No. 653,297. Patented July 10, 1900.

# M. M. HUNTER.

## SAFETY DEVICE FOR ELEVATORS.

(Application filed Mar. 14, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

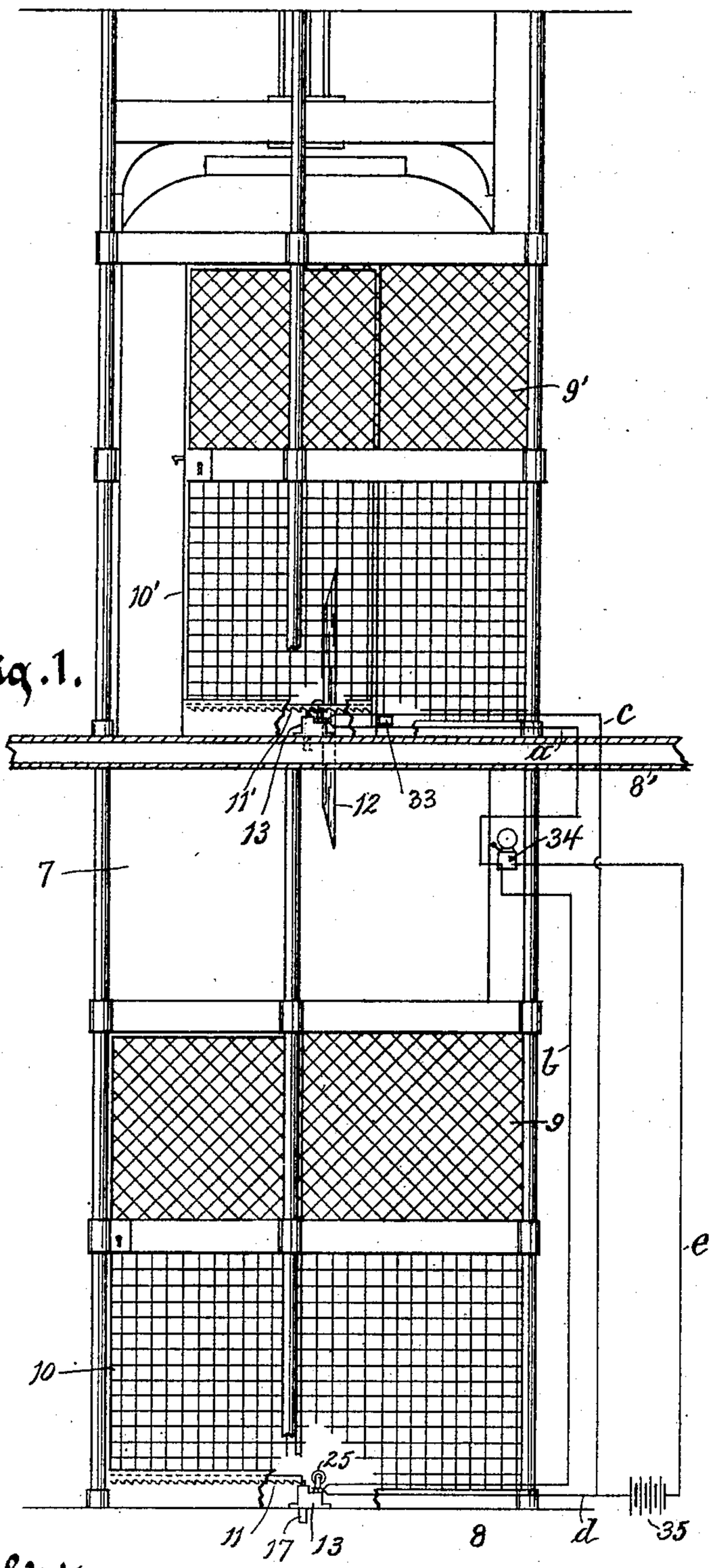


Fig. 2.

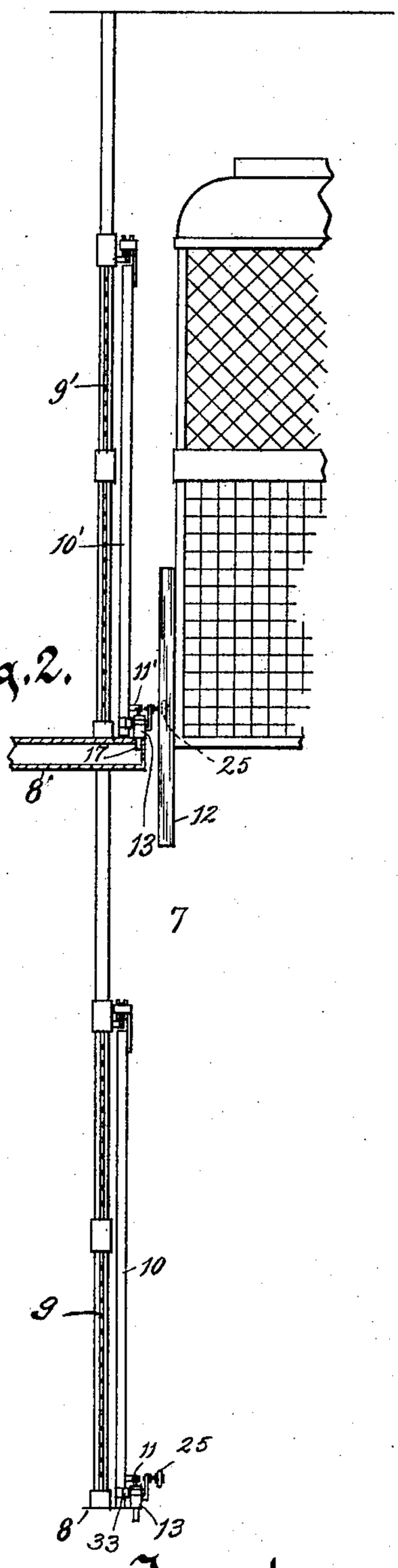


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Fig. 3.

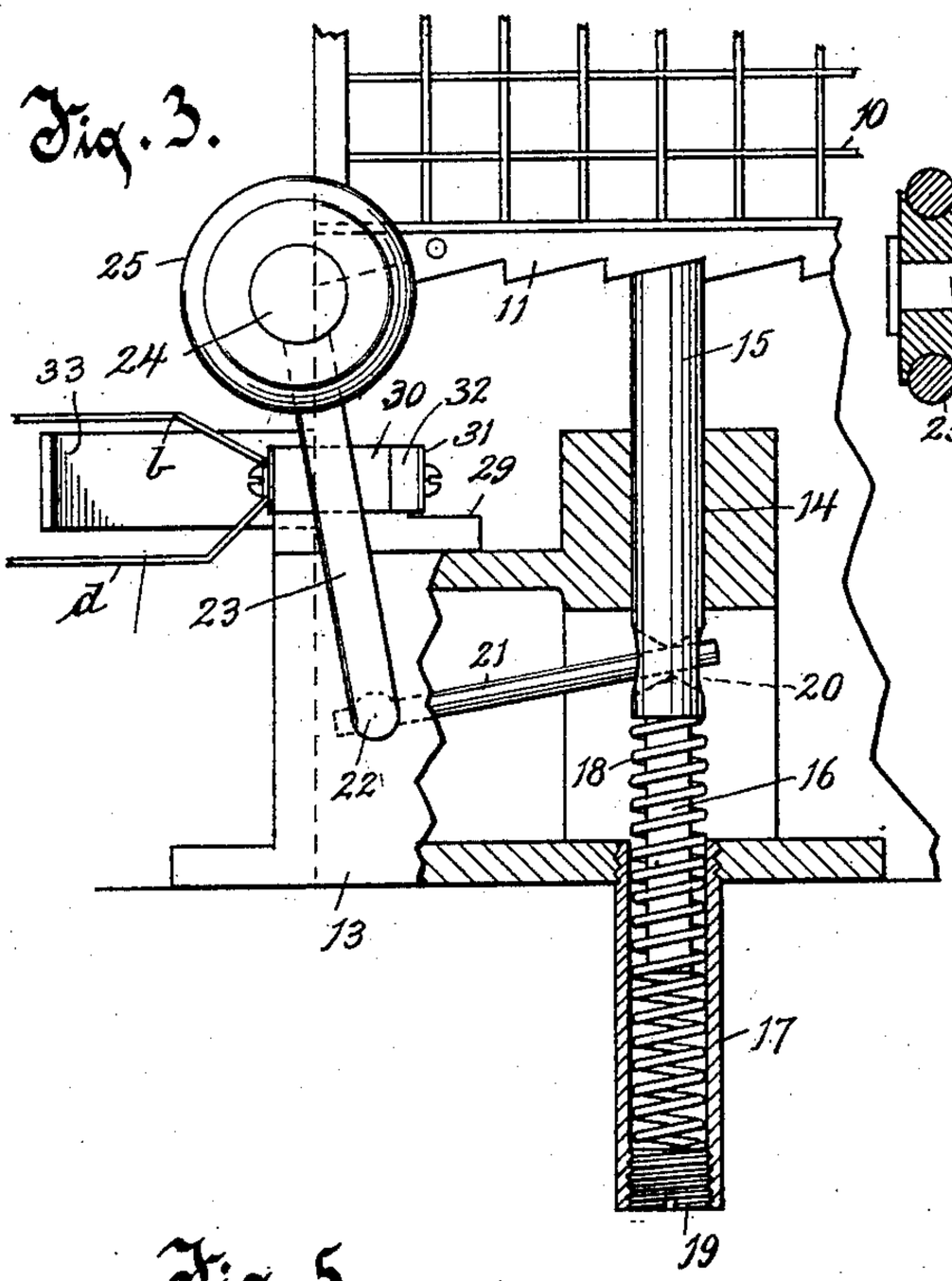



Fig. 4.

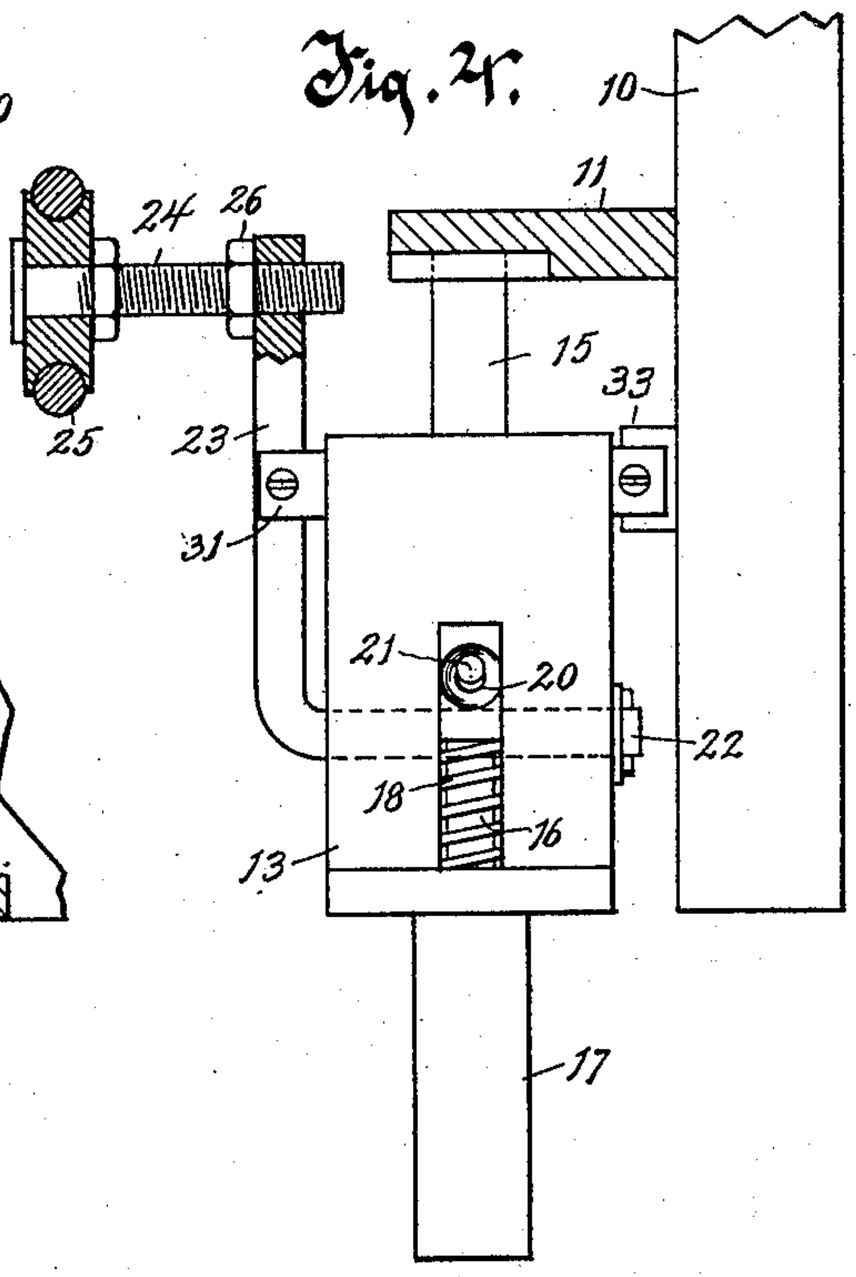



Fig. 5.

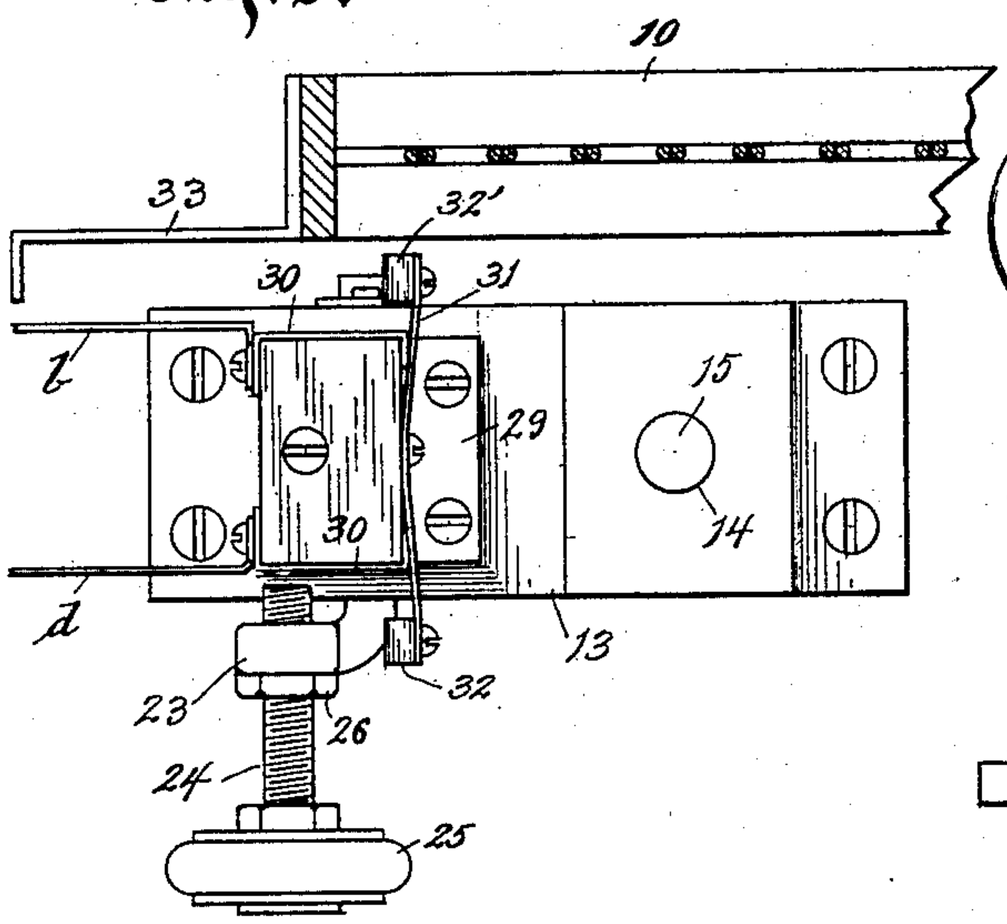
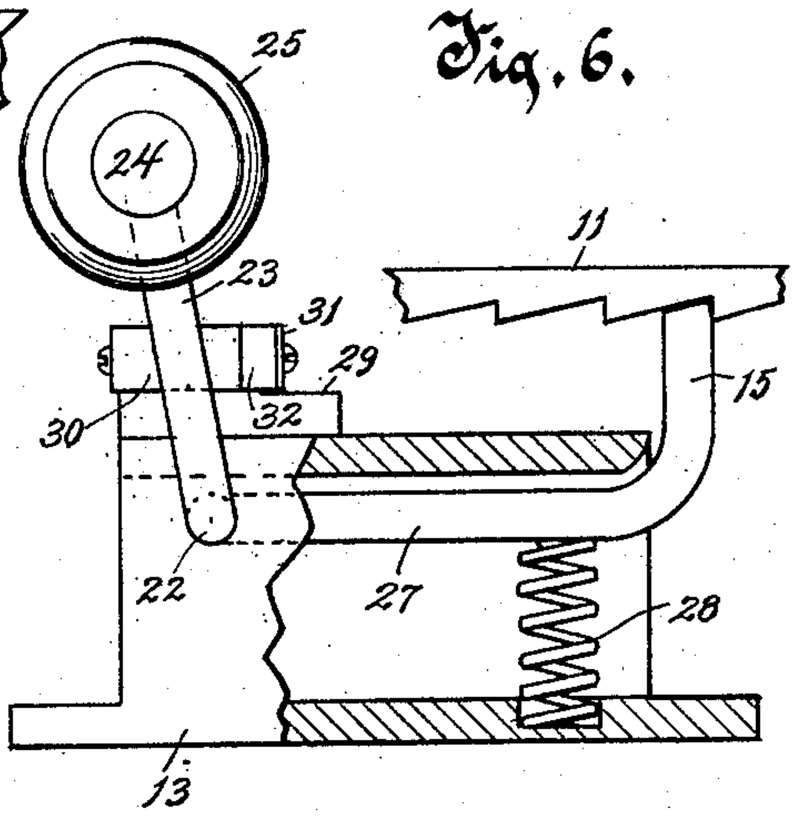



Fig. 6.

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# UNITED STATES PATENT OFFICE.

MURRAY M. HUNTER, OF MILWAUKEE, WISCONSIN.

## SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 653,297, dated July 10, 1900.

Application filed March 14, 1900. Serial No. 8,584. (No model.)

*To all whom it may concern:*

Be it known that I, MURRAY M. HUNTER, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Safety Devices for Elevators, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in safety devices for elevators.

It consists particularly in certain improvements upon the construction covered by United States Letters Patent issued to me under date of January 30, 1900, and numbered 642,332, the object being not only to simplify and cheapen the construction covered by said Letters Patent, but also to improve the general efficiency of the device.

Having the above in view, the invention consists of the devices and parts or their equivalents, as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a front elevation of an elevator-shaft, showing two floors and the elevator-cage in position at the upper floor, parts being broken away and the door of the upper floor or landing being shown as partially opened, while the door at the lower landing is shown as fully closed. Fig. 2 is a vertical section through the elevator-shaft, showing a fragment of the cage. Fig. 3 is a fragmentary view, on an enlarged scale, of the locking mechanism, parts being broken away. Fig. 4 is a view at right angles to Fig. 3, parts being broken away. Fig. 5 is a plan view of Fig. 3, and Fig. 6 is a fragmentary view of a modified form of locking mechanism.

Referring to the drawings, the numeral 7 indicates an elevator-shaft, and 8 8′ two floors or landings of a building. The elevator-shaft is inclosed at the different floors, preferably by the usual wire housings, indicated, respectively, in the accompanying drawings by the numerals 9 9′. The doors of the elevator-shaft at the respective floors are indicated, respectively, by the numerals 10 10′. Each door near its bottom edge is provided with a rack-plate, having beveled teeth on its under edge. These plates are adapted to be engaged by locking devices, as will be hereinafter more fully referred to. The rack-plate for the lower door is indicated by the numeral 11 and the plate for the upper door by the numeral 11′. The teeth of these rack-plates are beveled or inclined in a direction so that when the locking mechanism engages the teeth it is impossible to slide the door toward an open position; but no impediment is offered, however, at any time to the door being slid to a closed position, inasmuch as the locking mechanism will then ride over the beveled faces of the teeth.

Secured to the front of the elevator-cage is a strip 12, (shown most clearly in Figs. 1 and 2,) the opposite ends of said strip being preferably beveled. In cases where the door of the landing is at the side of the elevator-shaft instead of at the front, as shown in the drawings, the strip 12 is secured to the side of the elevator-cage, and the mechanism with which said strip coacts and which is to be hereinafter described is also located at the side.

The locking mechanism will now be described. At each landing is arranged and properly located a boxing 13, said boxing provided at one end with a vertical opening 14, forming a bearing for a locking dog or catch 15, the upper end of said dog or catch being preferably beveled, so as to register with the beveled faces of the teeth of the rack-bar. This dog has a depending reduced portion or stem 16, which extends downwardly for a desired distance into a tubular casing 17. A coiled spring 18 surrounds the reduced stem 16, and the lower end of this spring bears against the bottom of the casing. The bottom of the casing preferably consists of a nut 19, engaging internal threads at the lower end of said casing. By the employment of this nut provision is made for readily adjusting the tension of the spring. Near its lower end the locking-dog 15 is intersected by an opening 20, said opening advisably tapering from opposite sides inwardly, the contracted central portion of the opening forming a bearing for the end of an arm 21. The opposite end of the arm 21 is connected to a rock-shaft 22, said shaft being journaled in the sides of the

boxing 13. One end of the shaft 22 is extended beyond the side of the boxing and is provided with an upwardly-extending crank 23. The upper end of this crank has an outwardly-projecting extension 24, which has mounted revolubly on its outer end an anti-friction-roller 25. This roller is in position to be engaged by the strip 12, carried by the elevator-cage when said cage ascends or descends to a position to bring the strip into register with the roller. The extension 24 of course could be an integral part of the crank 23; but I prefer to make said extension in the form of a screw engaging a threaded opening at the upper end of the crank and carrying a jamb-nut 26, which is adapted to be turned against the crank. When the strip 12 is brought to position to engage the roller 25, as just explained, the beveled end of the strip rides along the roller, and will thus gradually force the locking-dog 15 downwardly out of engagement with the rack-plate, said dog being fully disengaged when the straight edge of the strip 12 engages the roller, and this occurs when the elevator-cage is brought flush with the floor. At this time it is obvious that the door may be readily opened by the elevator-attendant. Whenever the elevator-cage leaves a floor and the door has been opened, the person in charge of the elevator can then push the door to a closed position, and as the cage moves away from the landing, either in ascending or descending, the strip 12 is gradually brought out of contact with the roller, and when fully out of contact therewith the recoil of the spring 17 will return the locking-dog to the locking position in which it is in engagement with the rack-plate, and this engagement occurs no matter whether the door has been fully closed or only partially closed. In the upper portion of Fig. 1 of the drawings the elevator-cage is shown flush with the landing and the door in the act of being opened, the locking mechanism being out of engagement with the rack-plate. It will thus be seen that when the elevator-cage is flush with the landing the locking mechanism is released; but when the cage leaves a landing the locking mechanism automatically engages the rack, and thereby locks the door of the shaft against being opened, whether said door be fully closed or only partially closed.

It will be seen that a device constructed as described possesses advantages in point of simplicity of construction and operation and at the same time is efficient in work and will positively lock the door notwithstanding any little sidewise play to which the door may be subject owing to wear or looseness of fit of the door in its bearing.

While in Figs. 1 to 5, inclusive, I have shown the mechanism which coöperates with the locking-dog as consisting of an arm 21, the rock-shaft 22, the crank-arm 23, and the extension 24 from said crank-arm, yet I do not wish to be understood as restricting myself to that particular combination and arrangement of parts, inasmuch as modifications and variations may be resorted to without departing from the spirit and scope of my invention. For instance, in Fig. 6 I have shown a construction wherein the arm 21 is entirely dispensed with, and in lieu thereof the locking-dog is provided with a rigid projection 27, extending to and connecting with the rock-shaft 22. A coiled spring 28 presses upwardly against this extension and serves to hold the locking-dog normally in engagement with the rack-plate.

I prefer to employ in connection with the door-locking mechanism a means for automatically sounding an alarm whenever the cage leaves a floor or landing and the elevator-attendant has through an oversight omitted to close the door or has only partially closed the same, the alarm continuing until the door is again closed either by the person in charge of the elevator or by some person at the floor or landing. Referring to this mechanism, at each floor or landing is located a make-and-break mechanism, preferably connected to the boxings 13. These make-and-break mechanisms each consist of an insulating-block 29, and at opposite ends of each block are secured contact-strips 30 30. Secured at a medial point to one side face of each insulating-block is a make-and-break arm 31. This arm is of spring material and normally makes contact with the contact-strips 30. The opposite ends of each of these arms project beyond the ends of the insulating-block 29 and have small insulating-blocks 32 32′, respectively, connected thereto. That end of each arm 31 which carries the insulating-block 32 is in position to be contacted with by the crank 23, and that end of said arm 31 which carries the block 32′ is in position to be contacted with by an arm 33, carried by each door of the elevator-shaft.

Referring to the electrical wiring, the letter *a* indicates a wire leading from the binding-screw of one of the upper contact-strips 30 and extending to an alarm-bell 34. Another wire *b* extends from the bell and leads to the binding-screw of one of the contact-strips 30 of the lower make-and-break mechanism. Another wire *c* extends from the binding-screw of the other contact-strip 30 of the upper make-and-break mechanism, and this wire extends to and connects with a wire *d*, leading to the binding-screw of the other strip 30 of the lower make and break. This wire *d* also connects with a battery 35. From the battery 35 extends another wire *e*, which connects with the alarm mechanism. In the operation of this alarm whenever a door is fully closed the arm 33 acts on the end of the contact-arm 31, which carries the insulating-block 32′, and breaks the connection, and consequently the alarm is not sounded. Also whenever the elevator-cage is at a flooring

and a door is opened the alarm is also not sounded by reason of the fact that at this time the strip 12 is acting on the roller 25 and has caused the crank 23 to engage the block 32 at one end of the contact-arm 31, and consequently has broken the circuit. Whenever the elevator-cage leaves a floor, if the elevator-boy fully closes the door the arm 33 will again act on that end of the contact-arm carrying the insulating-block 32′, and thereby break the circuit, and hence prevent the alarm from being sounded. If, however, the elevator-boy should fail to entirely close the door, or should only partially close the door, then the arm 33 does not act on the end of the contact-arm which carries the insulating-block 32′, and as soon as the elevator-cage has traveled sufficiently far from the landing to bring the strip 12 out of engagement with the roller 25 the circuit is left unbroken throughout, and consequently the alarm is sounded and will continue to sound until the elevator-boy again closes the door or the door is closed by some person at the floor or landing.

What I claim as my invention is—

1. In a safety device for elevators, the combination of an elevator-shaft, an opening and closing door at the landing of said shaft, a horizontally-arranged rack extending transversely of the door, and throughout the width, or substantially the width, of said door, a bolt movable toward and from the rack and normally in engagement with any of the teeth of the rack so as to hold the door locked against being further opened whether said door is fully closed or only partially closed, a rock-shaft, an arm extending from the rock-shaft and adapted to actuate the bolt, a crank-arm extending at an angle from the rock-shaft, a device carried by the elevator-cage and movable in a direction substantially parallel to the crank-arm and adapted to contact with the crank-arm, whereby when said contact is made the bolt is withdrawn from engagement with the rack, and means acting to thrust the bolt into engagement with the rack when the device carried by the elevator-cage ceases to act on the crank-arm.

2. In a safety device for elevators, the combination of an elevator-shaft, an opening and closing door at the landing of said shaft, an elevator-cage, a movable locking dog or catch, means for causing said dog to normally engage the door for the purpose of holding the door in a closed or partially-closed position, a crank-arm provided with an adjustable arm extending at an angle therefrom, a connection between the crank-arm and the locking-dog, and mechanism carried by the elevator-cage and adapted to act on the arm extending from the crank-arm, when the cage approaches a landing, so as to disengage the locking-dog and thereby permit of the opening of the door.

3. In a safety device for elevators, the combination of an elevator-shaft, an opening and closing door at the landing of said shaft, a horizontally-arranged rack extending transversely across the bottom of the door, and throughout the width, or substantially the width, of said door, a vertical bolt movable toward and from the rack and normally in engagement with any of the teeth of the rack so as to hold the door locked against being further opened whether said door is fully closed or only partially closed, a rock-shaft, an arm extending from the rock-shaft and adapted to actuate the bolt, a crank-arm extending upwardly at an angle from the rock-shaft, a device carried by the elevator-cage, and movable in a direction substantially parallel to the crank-arm and adapted to contact with the crank-arm, whereby when said contact is made the bolt is withdrawn from engagement with the rack, and means for thrusting the bolt into engagement with the rack when the device carried by the elevator-cage ceases to act on the crank-arm.

4. In a safety device for elevators, the combination of an elevator-shaft, an opening and closing door at the landing of said shaft, an elevator-cage, an electrical circuit, an alarm within the circuit, make-and-break mechanism at the landing of the elevator-shaft and also within the electrical circuit, and consisting of contact-strips and a contact-arm adapted, when contacting with the strips, to complete the electrical circuit, mechanism carried by the opening and closing door and adapted to engage one end of the contact-arm, when the door is closed, and thereby break the circuit, and mechanism carried by the elevator-cage and adapted to engage the opposite end of the contact-arm, when the elevator-cage approaches a landing, thereby breaking the circuit at that time, even though the door is opened, the circuit, however, being completed and the alarm sounded when the elevator-cage leaves the landing and the door is left open or partially open.

5. In a safety device for elevators, the combination of an elevator-shaft, an opening and closing door at the landing of the elevator-shaft, an elevator-cage, a locking dog or catch, means for causing said dog or catch to normally engage the door for the purpose of holding the door in a closed or partially-closed position, an electrical circuit, an alarm within the circuit, make-and-break mechanism at the landing of the elevator-shaft and also within the electrical circuit, and consisting of contact-strips and a contact-arm adapted, when contacting with the strips, to complete the electrical circuit, mechanism carried by the opening and closing door and adapted to engage one end of the contact-arm, when the door is closed, and thereby break the circuit, and mechanism carried by the elevator-cage and adapted to act on the locking-dog, when the cage approaches a landing, so as to disengage said dog and thereby permit of the

opening of the door, and adapted also at this time to engage the opposite end of the contact-arm and thereby break the circuit, even though the door is open, the circuit, however, being completed and the alarm sounded when the elevator-cage leaves the landing and the door is left open or partially open.

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

MURRAY M. HUNTER.

Witnesses:
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ANNA V. FAUST.