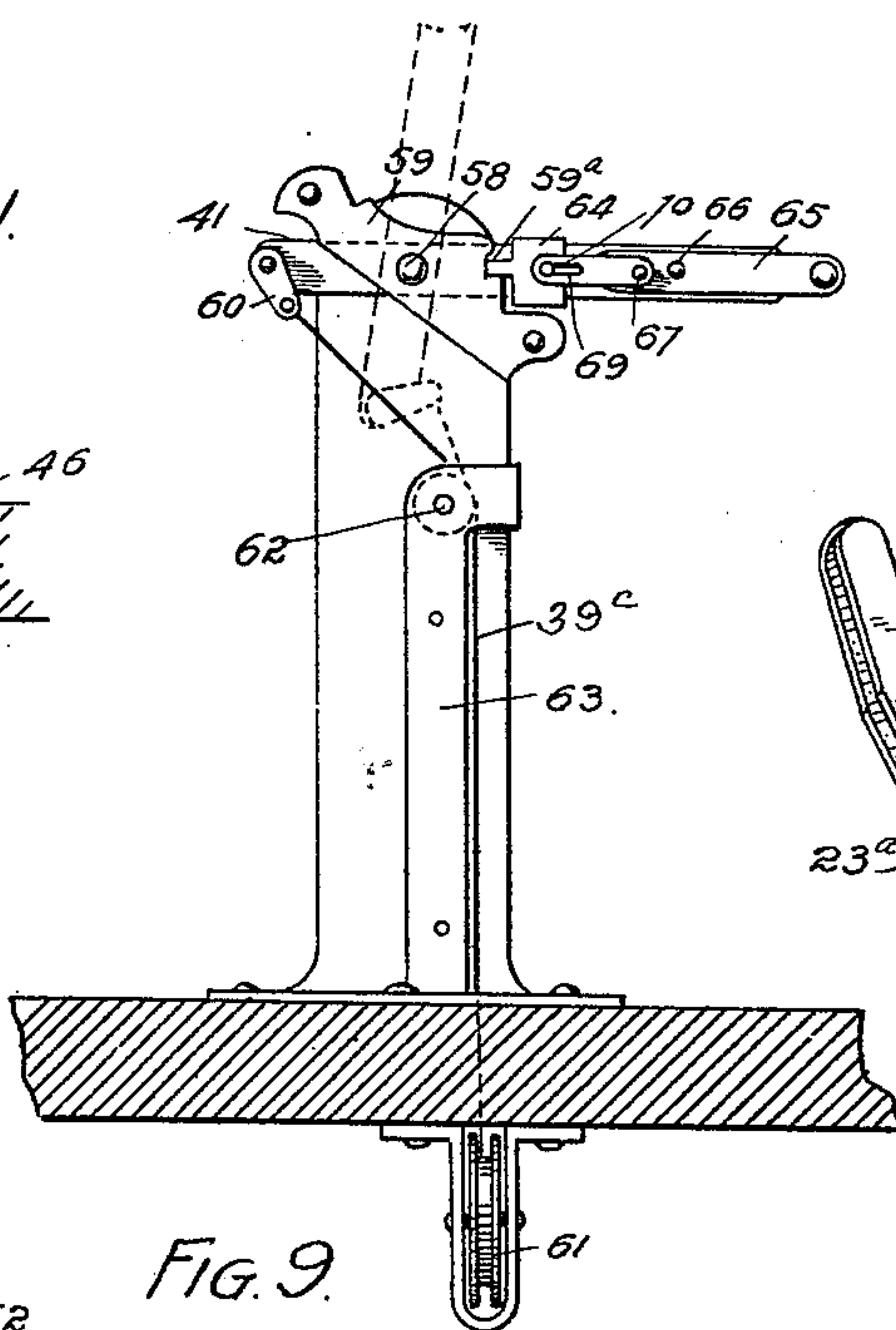


FIG. 9.

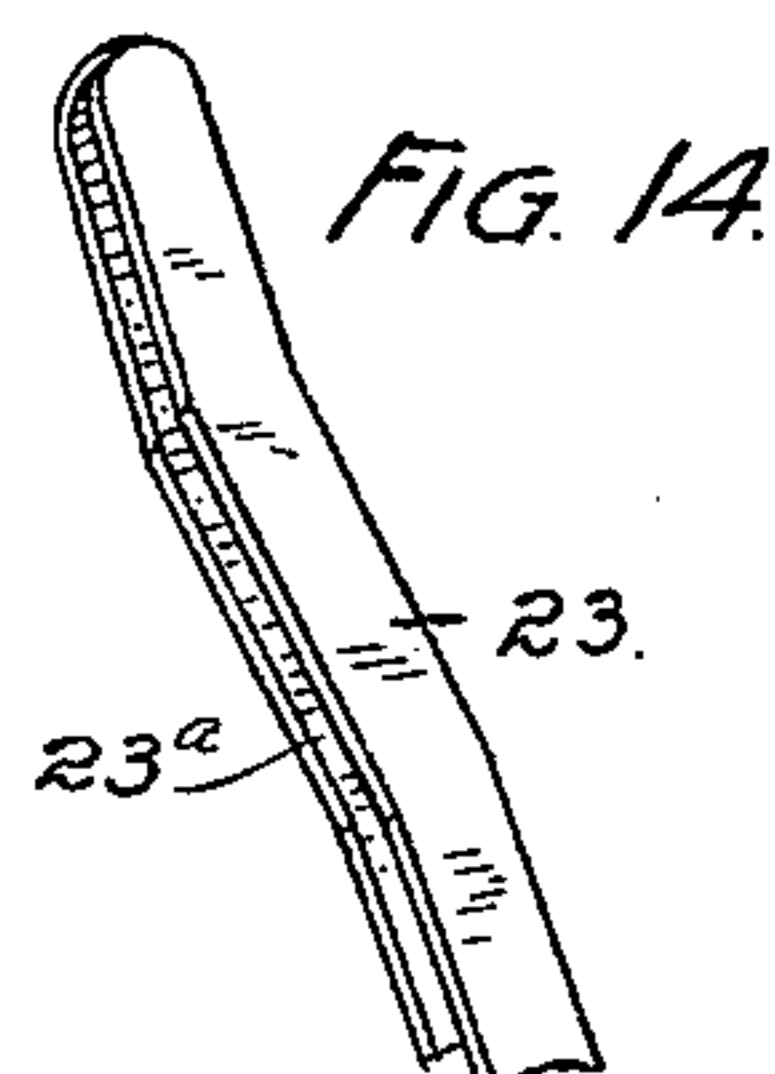


FIG. 14.

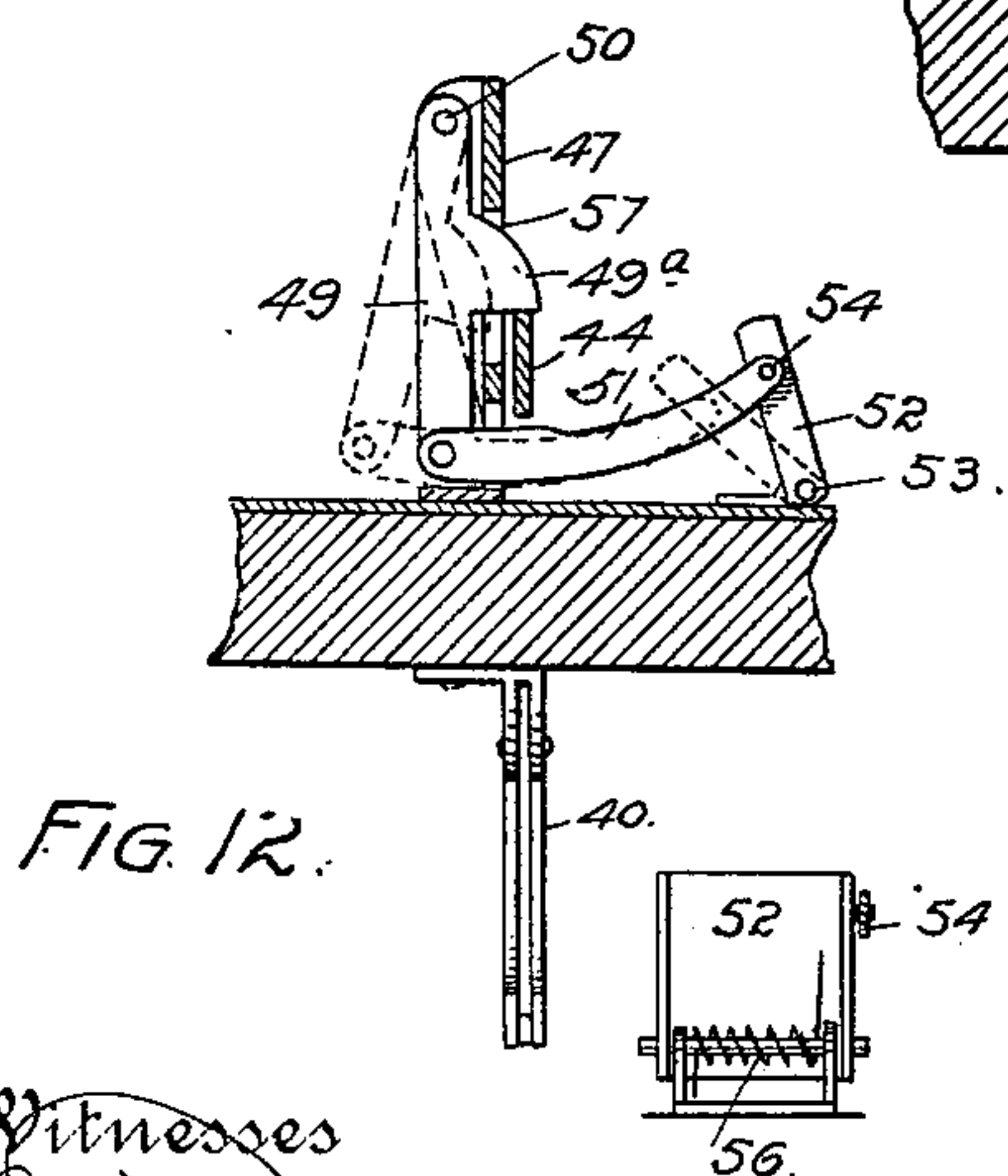


FIG. 12.

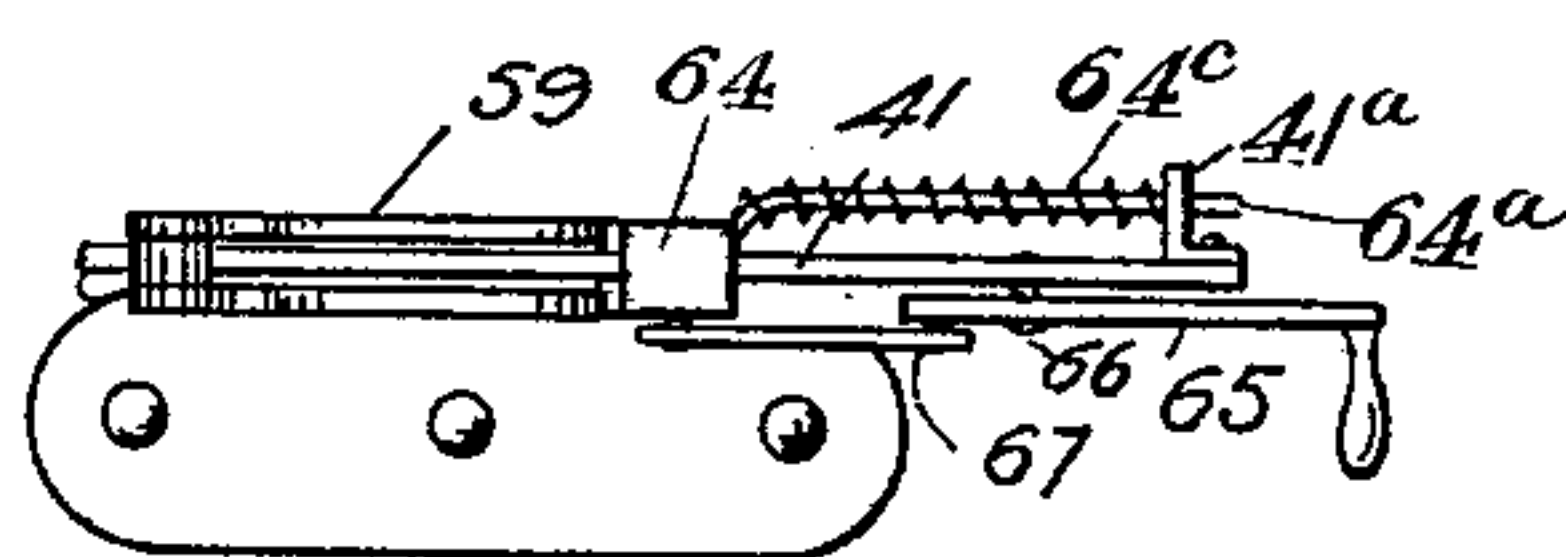


FIG. 10.

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM CHATER, OF DENVER, COLORADO, ASSIGNOR OF TWO-THIRDS TO
DAVID DOWNIE AND JOHN EDWARD CLARKE, OF SAME PLACE.

AUTOMATIC MEANS FOR OPENING, CLOSING, AND LOCKING ELEVATOR-DOORS.

SPECIFICATION forming part of Letters Patent No. 613,224, dated October 25, 1898.

Application filed October 7, 1897. Serial No. 654,356. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM CHATER, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Automatic Means for Opening, Closing, and Locking Elevator-Doors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in automatic means for opening, closing, and locking elevator-doors.

The construction set forth in this application is of the same class and may be considered an improvement over the invention described in my previous application, Serial No. 646,851, filed August 2, 1897.

The mechanism will first be described and the points of novelty subsequently indicated in the claims.

In the accompanying drawings, Figure 1 is a front view of an elevator-shaft equipped with my improvements. In this view the devices attached to the car or acting on the door-opening mechanism are shown in two positions, one being in full lines and the other in dotted lines. Figs. 2 and 3 are front and side views, respectively, illustrating a detail of construction. Fig. 4 is a rear view or a view taken from the inside of the shaft or well, illustrating the mechanism attached to the elevator-shaft. Figs. 5, 6, and 7 illustrate details. Fig. 8 is a fragmentary underneath view of the car, illustrating the mechanism attached to its bottom. Fig. 9 is a section taken through the car, illustrating the hand operating devices for controlling the mechanism attached to the car. Fig. 10 is a top view of the said mechanism. Fig. 11 is a section taken through the car, illustrating the foot operating devices for controlling the mechanism attached to the car. Fig. 12 is a section taken on the line xx , Fig. 13 is a detail view of the spring-

held foot-plate forming a part of the mechanism illustrated in Figs. 11 and 12. Fig. 14 is a fragmentary perspective view illustrating one toggle member or lever. This view shows the flange of the toggle member, which is engaged by the actuating-wheel carried by the car. Fig. 15 is a section taken through the joint of the toggle members.

Similar reference characters indicating corresponding parts in the views, let the numeral 5 designate the framework of the shaft or well, and 6 one of the sliding doors adapted to close an opening in the said shaft. The door is held normally closed through the instrumentality of a lever 7, fulcrumed on the shaft-casing at 8 and adapted to move between and engage antifriction devices 9, mounted on the door. (See Fig. 5.) To the lower extremity of the door-lever 7 is attached a clevis or link 10, to whose free extremity is attached a chain or other flexible connection 12, whose opposite extremity is connected with a link 13, pivotally attached at 14 to the upper extremity of a lever 15, fulcrumed on the shaft-casing at 16. The chain 12 engages a pulley or wheel 17, mounted on one extremity of an auxiliary lever 21, fulcrumed on the casing at 8. Attached to the lever 15 at a point intermediate the points 14 and 16 is a link 19, to which is connected one extremity of a coil-spring 20, whose opposite extremity is made fast to the shaft-casing. The strength of this spring is such as to close the door as soon as the devices for opening the door cease to act in opposition to the spring.

To the extremity of the auxiliary lever 21 remote from the pulley 17 is pivotally connected one extremity of a bar 22, which is also connected with two members 23 and 24 of a toggle-joint. The members 23 24 are connected together and to the bar 22 by means of a pivot 25. The bar 22 extends beyond this pivot, as shown at 22^a, and engages a metal guide-strap 27, attached to the shaft-casing. The extremity of the member 23 remote from the pivot 25 is pivoted on the shaft-casing, as shown at 26. The extremity of the toggle member 24 remote from the pivot 25 is pivoted on said casing, as shown at 28, and is provided with a slot 24^a, through

which the pivot passes. This slot allows the toggle members the necessary movement during the operation of opening and closing the door 6.

- 5 The mechanism mounted on the elevator-car will now be described. These devices carried by the car are adapted to act on the mechanism attached to the shaft-casing for the purpose of opening the elevator-door.
- 10 Attached to the bottom of the car by means of horizontal straps 29^a is a depending plate 29, upon which is movably mounted a bar 30, which is supported by grooved pulleys or wheels 31, attached to the bracket-plate 29.
- 15 The bar 30 is provided with a right-angular extension 30^a, to whose extremity is pivotally connected at 33 a lever 32, whose opposite extremity is pivotally attached at 34 to the bottom of the car. On the bar 30 and projecting outwardly beyond the front vertical side of the car is a grooved wheel 35, adapted to engage the toggle-joint composed of the members 23 24, mounted on the shaft-casing, as heretofore explained. The lever 32 is provided with a lug 32^a, to which is attached one
- 25 extremity of a coil-spring 55, whose opposite extremity is attached to a tension-bolt screwed into a depending lug 36, fast on the bottom of the car. Attached to the extension 30^a of the bar 30 by means of a tension-bolt 37 is a coil-spring 38, which should be stronger than the spring 55. This spring 38 extends in the opposite direction from the spring 55. To the opposite extremity of the
- 35 coil-spring 38 is attached a rope or cable 39, which is attached to a segment 40 (see Figs. 11 and 12) or a lever 41, (see Figs. 9 and 10,) according as it is desired to control the mechanism by the hand or the foot. The segment
- 40 40 is pivoted at 42 on a depending lug 43, attached to the bottom of the car. The cable 39 is attached to the top of the segment, as shown at 39^a, and engages a groove in its edge. The segment 40 is connected with a
- 45 foot-lever 44 by a link 45, which passes through an opening 46, formed in the bottom of the car. The lever 44 is fulcrumed at 48 on a bracket 47, attached to the upper surface of the bottom of the car and projecting
- 50 upwardly thereinto.

The spring 38 is placed under tension by pressing the foot-lever downwardly to the position shown in full lines in Fig. 11. This movement of the lever 44 shifts the bar 30 sufficiently to throw the pulley 35 in the position to engage the toggle-joint as the car moves up and down in the shaft. The foot-lever is held in this position by a projection 49^a on a latch 49, pivoted at 50 on the

60 bracket 47. The opposite extremity of this latch is connected with a plate 52 by a link 51, as shown at 54. The plate 52 is pivoted at 53 and normally held in the upright position by a spring 56, coiled around the pivot-spindle 53. As the lever 44 is pressed downwardly to the full-line position in Fig. 11 the latch engages the projection 49^a, which pro-

trudes through an opening 57 in the bracket 47, and forces the latch to the dotted-line position. (See Fig. 12.) As soon, however, as 70 the lever 44 is passed beneath the projection 49^a the latter is drawn outwardly and locks the lever in position until the plate 52 is pressed to the dotted-line position, (see Fig. 12,) when the latch is moved outwardly sufficiently to release the foot-lever. As soon as 75 this occurs the spring 38 is released and the pulley 35 drawn to such a position by the spring 55 that it will not actuate the toggle members 23 24 as the car moves up or down. 80 The same function will be accomplished by means of the hand-lever 41, which is fulcrumed at 58 on a bracket 59, supported on the side of the car at a convenient height for the person in charge of the car. To one ex- 85 tremity of this lever is attached a clevis 60, to which is connected a cable 39^c, leading from the spring 38 and passing over a pulley 61, attached to the bottom of the car and engaging another pulley 62, mounted on a stand- 90 ard 63, located within the car. When the lever 41 is in the position shown in full lines in Fig. 9, the pulley 39 will be in the position shown in dotted lines in Fig. 8, and consequently in the position to engage the joint- 95 ed track. The lever 41 is held in this position by means of a sliding dog 64, mounted on the lever and having a tooth or projection engaging a recess 59^a, formed in the bracket 59. The dog 64 is provided with a stem 64^a, 100 which passes through an aperture formed in a lug 41^a, attached to the lever 41. Surrounding this stem is a coil-spring 64^c, located between the dog and the lug 41^a. This spring normally holds the tooth of the dog in the re- 105 cess 59^a.

The dog 64 is actuated by means of an arm 65, fulcrumed on the lever 41 at 66 and connected at 67 with a link 68, having a slot 69, through which protrudes a pin 70, fast on 110 the dog 64. The arm 65 is provided at its outer extremity with a suitable handle. The dog may be disengaged from the bracket by moving this handle upwardly. This action causes the joint 67 to move downwardly suffi- 115 ciently to disengage the dog from the bracket. The lever then turns on its fulcrum until it assumes the upright position shown in dotted lines in Fig. 9. The tension of the spring 38 is then released, and the recoil of the spring 120 55 shifts the pulley 35 and its connections to the position shown in full lines in Fig. 8.

In Figs. 2 and 3 a dog 71 is illustrated. This dog is pivoted at 72 on the elevator-casing adjacent the door. Its function is to lock 125 the door open when it would otherwise be closed under the influence of the door-closing mechanism heretofore described.

In Figs. 5 and 6 a cam 73 is illustrated. This cam is attached to a rotatable key-post 130 74, adapted to be actuated by a key 75. (See Fig. 7.) By turning the key-post the cam 73 is brought in contact with the hook-shaped extremity 7^a of the lever, which is raised suf-

ficiently to unlock the lever and permit the opening of the door in opposition to the action of the closing mechanism.

From the foregoing description the operation of the mechanism will be readily understood. Assuming that the toggle-joint is in the position shown in Fig. 1 and in full lines in Fig. 4 and that the wheel 35 is in the position shown in Fig. 1 and in dotted lines in Fig. 8, the said wheel will engage the toggle-joint as the car approaches any floor. This engagement throws the toggle members to the position shown in dotted lines in Fig. 4, which movement opens the door 6 through the instrumentality of the bar 22, the auxiliary lever 21, the chain 12, the link 13, the lever 15, the spring 20, and the door-lever 7. It is evident that the same result will follow whether the elevator is moving up or down in the shaft. If it is not desired to open the door automatically during the movement of the car, the tension of the spring 38 is released, allowing the spring 55 to draw the wheel 35 out of the path of the jointed track 23 24. In this event the car moves up and down in the shaft without opening the door. If, however, it is desired to open the door when the car is at any floor, it may be accomplished by placing the foot-lever 44 in the position shown in full lines in Fig. 11 or by placing the hand-lever 41 in the position shown in full lines in Fig. 9. This operation will shift the wheel 35 and force it against the toggle-levers 23 24 and actuate the same sufficiently to open the door, the result being the same as when the wheel 35 is set to engage the track as the elevator moves in the shaft.

To insure the closing of the door, I employ auxiliary means consisting of a bell-crank lever 80, fulcrumed on the door at 81. One arm of this lever is connected with the lever 7 by a link 82. The opposite arm of this bell-crank lever is connected by a link 83 with a coil-spring 84, whose opposite extremity is attached to one extremity of a short lever 85, fulcrumed on the door at 86. When this lever is adjusted as required to give the spring 84 the proper tension, it is held in the adjusted position by a set-screw 87, screwed into the door and engaging a slot formed in the lever. This spring 84, whose tension may thus be regulated by adjusting the lever 85, exerts power on the short arm of the bell-crank lever 80 according to the tension of the spring. This pull on the short arm of the bell-crank lever when the door has been thrust forward by the mechanism heretofore described turns the lever 80 on its pivot 81 and throws the long arm of said lever forward, thus exerting a pull on the link 82, which, acting on the lever 7, insures the closing of the door in case the power of the ordinary door-closing mechanism should not be sufficient to effect the desired purpose.

The function of my particular construction of door opening and closing mechanism is to avoid breakage of parts in case of obstruction

in opening and closing the door and also to avoid unnecessary jar or concussion, which has a tendency to quickly wear out the parts of the mechanism.

The jointed track is provided with a flange 23^a 24^a. (See Figs. 14 and 15.) This flange engages the actuating-wheel 35.

The auxiliary lever 21 is provided with a lip 21^a, formed on its upper extremity and adapted to engage the lever 7. The function of this lip is to engage the said lever and close the door as the auxiliary lever is returned to its normal position by the recoil of the spring 20 after the wheel 35 has left the toggle-levers 23 24.

Having thus described my invention, what I claim is—

1. The combination with the elevator-car and shaft-door, of a lever fulcrumed on a suitable support independent of the door and engaging the door in such a manner that the movement of the lever actuates the door, an auxiliary lever fulcrumed independently of the door, a flexible connection attached to the door-lever at one extremity and engaging one arm of the auxiliary lever, a spring, a suitable connection between said spring and the opposite extremity of the flexible connection, a pair of toggle-levers mounted on the shaft-casing, a connection between said levers and the other arm of the auxiliary lever, and suitable means mounted on the car and adapted to engage the toggle-levers, whereby the latter are actuated as the car moves up and down, for the purpose of opening the door.

2. The combination with the elevator-car and the shaft-door, of a lever engaging the door and fulcrumed on a suitable support in proximity to the door, an auxiliary lever fulcrumed on a stationary support, a flexible connection attached to the door-lever and engaging one arm of the auxiliary lever, spring-held mechanism to which the opposite extremity of the flexible connection is attached, a pair of toggle-levers mounted on a stationary support, a connection between said levers and the other arm of the auxiliary lever, whereby the movement of the toggle-levers actuates the auxiliary lever, and means mounted on the car for engaging the toggle-levers as the car moves up or down for the purpose of opening the door.

3. The combination with the car and the door of an elevator-shaft, of a lever fulcrumed on a suitable support and engaging the door, an auxiliary lever fulcrumed on the fulcrum of the door-lever, spring-actuated mechanism connected with the door-lever, an antifrictional device mounted on one arm of the auxiliary lever and engaging said mechanism, a pair of toggle-levers mounted on a suitable support, a connection between said levers and the opposite arm of the auxiliary lever, and means mounted on the car for actuating the toggle-levers as the car moves up or down, for the purpose of opening the door.

4. The combination with the elevator-car

and the door of the shaft, of a lever fulcrumed adjacent the door which it engages, spring-actuated mechanism connected with one arm of the door-lever, an auxiliary lever fulcrumed on the door-lever fulcrum, one arm of the auxiliary lever engaging said mechanism, a pair of toggle-levers, the connecting-pivot of the toggle-levers being connected with the opposite arm of the auxiliary lever, and suitable means mounted on the car for actuating the toggle members as the car moves up or down, for the purpose of opening the door.

5. The combination with the elevator-car and the door of the shaft, of means connected with the door for normally holding the latter in the closed position, said means comprising a lever engaging the door, and spring-actuated mechanism connected with the lever, a pair of toggle members connected with the door-closing mechanism, and means mounted on the car for engaging the said levers, said means consisting of a movable spring-held arm and a wheel mounted thereon.

6. The combination with the elevator-car and the door of the shaft, of means mounted in proximity to the door for normally holding the latter closed, said means comprising a lever and spring-actuated mechanism connected therewith, a pair of toggle-levers mounted in the elevator-shaft and connected with the door-closing mechanism, and means mounted on the car for actuating said levers as the car moves up or down, said means on the car consisting of a movable bar, a wheel mounted thereon, a spring holding said bar in position to perform its function, and another spring acting on the bar in opposition to the first-named spring and adapted to withdraw the bar and its wheel from the actuating position when the first-named spring is released.

7. The combination with the car and the door of an elevator-shaft, of a lever mounted in proximity to the door for normally holding the latter in the closed position, a pair of toggle-levers mounted in the shaft and adapted when actuated, to open the door in opposition

to the closing mechanism, and means mounted on the car for actuating said opening mechanism, said means on the car consisting of a movable bar, a wheel mounted thereon, a spring holding said bar in position for the wheel to perform its function, another spring acting in opposition to the first-named spring, and means adapted to withdraw the bar and its wheel from the actuating position when the first-named spring is released, and suitable means under the control of the person in charge of the car for regulating the tension of the first-named spring.

8. The combination with the door of an elevator-shaft, of a lever fulcrumed in proximity to the door for controlling the latter, and auxiliary door-closing means consisting of a lever fulcrumed on the door, a spring connected with the door at one extremity and with one arm of the lever at the opposite extremity, and a suitable connection between the main lever and the other arm of the auxiliary lever.

9. The combination with the elevator-car and the shaft-door, of a lever engaging the door and fulcrumed on a suitable support in proximity to the door, an auxiliary lever fulcrumed on a stationary support and provided with a lip or projection adapted to engage the door-lever for the purpose of closing the door, spring-actuated mechanism connected with the door-lever and engaging the auxiliary lever, a pair of toggle-levers mounted on a stationary support, a connection between said levers and the auxiliary lever, whereby the movement of the toggle-levers actuates the auxiliary lever, and means mounted on the car for engaging and actuating the toggle-levers as the car moves up or down.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM CHATER.

Witnesses:

G. J. ROLLANDET,
ALFRED J. O'BRIEN.