900,158.

P. F. FOLEY.

SAFETY MECHANISM FOR ELEVATORS.

APPLICATION FILED FEB. 17, 1905.

Patented Oct. 6, 1908.

3 SHEETS—SHEET 1.

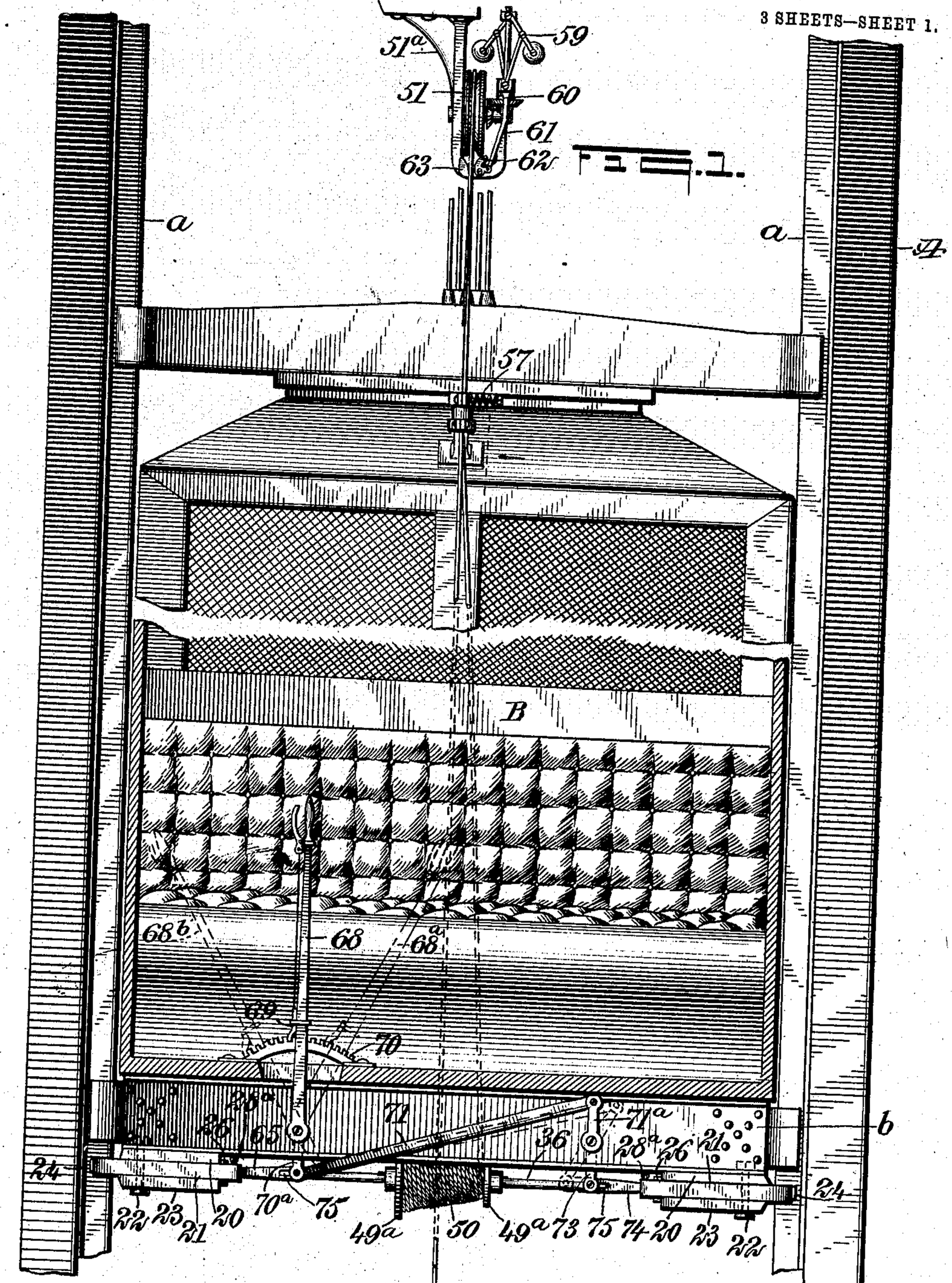

Fig. 1.

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3 SHEETS—SHEET 2.

FIG. 2.

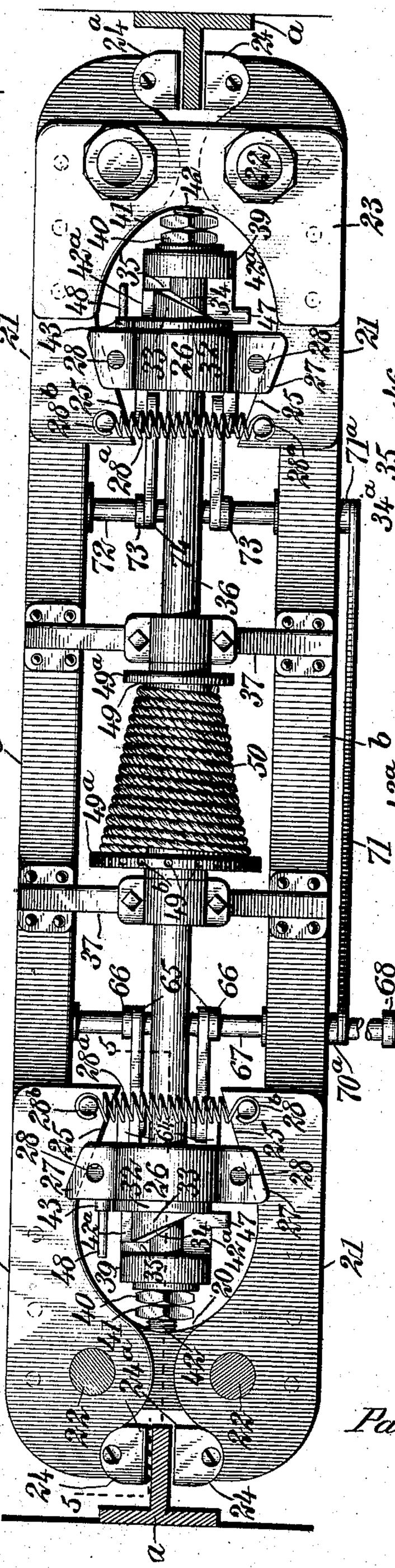

FIG. 3.

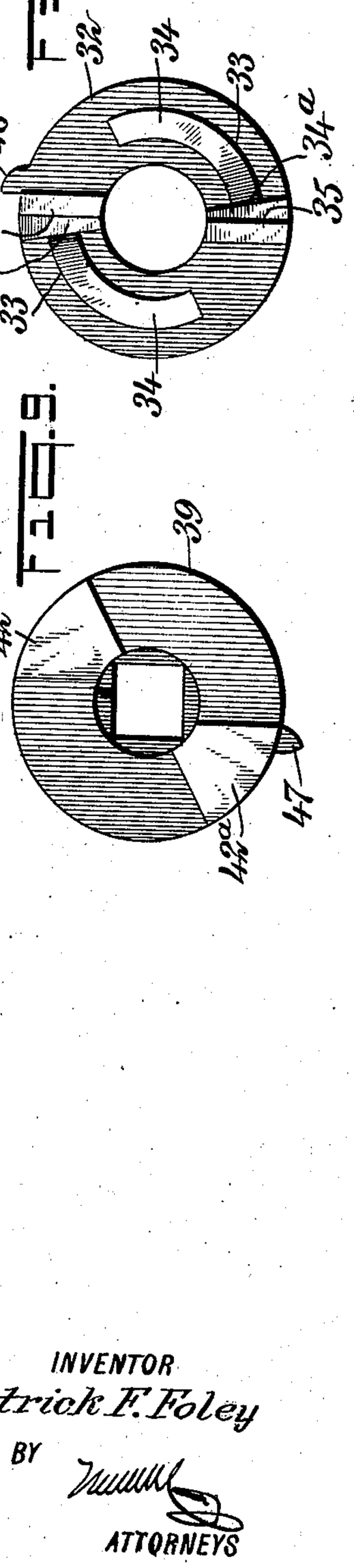

FIG. 10.

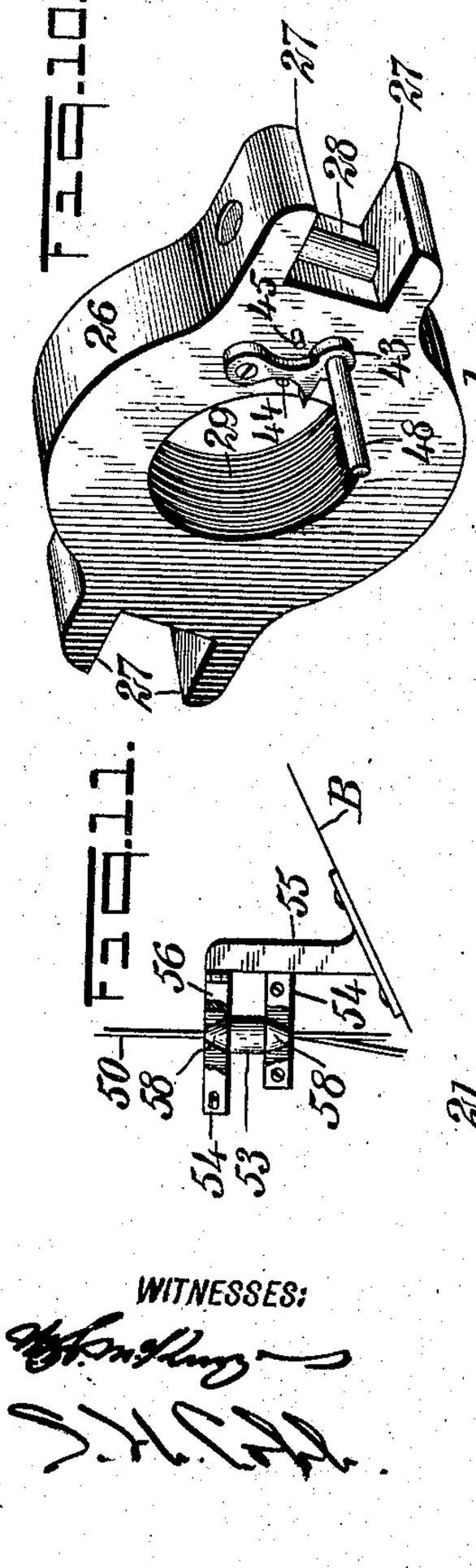

FIG. 9.

FIG. 11.

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3 SHEETS—SHEET 3.

FIG. 3.

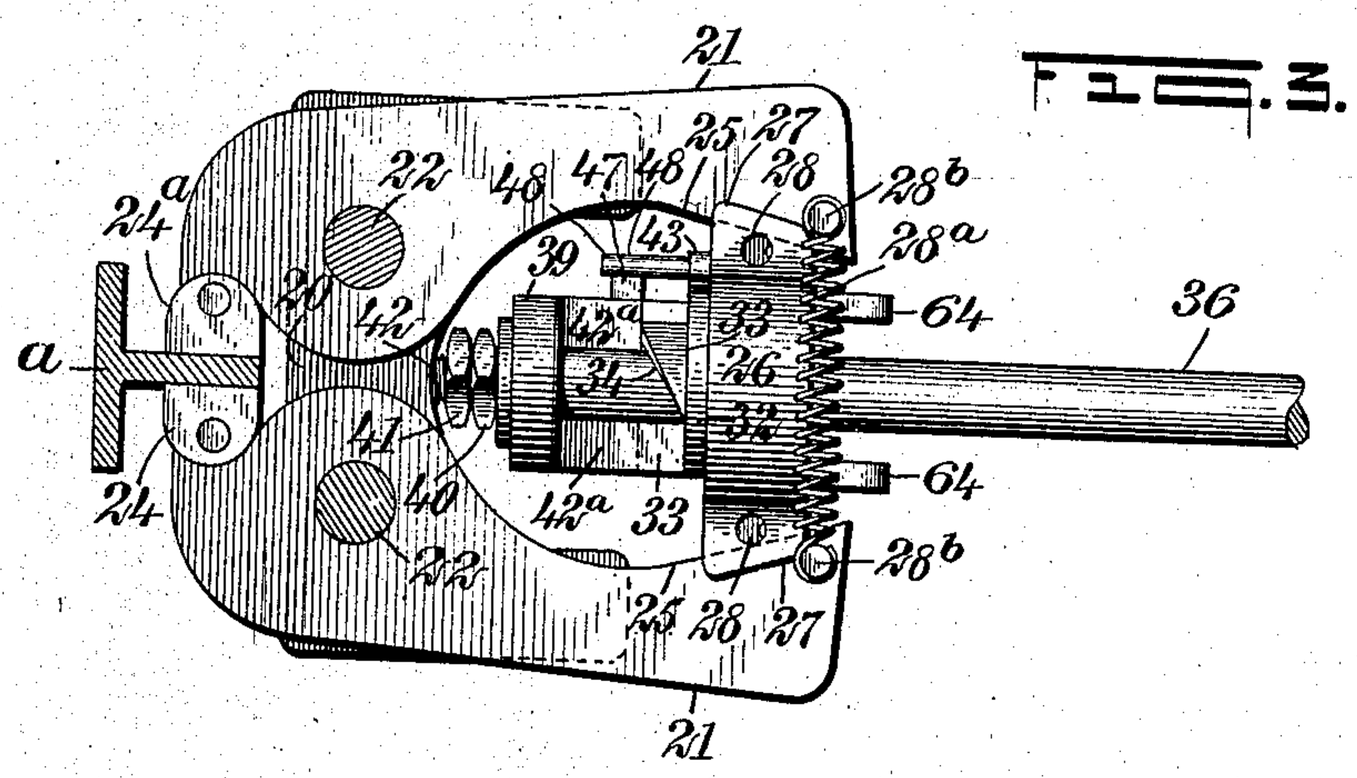


FIG. 4.

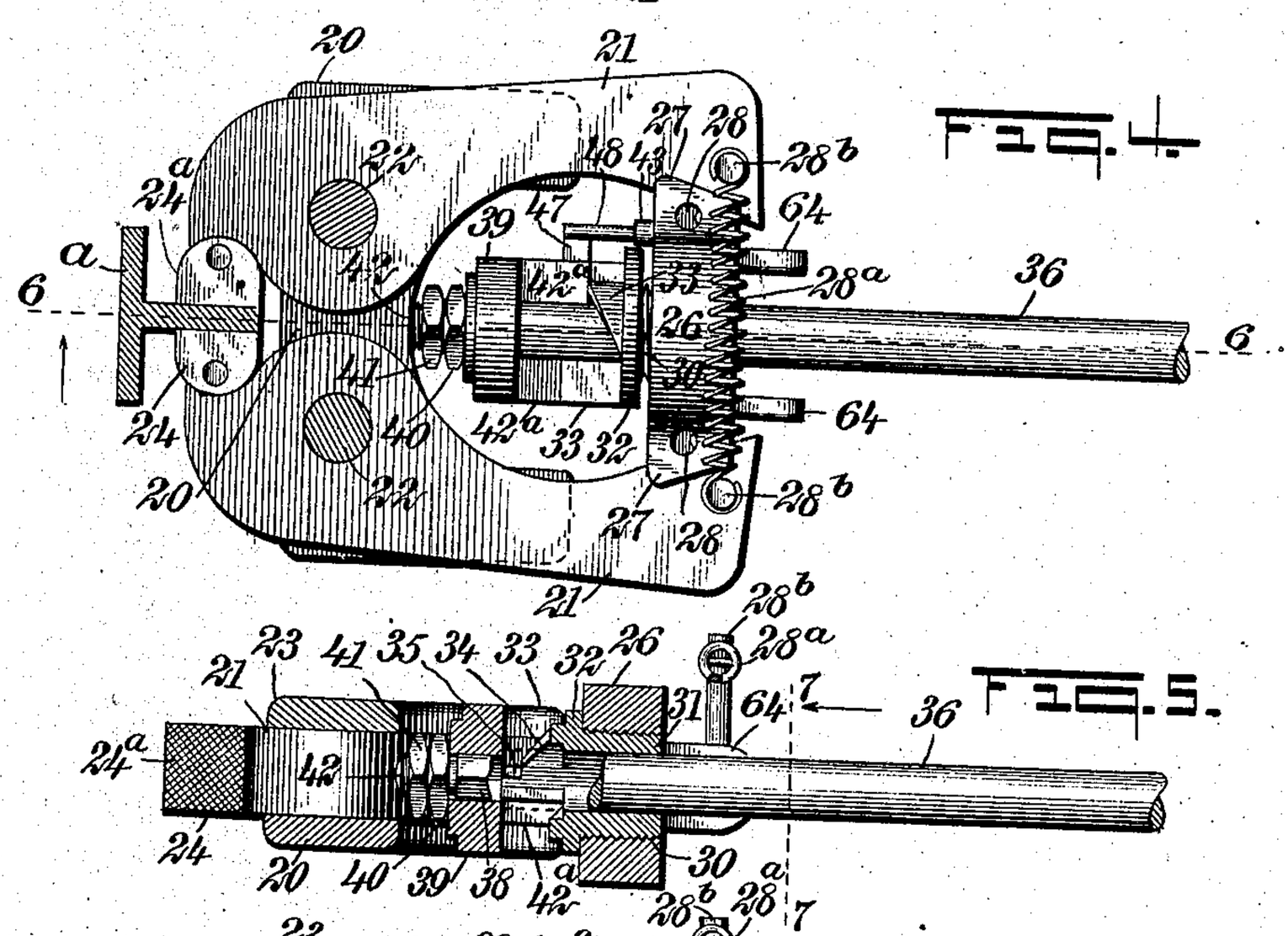


FIG. 5.

FIG. 6.

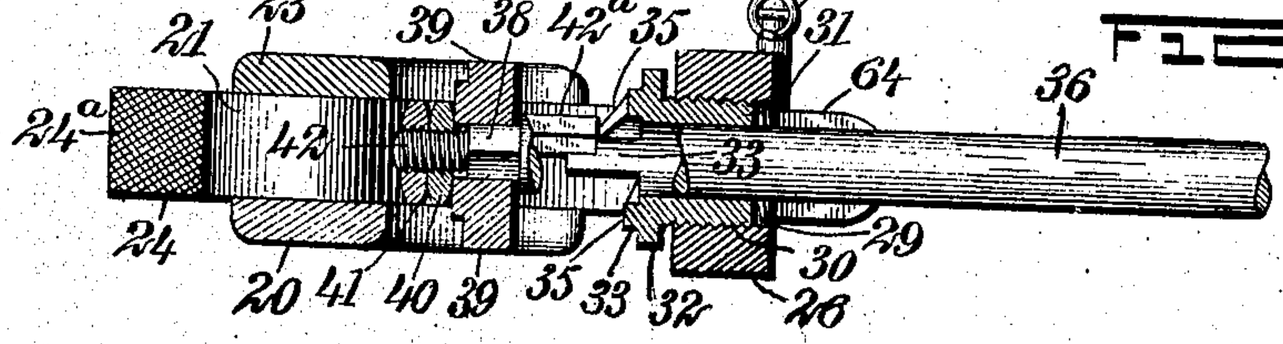
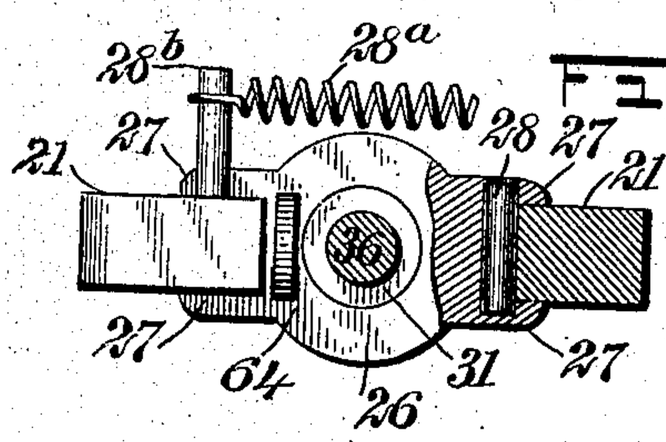


FIG. 7.



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UNITED STATES PATENT OFFICE.

PATRICK F. FOLEY, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CHARLES W. HOFFMAN, OF NEW YORK, N. Y.

SAFETY MECHANISM FOR ELEVATORS.

No. 900,158. Specification of Letters Patent. Patented Oct. 6, 1908.

Application filed February 17, 1905. Serial No. 246,049.

To all whom it may concern:

Be it known that I, PATRICK F. FOLEY, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Safety Mechanism for Elevators, of which the following is a full, clear, and exact description.

My invention relates to mechanisms for arresting the movement of an elevator which has, from any cause, attained an excessive speed. Its principal objects are to provide positive and automatic means for quickly bringing this safety mechanism into position for application and then, by a continuation of this movement, more gradually effecting its engagement, and to enable the mechanism to also be manually operated without interference with its automatic action.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a broken sectional elevation of an elevator-car and a portion of the shaft in which it moves; Fig. 2 is a bottom plan view of the safety mechanism, parts being broken away and the guide-rails being shown in section; Fig. 3 is a similar view of one end of the safety mechanism but with the jaws brought into proximity with the rail; Fig. 4 shows the same elements in the position for effecting engagement; Figs. 5 and 6 are vertical longitudinal sections on the lines 5—5 of Fig. 2 and 6—6 of Fig. 4, respectively; Fig. 7 is a transverse sectional detail on the line 7—7 of Fig. 5; Figs. 8 and 9 show, in end elevation, the coacting portions of the actuating member and the adjacent rotatable member; Fig. 10 is a perspective view of the operating member; and Fig. 11 is a detail in broken side elevation of the stop-button and its more closely associated elements.

Upon the walls of a shaft A are supported the usual vertical guide-rails *a*, *a*, which may also serve as the fixed contact members of the safety mechanism. In this shaft moves a car B operated in any usual or convenient manner and having, across its lower portion, beams *b*, *b* spaced some distance apart. These beams serve to support the more essential elements of my improved mechanism, which is illustrated as substantially duplicated at opposite sides of the car for coöperation with both rails. As these sets of elements are the same, save that their inclined threaded or cam portions may be reversed to secure similar operating movements from a rotatable member common to both, but one will be particularly described. Considering, then, one side of the car, there is attached to the ends of the beams adjacent to the guide-rail a plate 20 cut away at its central portion to avoid interference with the movable portions of the mechanism. Upon this plate is fulcrumed a pair of levers 21, 21, by means of bolts 22, which also support a bottom-plate 23 upon which the levers rest. At the outer end of each lever is a pivoted contact member or jaw 24, the face 24ª, which coöperates with the rail, being shown as roughened to secure more effective engagement. The inner adjacent edges of the levers are inclined at 25, they converging inwardly and furnishing contact surfaces. Between these faces is situated an operating member which comprises a body 26, from opposite sides of which extend pairs of arms 27, 27 overlapping the levers and being supported and guided thereon. Between the arms are lateral recesses in which are rotatably mounted rolls 28 which coact with the contact-faces 25 of the levers and serve to reduce the friction between these elements. The levers may be drawn into contact with these rolls, they being thus held with the jaws separated for a suitable distance from the rail, by a spring 28ª connecting studs 28ᵇ depending from the under side of the levers near their extremities. In the operating member is shown an axial opening, which is threaded at 29, and with this thread coacts a threaded portion 30 of an actuating member or sleeve 31. This sleeve has, at its opposite or outer end, a head 32 overhanging the adjacent face of the operating member and being provided with opposite extensions 33, 33, each of which has an inclined contact or cam-face 34 which is, in effect, a portion of a screw-thread of much greater pitch than that formed upon the sleeve at 30. Each of these cam-faces leads to a face 34ª situated substantially parallel to the head of the sleeve and terminates in a vertical stop-face 35. Through the operating member and sleeve extends an operating shaft 36 mounted to rotate in bearings carried by bars 37, 37 extending between the beams *b*. This shaft projects beyond the sleeve and is squared at 38 to receive a collar 39, which, by its squared engagement, is con-

strained to rotate with the shaft while being permitted longitudinal adjustment thereon. Its position with respect to the outer end of the shaft is fixed by a nut 40, which, with a lock-nut 41, is carried by the threaded end 42 of the shaft. From the inner side of the collar 39 project a pair of separated arms 42ª which coact with the contact-faces of the sleeve.

Pivoted upon the outer face of the operating member is a pawl 43 movable between inner and outer stop-pins 44 and 45 and in its inner position engaging a projection 46 from the periphery of the sleeve-head, this preventing the rotation of the sleeve. To disengage the pawl from the projection and allow the sleeve to rotate, a projection 47 is provided at one side of one of the arms 42ª, and when it revolves with the arm, contacts with a pin 48 extending laterally from the pawl, forcing it outward beyond the projection 46. Fixed upon the shaft 36 near its center is a drum 49, which, in the present instance, is shown as tapered from one end to the other. About this drum, between opposite heads 49ª, is wound an operating cable 50 which has one end attached to the drum and then passes upwardly over a pulley 51 mounted upon a bracket 51ª at the top of the shaft; then downwardly over a pulley 52 rotatable in a bracket 52ª fastened at the bottom of the shaft, and finally upwardly, where its other end is secured to a stop or controlling-button 53 fixed on the cable between the drum and pulley 51 and normally located between arms 54 projecting from a bracket 55 which is shown as mounted upon the top of the car. Coacting with each of the arms 54 is a pivoted arm 56 which is normally held in proximity to the companion arm by a spring 57 carried by the car. The button is preferably provided with inclined ends 58 resting in similarly formed recesses between the arms so that, if the movement of the cable is arrested, the button will force its way between the arms, thus releasing its engagement with the car. Carried by the bracket 51ª is a governor 59 of any convenient type, which is connected to the shaft of the pulley 51 by some such gearing as the bevel-pinion 60. An arm 61 is moved by this governor and is connected to a grip member 62 pivoted upon the bracket, and when the pulley 51 rotates at an abnormal speed, acting, by the movement of the governor, to clamp the operating cable between it and a companion member 63 fixed upon the bracket.

Under rates of travel of the car not much exceeding the normal the grip member 62 will be out of contact with the operating cable and the stop-button held between its coöperating arms will move the cable with the car, this passing over the pulleys at the top and bottom of the shaft without rotating the drum and operating-shaft. At this time the arms of the collar 39 are at the lower ends of the cam-faces upon the sleeve and the pawl is in engagement with the projection 46. This allows the operating member to occupy its extreme outward position, it being held there by the pressure of the lever-inclines under the tension of the connecting spring, which also holds the lever-jaws separated from the guide-rail by such a distance that they are not liable to come into contact with it during the movement of the car. If the car falls or attains an undue velocity the governor acts to grip the operating cable between the members 62 and 63, thus holding it against movement with the car. The operating-button then forces its way between the arms 54 and 56, pressing the latter to one side and permitting the cable to rotate the drum, the direction of its inclination giving it a gradually-decreasing speed. This causes the arms 42ª to ride up the inclines of the actuating-sleeve, which is held against rotation by the pawl and therefore forces both the actuating member and operating member longitudinally of the shaft and the latter against the levers, which are quickly swung sufficiently upon their fulcrums to bring the jaws into close proximity with the rail. This having been accomplished during a comparatively short travel of the car, the arms reach the stop-faces of the sleeve and at this time their projection strikes the pawl-pin, moving it outward and releasing the projection 46. The sleeve is now free to rotate with the arms and this turns it in the operating member, the threaded engagement causing the latter to act as a nut, it moving longitudinally but at a much less speed, thus slowly forcing the lever-arms from one another and the jaws into engagement with the rail. The pressure of the jaws increasing as the car advances gradually brings it to rest. It is also desirable that the operator shall be able to manually stop the car independently of its ordinary starting and stopping mechanism in event of its becoming uncontrollable. For this purpose each operating member has projections 64, here shown as two in number and situated upon its inner face at each side of the shaft. To these projections, at one side of the car, are articulated links 65 which, at their inner ends, are pivoted to arms 66 depending from a rock-shaft 67 which is shown as journaled in the beams *b*. Upon one end of the rock-shaft is a lever 68 projecting through the car-floor and having latch mechanism 69 by means of which it may be locked in position by engagement with a toothed sector 70. An arm 70ª on the shaft 67 is connected by a link 71 to an arm 71ª fixed upon a rock-shaft 72 at the opposite side of the car, and this shaft 72 also has fixed upon it and depending beneath the beams, similarly to the arms 66, rock-arms 73 which are

joined by links 74 to the projections 64 from the operating member at this side of the car. It is quite essential that the movement of the hand-lever shall in no wise interfere with the automatic operation of the safety mechanism, and to avoid this a slotted connection is provided between the elements at each side of the car. As illustrated, these slots 75 are formed in the links 65 and 74, where they are articulated to the rock-arms 66 and 73. The thrust of the lever in the manual application of the safety mechanism comes against the inner ends of the slots, thus leaving the links perfectly free to move independently of the automatic mechanism.

Normally the hand-lever would occupy the position indicated in dotted lines at 68^a in Fig. 1 of the drawings. In application the operator would swing the lever outwardly, and when it reaches a position substantially that shown in full lines the jaws will have been moved into close proximity with the rails, and upon a further outward movement of the lever toward the position indicated in dotted lines at 68^b they will be brought into operative engagement with said rails to check the movement of the car. Because of the slot-connection between the elements just described, if the efforts of the operator to stop or control the car are ineffective and it attains an excessive speed, the safety mechanism will still be free to work independently. After the jaws have been automatically set upon the rails to stop the car, they may be again released by inserting a suitable rod in openings 49^b in the periphery of the larger of the heads 49^a. A comparatively slight angular movement of the shaft 36 frees the ends of the arms 42^a from the face 34^a, when the clutch of the jaws is at once slackened. Then, as the arms run down the cam-faces 34, it is a very easy matter to continue the rotation of the drum until the parts assume their normal positions.

It will be seen that with my improved mechanism the contact-jaws will be brought from a position properly removed from the guide-rails for the ordinary operation of the car into close proximity with them by a positive and comparatively simple mechanical movement without the aid of such uncertain factors as springs, compressed air or electromagnets; and then, by a direct continuation of this movement, will be gradually applied with a force sufficient to automatically stop the car after a relatively brief advance for any load which can be lifted, and that manual control is provided for without interference with the automatic operation.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, and means for moving the operating member quickly and then more slowly, to effect engagement of the car contact member and fixed contact member, comprising a normally engaged sleeve and releasing devices therefor, permitting the sleeve to rotate in and move longitudinally with the operating member.

2. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, and a longitudinally movable and rotatable actuating member associated with the operating member.

3. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, and a longitudinally movable and rotatable actuating member having threaded engagement with the operating member.

4. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, a longitudinally movable and rotatable actuating member associated with the operating member, and means for retaining the actuating member against rotation during its longitudinal movement.

5. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, a longitudinally movable and rotatable actuating member associated with the operating member, and rotatable means for effecting both the longitudinal and rotatable movements of the actuating member.

6. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, a longitudinally movable and rotatable actuating member associated with the operating member, a pawl and coacting projection carried by the operating and actuating members, and means for disengaging the pawl.

7. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, an operating member for the car contact member, a longitudinally movable and rotatable actuating member associated with the operating member and being provided with a projection, and a pawl pivoted upon the operating member and which may engage the actuating member projection.

8. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, a shaft journaled upon the car, an operating member surrounding the shaft and coacting with

the car contact member, an actuating member having threaded engagement with the operating member and being provided with an inclined face, and a member rotatable with the shaft and coacting with the inclined face.

9. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, a shaft journaled upon the car, an operating member surrounding the shaft and coacting with the car contact member, an actuating member having threaded engagement with the operating member and being provided with a cam-face and a stop-face, and a member rotatable with the shaft and coacting with the faces of the actuating member.

10. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, a shaft journaled upon the car, an operating member surrounding the shaft and coacting with the car contact member, an actuating member having threaded engagement with the operating member and being provided with a cam-face and a stop-face and with a projection, a pawl pivoted upon the operating member and which may engage the projection, and a member rotatable with the shaft and coacting with the faces of the actuating member and having a portion for engagement with the pawl.

11. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, a shaft journaled upon the car, an operating member surrounding the shaft and coacting with the car contact member, an actuating member having threaded engagement with the operating member and being provided with an inclined face, a member rotatable with the shaft and coacting with the inclined face, and means for effecting an adjustment of the last-named member upon the shaft.

12. The combination with an elevator-car and a fixed contact member, of levers pivoted upon the car and extending upon opposite sides of the contact member, a shaft extending in proximity with the levers, means for rotating the shaft, an operating member associated with the levers and having a threaded portion, a sleeve surrounding the shaft and being provided with a thread engaging that of the operating member and with contact-faces, and a collar rotatable with the shaft and having an arm coöperating with the sleeve contact-faces.

13. The combination with an elevator-car and a fixed contact member, of levers pivoted upon the car and extending upon opposite sides of the contact member, a shaft extending in proximity with the levers, means for rotating the shaft, an operating member associated with the levers and having a threaded portion, a sleeve surrounding the shaft and being provided with a thread engaging that of the operating member and with cam and stop-faces, and a collar rotatable with the shaft and having an arm coöperating with the sleeve cam and stop-faces.

14. The combination with an elevator-car and a fixed contact member, of levers pivoted upon the car and extending upon opposite sides of the contact member, a shaft extending in proximity with the levers, means for rotating the shaft, an operating member associated with the levers and having a threaded portion, a sleeve surrounding the shaft and being provided with a thread engaging that of the operating member and with contact-faces, a pawl mounted upon the sleeve and which may engage the operating member, and a collar rotatable with the shaft and having an arm coöperating with the sleeve contact-faces, said arm having a projection which may coact with the pawl.

15. The combination with an elevator-car and a fixed contact member, of levers pivoted upon the car and extending upon opposite sides of the contact member, a shaft extending in proximity with the levers, means for rotating the shaft, an operating member associated with the levers and having a threaded portion, a sleeve surrounding the shaft and being provided with a thread engaging that of the operating member and with contact-faces, and a collar rotatable with the shaft and being longitudinally movable thereon and having an arm coöperating with the sleeve contact-faces.

16. The combination with an elevator-car and a fixed contact member, of a movable contact member carried by the car, a shaft journaled upon the car, a tapered drum fixed upon the shaft and operating cables surrounding the drum, and means for moving the car contact member actuated by the shaft at a varying speed, a portion of which variation is secured by the taper of the drum, said means comprising a normally engaged sleeve and releasing devices therefor permitting the sleeve to rotate in and move longitudinally with the operating member.

17. The combination with an elevator-car and a fixed contact member, of levers pivoted upon the car and extending upon opposite sides of the contact member, automatically movable means for operating the levers, a link pivoted to the operating means, and an operating lever fulcrumed upon the car and being connected with the link, the link having a slotted connection with the elements it joins.

18. An elevator car, a clamping device therefor, and a differential screw having a high pitch thread and a low pitch thread for actuating the clamping device.

19. An elevator car, a clamping device

therefor, a high pitch screw and a low pitch screw, said screws arranged to actuate the clamping device.

20. An elevator car, a clamping device therefor, a high pitch screw arranged to move the clamping device quickly and a low pitch screw arranged to tighten the clamping device.

21. In a safety device for elevators, the combination of a car, guides for the car, a clamping device for the car, a high pitch screw arranged to move the clamping device against the guides, and a low pitch screw arranged to tighten the clamping device on the guides.

22. In a safety device for elevators, the combination of a car, guides over which the car is adapted to run, a clamping device on the car, and a differential screw having a high pitch thread and a low pitch thread, said screw arranged to move the clamping device quickly against the guides and then to tighten it on the guides.

23. In a safety device for elevators, the combination of a car, guides over which the car is adapted to run, a clamping device on the car, and a differential screw having a high pitch screw and a low pitch screw, said screw arranged to move the clamping device quickly against the guides and then to tighten it on the guides more slowly and with greater force.

24. In a safety device for elevators, the combination of a car, guides over which the car is adapted to run, a clamping device on the car, a high pitch screw arranged to move the clamping device against the guides, a low pitch screw arranged to tighten the clamping device on the guides, and means for actuating the screws.

25. In a safety device for elevators the combination of a car, guides over which the car is adapted to run, a clamping device on the car, a high pitch screw arranged to move the clamping device against the guides, a low pitch screw arranged to tighten the clamping device on the guides, and means for actuating the screws by the motion of the car.

26. In a safety device for elevators, the combination of a car, guides over which the car is adapted to run, a clamping device on the car, a high pitch screw arranged to move the clamping device against the guides, a low pitch screw arranged to tighten the clamping device on the guides, means for actuating the screws by the motion of the car, and additional means for actuating the screws by hand.

27. In a safety device for elevators, the combination of a car, guides over which the car is adapted to run, a clamping device on the car, a high pitch screw arranged to move the clamping device against the guides, a low pitch screw arranged to tighten the clamping device on the guides, and means for actuating the screws by the motion of the car when the car speed reaches a predetermined limit.

28. The combination with an elevator car, guides over which the car is adapted to move, a clamping device on the car, a high pitch screw arranged to move the clamping device against the guides, a low pitch screw arranged to tighten the clamping device on the guides, and a governor connected to be run by the car and arranged to actuate the screws when the speed of the car reaches a predetermined limit.

29. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage with the guides, right and left hand differential screws each having a high pitch thread and a low pitch thread, arranged to operate the clamping devices.

30. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage with the guides, right and left hand differential screws each having a high pitch thread and a low pitch thread, arranged to move the clamping devices quickly against the guides and to tighten the clamping devices on the guides.

31. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage the guides, right and left hand screws arranged to move the clamping devices quickly against the guides, and right and left hand screws of low pitch arranged to tighten the clamping devices on the guides.

32. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage the guides, right and left hand screws arranged to move the clamping devices quickly against the guides, right and left hand screws of low pitch arranged to tighten the clamping devices on the guides, and means for actuating the screws.

33. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage the guides, right and left hand screws arranged to move the clamping devices quickly against the guides, right and left hand screws of low pitch arranged to tighten the clamping devices on the guides, and a governor arranged to actuate the screws when the speed of the car reaches a predetermined limit.

34. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage the guides, right and left hand screws arranged to move the clamping devices quickly against the guides, right and left hand screws of low pitch arranged to tighten the clamping devices on the guides, a governor arranged to actuate the screws when the speed of the car reaches a predetermined limit, and means for actuating the screws by hand.

35. In an elevator safety device, the combination of a car, guides therefor, clamping devices adapted to engage the guides, right and left hand screws arranged to move the clamping devices quickly against the guides, right and left hand screws of low pitch arranged to tighten the clamping devices on the guides, and means for actuating the screws by the movement of the car.

36. In an elevator safety device, the combination with hoistway rails, of friction members adapted to engage said rails, a shaft having portions provided with threads of the same kind or direction but of different pitch, means connecting said threaded portions to said friction members, and means for automatically rotating the shaft.

37. In a safety device for elevators, the combination with hoistway rails, of friction members adapted to engage said rails, a shaft having differentially threaded portions, means connecting said threaded portions to the said friction members, and means for automatically rotating the shaft.

38. In an elevator safety device, hoistway rails, friction members adapted to engage said rails, and a differential screw to operate said members.

39. In an elevator safety device, hoistway rails, gripping jaws adapted to bite against opposite sides of said rails, and a differential screw for operating said jaws.

40. In an elevator safety device, rigid rails for the hoistway, gripping jaws adapted to be mounted on a car and engage said rails, and a differential screw to operate said jaws.

41. In a safety device for elevators, the combination with hoistway rails, of gripping jaws adapted to engage said rails, a differential screw to operate said gripping jaws, and means for automatically operating said screw.

42. In a safety device for elevators, a brake to stop the car, longitudinally operating means for operating the brake, and positive means for actuating said longitudinally operating means at different speeds to first cause the brake to operate quickly and then slower and more powerfully.

43. In a safety device for elevators, a brake, a longitudinally operating member to operate said brake, a drum, and positive means actuated by the drum to first give the brake actuating member a quick initial movement and then a slower and more powerful movement to stop the car.

44. In a safety device for elevators, a brake to stop the car, longitudinally operating means for operating the brake, means for actuating said longitudinally operating means at different speeds to first cause the brake to operate quickly and then slower and more powerfully, and a drum, said actuating means being controlled by the drum.

45. In a safety device for elevators, a brake to stop the car, means for operating the brake, means for automatically actuating said means at different speeds to first cause the brake to operate quickly and then slower and more powerfully, and means for actuating the brake by hand.

46. In a safety device for elevators, a brake, a member to operate said brake, a drum, means actuated by the drum to first give the actuating member a quick initial movement and then a slower and more powerful movement to stop the car, and means for operating the actuating member by hand.

47. In a safety device for elevators, the combination of a brake, a brake actuating member, rotatable means to actuate the brake actuating member, said rotatable means being adapted to first give a quick initial movement to the brake actuating member and then a slower and more powerful movement.

48. In a safety device for elevators, the combination of a brake, a brake actuating member, rotatable means to actuate the brake actuating member, said rotatable means being adapted to first give a quick initial movement to the brake actuating member and then a slower and more powerful movement, and means for operating the brake by hand.

49. In a safety device for elevators, a braking device therefor, and rotatable means having different surfaces for actuating the braking device, one surface being adapted to give a quick initial movement to the braking device and another surface being adapted to give a slower and more powerful movement to the braking device.

50. In a safety device for elevators, a braking device therefor, rotatable means having different surfaces for actuating the braking device, one surface being adapted to give a quick initial movement to the braking device and another surface being adapted to give a slower and more powerful movement to the braking device, and means for automatically actuating the braking device.

51. In a safety device for elevators, a braking device therefor, rotatable means having different surfaces for actuating the braking device, one surface being adapted to give a quick initial movement to the braking device and another surface being adapted to give a slower and more powerful movement to the braking device and means for operating the braking device by hand.

52. In a safety device for elevators, a braking device therefor, rotatable means having different surfaces for actuating the braking device one surface being adapted to give a quick initial movement to the braking device and another surface being adapted to give a slower and more powerful movement to the braking device, and a drum for controlling the action of the rotatable means.

53. In a safety device for elevators, the combination of a car, guides for the car, a clamping device for the car, rotatable means for positively moving the clamping device quickly to the guides, and additional rotatable means for tightening the clamping device on the guides.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PATRICK F. FOLEY.

Witnesses:

JNO. M. RITTER,

SYLVANUS H. COBB.