(No Model.) 3 Sheets—Sheet 1.

J. P. RUNKEL.

DEVICE FOR OPENING OR CLOSING DOORS OF ELEVATOR WELLS.

No. 540,406. Patented June 4, 1895.

Fig. 1.

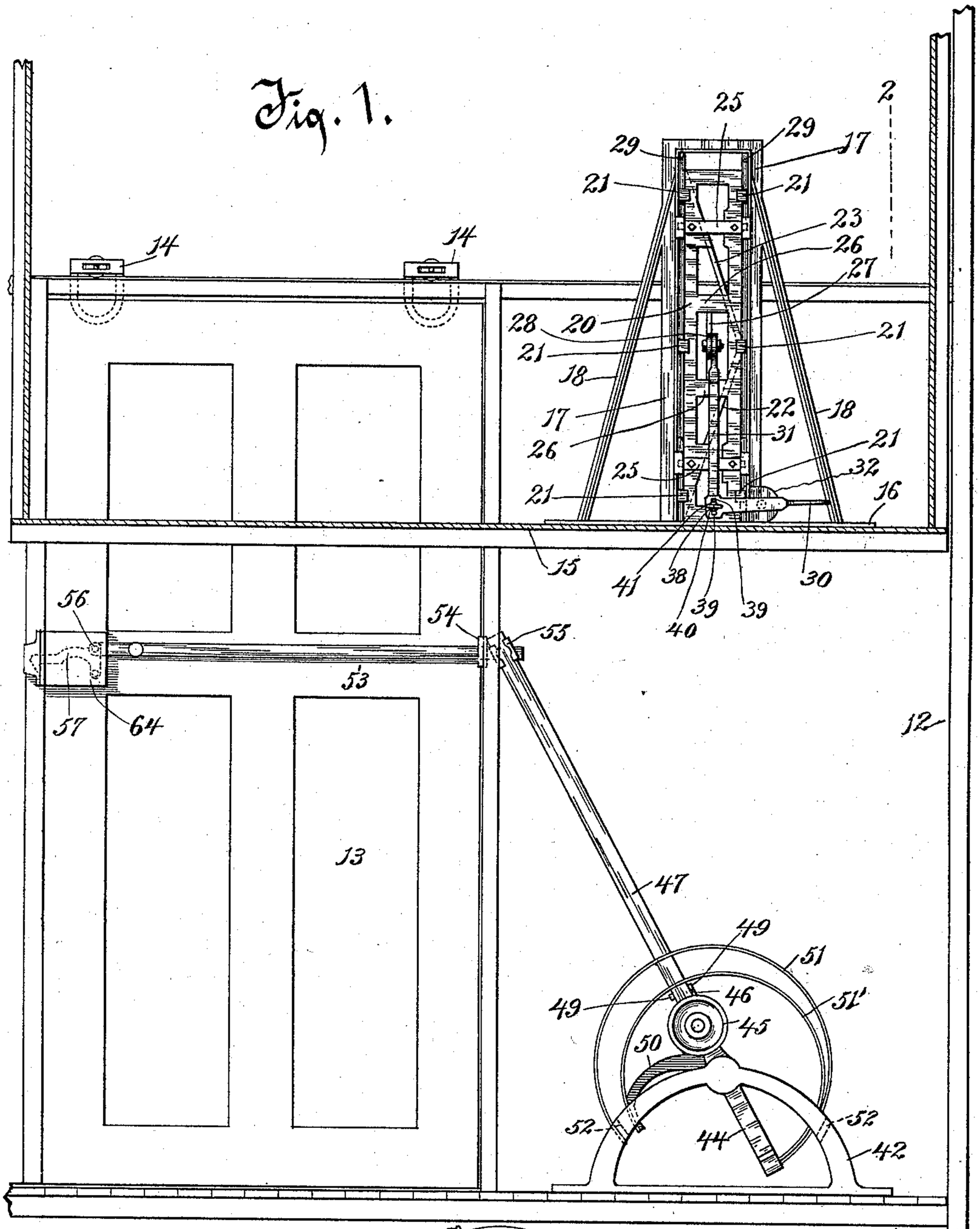
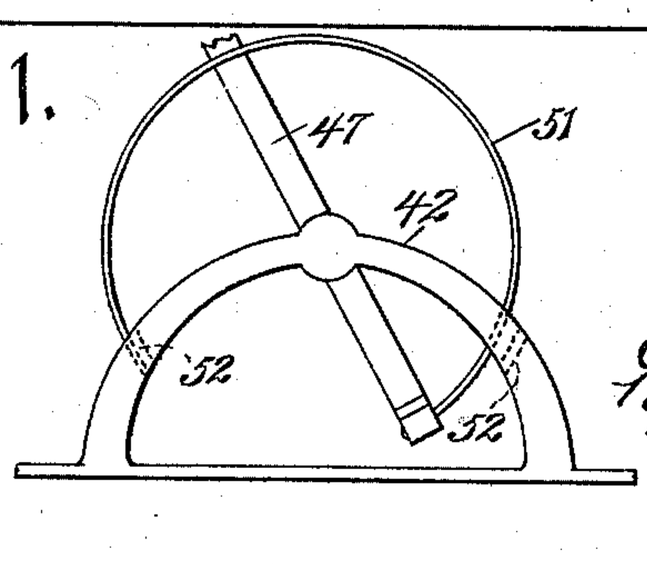


Fig. 11.



Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

J. P. RUNKEL.

DEVICE FOR OPENING OR CLOSING DOORS OF ELEVATOR WELLS.

No. 540,406. Patented June 4, 1895.

Fig. 2.

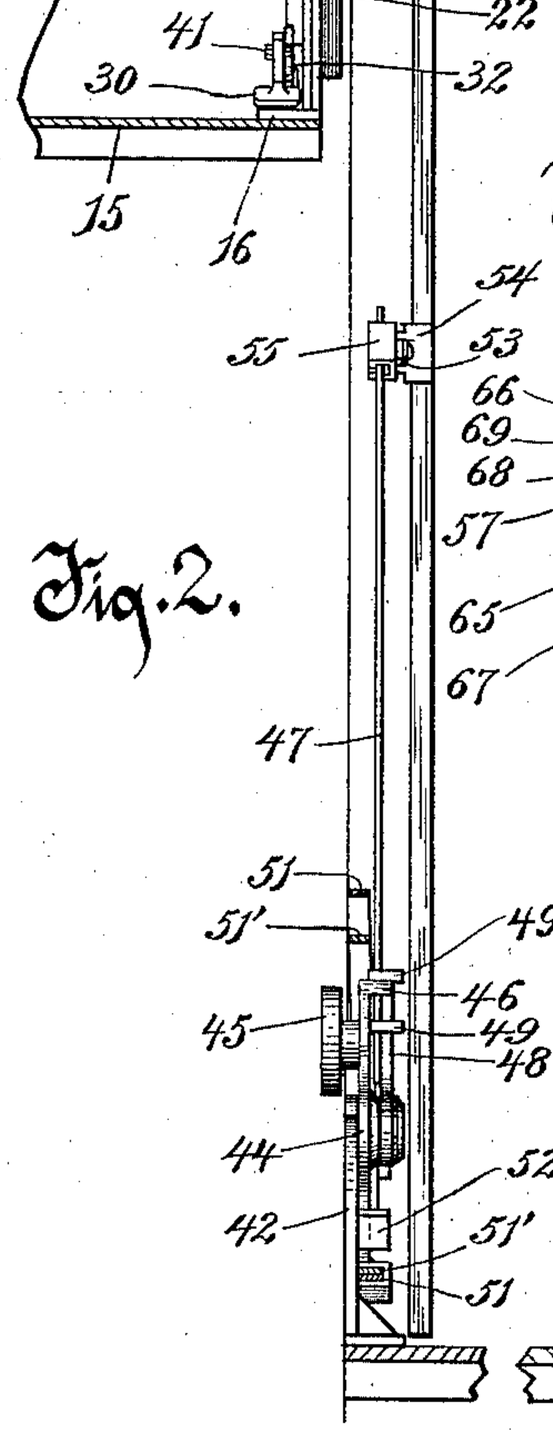


Fig. 3.

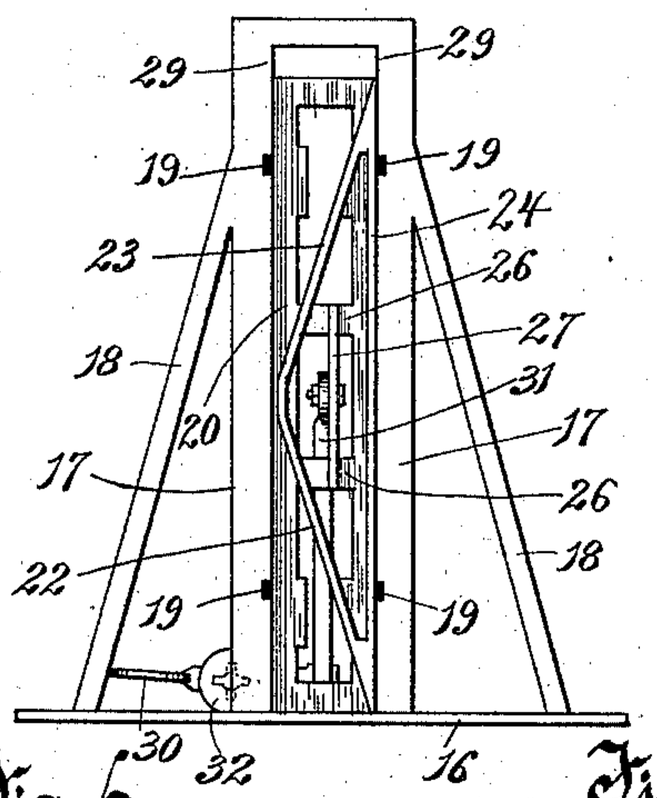


Fig. 4.

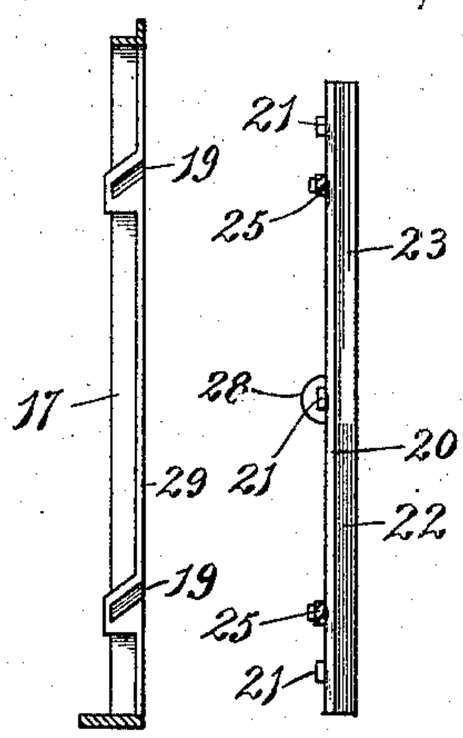


Fig. 5.

Fig. 6.

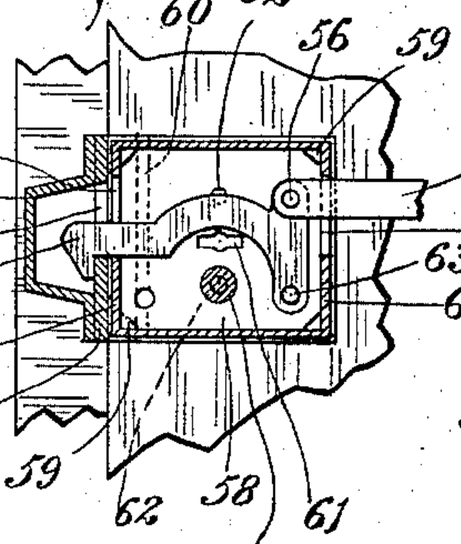


Fig. 7.

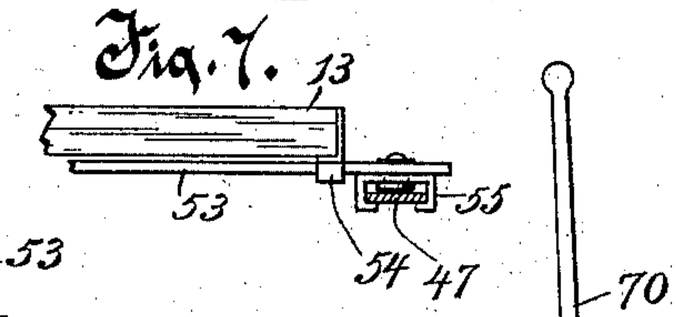


Fig. 8.

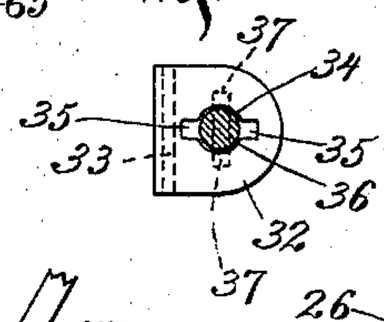


Fig. 9.

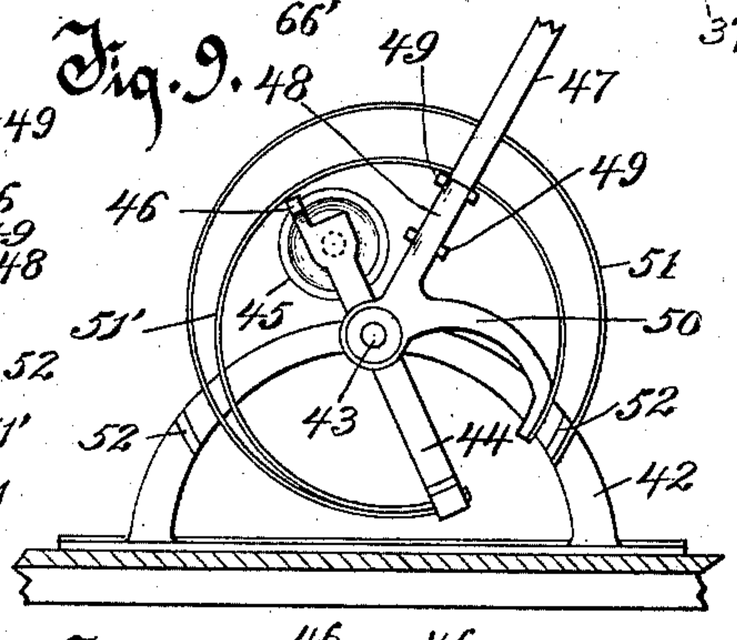


Fig. 10.

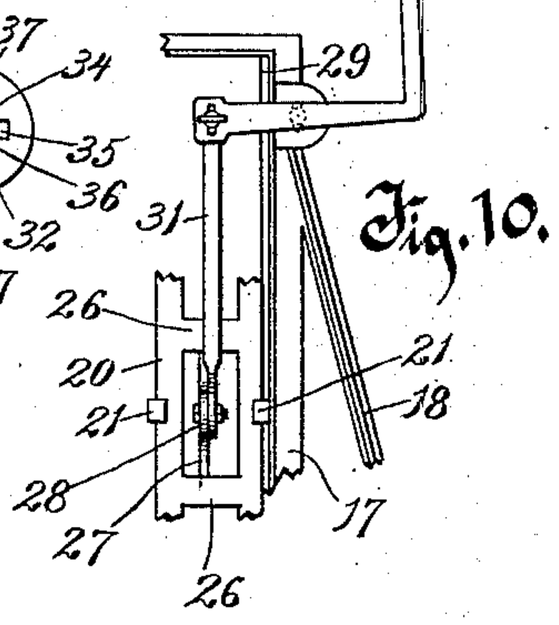
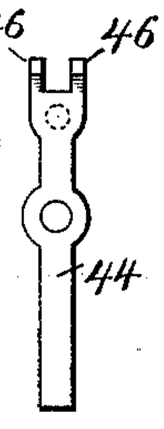


Fig. 12.



Witnesses.

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(No Model.) 3 Sheets—Sheet 3.

J. P. RUNKEL.

DEVICE FOR OPENING OR CLOSING DOORS OF ELEVATOR WELLS.

No. 540,406. Patented June 4, 1895.

Fig. 13.

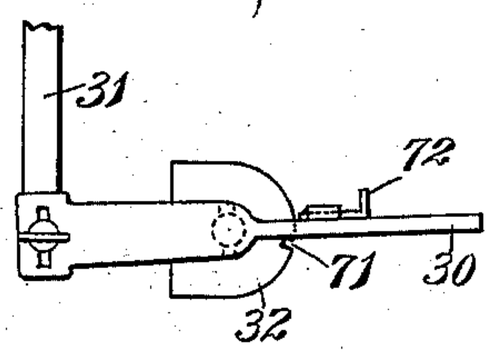


Fig. 14.

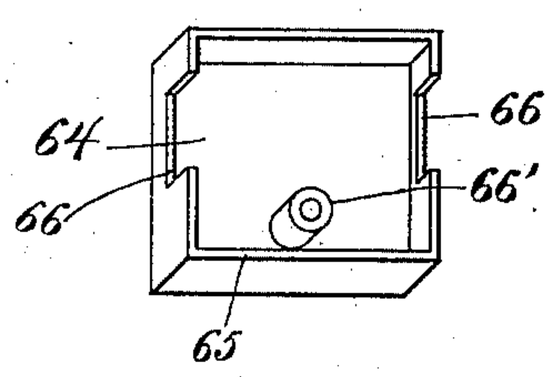


Fig. 15.

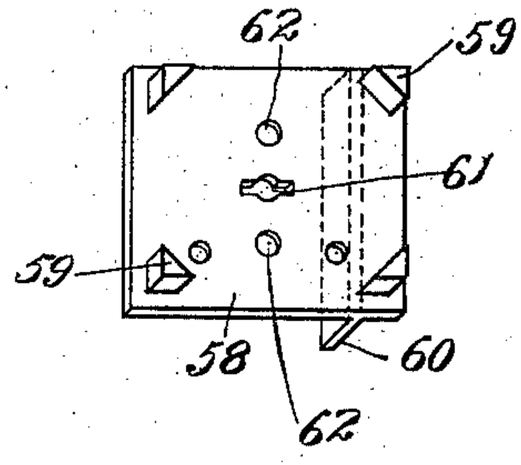
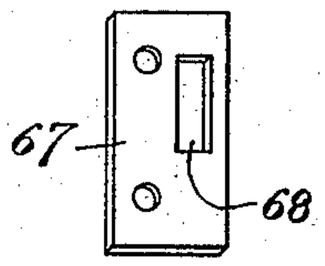


Fig. 16.



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UNITED STATES PATENT OFFICE.

JOHN P. RUNKEL, OF MILWAUKEE, WISCONSIN.

DEVICE FOR OPENING OR CLOSING DOORS OF ELEVATOR-WELLS.

SPECIFICATION forming part of Letters Patent No. 540,406, dated June 4, 1895.

Application filed December 26, 1894. Serial No. 532,904. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. RUNKEL, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Devices for Opening or Closing the Doors of Elevator-Wells, 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 devices for opening and closing the doors of elevator wells.

The primary object of the device is to provide improved means whereby, as the elevator cage travels up and down in its well, the doors in the different stories of the building leading to the well may be opened and closed.

Secondarily, the invention comprehends as objects, first, the provision of improved means whereby the door when closed is automatically locked, and when necessary to be opened is automatically unlocked; secondly, the provision of improved safety mechanism as will hereinafter more fully appear, and, thirdly, a construction whereby the mechanism is adaptable for opening and closing any elevator well door, no matter in what direction said door is required to be opened or closed.

With the above objects, and others, in view the invention consists of the devices and parts, or their equivalents, as hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view through a fragment of the elevator-cage between upright posts or pillars, showing an elevation of the inner side of the door of the elevator-well in connection with the means for operating said door. Fig. 2 is a transverse section of Fig. 1 on the line 2 2 of said figure, the springs being also sectioned to disclose parts which would otherwise be obscured and the foot-treadle shown as depressed. Fig. 3 is an elevation of the outer side of the mechanism carried by the elevator-cage which engages the door-operating mechanism. Fig. 4 is a central vertical section of the frame shown in Fig. 3. Fig. 5 is an edge view of the part movable in the frame. Fig. 6 is a section through the latch-casing. Fig. 7 is a detail plan view showing the connection between the door-operating lever and the sliding bar, the upper end of the lever being in section. Fig. 8 is a detail of the pivot connection for the operating treadle or lever, the pivot-pin being shown in section. Fig. 9 is an elevation of the opposite side to that shown in Fig. 1 of the door-operating mechanism, showing the safety-lever as having been moved but the door-lever as yet unaffected by the spring connected thereto. Fig. 10 is a view of a portion of the mechanism carried by the elevator-cage for engaging the door-operating mechanism, showing the modification wherein a hand-lever is employed instead of the foot-operated treadle. Fig. 11 is a detail of a modification, showing a construction only adapted for closing the doors of elevator-wells. Fig. 12 is a detail of the safety-lever as first cast with two of the lugs 46. Fig. 13 is a detail view of the operating-treadle and allied parts, showing the means for retaining the said treadle in adjusted position. Fig. 14 is an inverted perspective view of the cover of the latch-casing. Fig. 15 is a perspective view of the plate 58, showing said plate turned from the position illustrated in Fig. 6 to adapt it to be applied to the edge of the elevator-well door opposite to the edge shown in Fig. 6; and Fig. 16 is a detail view of the plate 67.

Like numerals of reference denote like parts throughout the several views.

Referring to the drawings the numeral 12 indicates one of the upright pillars or posts of an elevator well, and 13 one of the doors of said well. This door is shown as suspended by the usual hangers 14, 14, and is adapted to slide laterally in grooves or ways therefor.

The numeral 15 indicates an elevator cage, upon the floor of which, in a convenient position, is supported the mechanism for engaging the door operating mechanism. The non-movable portion of this mechanism consists of a frame, which is composed of a base piece 16, a rectangular portion 17 extending upwardly from the base, and inclined braces 18, 18 connecting the upper ends of the side pieces of the rectangular frame with the base. The inner face of each side piece of the rectangular portion 17 is provided near upper and lower ends with grooves 19, which are inclined from the rear upwardly to the outer edges of the side pieces, the recesses having open outer ends.

The movable portion of the mechanism carried by the elevator cage, consists of a rectangular frame 20 which fits within the space of the rectangular portion 17 of the non-movable part, being slightly less in length than the said space. The back of the frame is provided with a series of projecting edge lugs 21, while the front thereof is provided with a forwardly-projecting rib, having a lower portion 22 inclined in one direction, and an upper portion 23 inclined in an opposite direction, the ends of the respective inclines extending to and merging into a forwardly-extending side brace 24.

Secured to the rear side of the frame 20, near the upper and lower ends thereof are cross bars 25, 25, provided with projecting ends or tenons which fit in the grooves 19. The frame 20 is cast with transverse ribs 26, 26, and with a connecting arm 27, having projecting rearwardly therefrom, a lug or ear 28. The frame 20 has a limited upward and forward movement in the rectangular portion 17 of the rigid frame, the projecting ends or tenons of the cross bars 25, 25 working in the upwardly inclined grooves 19. The forward movement is limited by means of the edge lugs 21 contacting with inwardly-projecting flanges 29, 29 of the frame 17. The movement is imparted to the frame 20 by means of a fulcrumed operating-treadle 30, which has its inner end connected up to the lug or ear 28 by means of a link 31. The fulcrum point of the treadle consists of a plate 32 (shown in detail Fig. 8) which is provided with a flange 33 projecting at right angles from near one end thereof. This flange is adapted to fit against and to be secured to the side of frame 17. The treadle is pivoted to the plate by means of a peculiar pivotal connection, to form which said plate is provided with a central circular opening 34, which has branching therefrom, at diametrically opposite points, elongated extensions 35, 35. The treadle is provided with a pivot stud 36 which has a cross strip 37 at its end, said cross strip projecting beyond the edges of the stud. In order to connect the parts, the cross strip is brought into register with, and passed through, the elongated slots 35, 35 and then a turn is given, so that said cross strip is brought out of register with the slots and bears against the face of the treadle. The treadle, therefore, is free to turn on the stud, and is prevented from being disengaged therefrom so long as the extended ends of the cross strip are out of register with the straight slots 35. A similar connection is made between the inner end of the treadle and the lower end of the link 31, the inner end of the treadle being provided with a circular opening 38, having the elongated branching slots 39, 39 extending from diametrically opposite points thereof. The lower end of the link is provided with a stud 40 having the cross strip 41. The connection is shown clearly in Fig. 1. If desired, the upper end of the link may be similarly connected, and in fact this form of pivot may be employed throughout wherever pivotal points are used.

Secured to each floor of the building, in proximity to, and to one side of, the door of the elevator well is a frame 42, preferably of the form of the segment of a circle. Pivoted centrally to the highest point of the circle, upon a stud 43, is a lever 44, having journaled at its upper end, upon one side, an anti-friction roller 45. At one edge, the upper extremity of the lever is provided with a lug 46 projecting forwardly at right angles thereto, as clearly shown in Fig. 9.

The numeral 47 indicates the door operating lever. The lower end instead of being an integral part of this lever is preferably a casting 48, which is provided with the edge lugs 49 projecting both ways beyond the casting. The lower end of the lever proper is passed between these lugs, and is secured to the casting. The lower end of the casting turns upon the stud 43, and is located thereon in front of the lever 44. The casting also has projecting therefrom an integral arm 50.

The ends of flat curved springs 51, 51′ are secured to the lower end of lever 44. The opposite end of the outer spring 51 is secured to a lug 52, while the opposite end of the inner spring 51′ is secured to the end of arm 50.

The numeral 53 indicates a bar which extends transversely across the inner side of the door, one end of said bar passing through a keeper 54 projecting from the frame of the door opening, and provided with a swiveled sleeve 55, which receives freely the upper end of lever 47. The opposite end of the transverse bar 53 is pivotally connected at the point 56 to a latch 57. The latch is arranged within a latch casing. This casing consists of two sections, one section 58 consisting of a plate secured to the door 13 and provided upon one side with rearwardly-projecting corner lugs 59, and upon its opposite side, near one end, with a projecting flange 60, which is let into an opening in the door, and suitably secured therein. Centrally the section 58 is provided with a key opening 61, and above and below said opening with apertures 62, 62. The latch 57 is pivoted to the section 58 at the point 63, which point is below the pivotal point 56 between the latch and the transverse bar 53. The other section or cover of the latch casing is indicated by the numeral 64, and is provided with a rectangular forwardly-extending flange 65, the angles of which receive the corner lugs 59 of section 58. Opposite sides of this rectangular flange, at upper points, are provided with slots 66, 66. Section 64 is also provided with a forwardly-extending post 66′ which is brought into alignment with one or the other of the apertures 62, in accordance with the particular adjustment of the section, said post serving to receive a screw passed through the aperture 62. Secured to the frame work of the door opening is a plate 67, provided with an opening 68 registering with the adjacent

recess 66 of the rectangular flange 65. Secured to this plate is a cap 69.

In the operation of the device, if the parts are in the position shown in Fig. 1, and in descending it is desired that the cage should stop on the floor below and the door opened, the operator depresses the foot treadle, or operates the hand lever, as the case may be, so that the movable frame 20 is thrown forward to bring the lower end of the incline 22 into position to engage the roller 45. As the cage continues to descend the roller rides along the incline, and the lever 44 is turned upon its pivot, thereby compressing the two springs 51 and 51′. When the elevator cage stops at the floor, the roller is at the angle between the two inclines 22 and 23, and therefore lever 44 is held to the position to which it has been turned. If the door moves very freely, and with but little friction, in its ways, the door lever 47 will be turned on its pivot at the same time the lever 44 is turned, but not so rapidly as lever 44. When the lever 44 has reached the limit of its movement, spring 51′ begins to regain its normal expanded condition, and in doing so, inasmuch as one end is attached to arm 50, the door operating lever 47 is brought to the full limit of its movement. As the upper end of said lever is connected through the swivel sleeve 55 to the bar 53, a pull is given to said bar, which has the effect, first, of turning the latch 57 upon its pivot 63, and thereby throwing it out of locked engagement, and, secondly, sliding the door laterally in its ways or grooves to an open position. The extent to which lever 47 is turned upon its pivot is limited by the stop 46 at the upper end of lever 44. After the passengers are let out at this floor, and as soon as the elevator begins to travel again, pressure of the incline 22 upon the roller is removed. The outer spring 51 has now an opportunity to expand, and in doing so acts upon the lower end of lever 44, and returns the lever to its former position. Said lever 44 in thus returning carries with it, by reason of the lug 46, the door operating lever, which lever acts upon the transverse bar 53, first shoving the door laterally in its ways or grooves to close the opening, and, secondly, turning the latch at the proper time to lock the door in its closed position. The door closing mechanism operates entirely independent of any of the other parts, so that the operator is at liberty to remove pressure from the foot treadle the moment the door is opened, and the passengers let out.

It is, of course, obvious that the anti-friction roller 45 is not absolutely essential, as any projection from the lever 44 may be employed with which the inclined surfaces can contact. The roller, however, is preferable, as it greatly reduces friction in the travel along the incline.

The upper end of the lever 47 passes freely through the sleeve 55 so as to admit of the lever moving in the arc of a circle upon its pivot.

Should the elevator cage ascend from the position shown in Fig. 1, it is of course obvious that, if it is desired to stop at any of the floors above to let out passengers, the foot treadle is depressed just before reaching said floor, thus throwing the movable frame 20 forward, so that the upper end of the upper incline 23 at the proper moment engages the anti-friction roller 45, when the operation before explained is repeated.

If it is desired that the elevator should pass a floor without stopping, and without opening the door of the elevator well, the operating treadle of course is not depressed, and consequently the movable frame is not thrown forward to bring the incline into operative position to engage the roller.

From this description of the operation of my invention, it will be seen that the inner spring 51′ and coacting parts perform entirely the operation of opening the door, without assistance from the outer spring 51 while said outer spring and coacting parts perform entirely the operation of closing the door.

If desired means for retaining the operating treadle or hand lever, as the case may be, may be employed, so that all the doors at the different floors will be opened or closed in the travel of the elevator cage. Such means are shown in Fig. 13 in connection with the foot treadle 30, and consists in providing the plate 32 with a notch 71, and the lever 30 with a dog 72. This dog 72 is capable of being made to engage said notch when the lever is depressed, whereby said lever is retained at its depressed position, and the movable frame 20 held out in active position.

It is of course evident that the inner spring 51′ could be omitted and the lever 44 simply made an extension of lever 47, with one end of the spring 51 attached thereto, and the inclined surface made to engage a suitable projection extending directly from the door operating lever 47. This construction would be exceedingly faulty, however, in that should the door become clogged before being fully opened, the elevator in its continued descent would necessarily cause a breakage to some of the parts. It is for this very reason that I employ the safety lever 44 and the inner spring 51′. It is evident that with this construction should the door become stuck from any cause whatever, no damage would be caused to the parts, as the action of the incline against the roller simply tends to contract the inner spring, as the elevator continues to descend. It is also evident that should the operator forget to press the foot treadle for the opening of the door, all he need to do is to take hold of the transverse bar 53, or the lever 47 and throw the door open by hand. In this case the outer spring only is acted upon.

Another important feature of my invention

is the interchangeability of the parts whereby they are made adaptable no matter in what direction laterally the elevator well doors are opened and closed. If for instance the door is opened in the opposite direction to that shown in Fig. 1, the mechanism carried by the cage is placed toward the left hand end of the cage, and the door operating mechanism in a position below the same. The safety lever 44 when first cast is provided with two of the projecting lugs 46, and one of these is removed, in accordance with the direction in which the door is to be opened.

Fig. 12 of the drawings shows the lever 44 as first cast, with two of these lugs. If the door is to be opened in an opposite direction to that shown in Fig. 1, the lug shown in Fig. 9 is removed, and the other lug left at the upper end of the lever. It is also apparent that the casting 48 is applied to the lower end of the door operating lever so that the arm 50 will project therefrom in an opposite direction to that shown in Fig. 1. It will also be noticed that the frame 42 is provided with two of the lugs 52, whereby provision is made for properly attaching the outer spring 51 when the parts are reversed in the manner now described. It is also evident that the plate 67 and cap 69 are removed from the position shown in Fig. 6, and that the latch casing and latch are separated, and then transferred over to the opposite edge of the door, and that the bar 53 and its keeper 54 are reversed in the manner hereinafter described. These several changes are accomplished as follows: After the plate 67 and cap 69 are removed, the screw passing through the aperture 62 and entering the post 66′ is first removed to allow section 64 to be taken off. The pivots 56 and 63 are then taken out, so that the latch may be separated from the bar 53 and the section 58 of the casing. The flange 60 of this section 58 is next released from the recess in the door, so as to permit the removal of said section 58. The bar 53 and its keeper 54 are next taken off. Section 58 is now transferred over to the opposite edge of the door, and turned to the position shown in Fig. 15, so as to bring its flange 60 in proper position to register with and to be received in a recess near the edge of the door. The latch is now properly pivoted to the section 58, and after the keeper 54 is secured to the edge of the door at which the latch casing was formerly secured, the bar 53 is arranged in proper relation thereto, and the end of said bar pivoted to the latch. The section 64 of the casing is next adjusted to place, and the screw passed through the post 66′, and finally the plate 67 and cap 69 are adjusted to the changed position of the latch casing.

Fig. 10 of the drawings represents a modification wherein instead of employing a foot treadle for operating the movable frame 20, a hand operating lever 70 is used, said lever having its lower end bent at right angles and pivotally connected to the upper end of the link 31, said link in this form of construction projecting upwardly from the lug or ear 28, instead of downwardly therefrom, as in the principal form.

Fig. 11 shows a modified form of construction which is only adaptable for closing the doors of elevator wells. In this construction only the door operating lever 47 and the spring 51 are employed, the safety lever 44 being omitted, as also the engaging mechanism carried by the elevator cage, the door being opened by the operator. Of course after the door is opened by the operator, the moment he releases the same the spring expands and automatically closes the door.

It will be understood that many of the details of this invention may be changed and varied, and parts omitted, without affecting the scope of the invention. For instance, merely a door closing device may be used, as illustrated in Fig. 11, or merely a door opening device. In this latter case the outer spring 51 will be omitted.

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

1. The combination of two pivoted levers, one of said levers having a connection at one end with the door, a spring having its opposite ends connected to the respective levers, and means carried by the elevator for engaging the lever other than the door lever, and turning it upon its pivot, upon the ascent or descent of the elevator cage, substantially as set forth.

2. In a door operating device for elevator wells, the combination of a frame, two levers pivoted respectively to the frame, one of said levers having a connection at one end with the door, a spring having its opposite ends connected to the respective levers, a second spring attached at one end to the lever other than the door lever and at its opposite end to the frame, and means carried by the elevator for engaging the last referred to lever and turning it upon its pivot upon the ascent or descent of the elevator cage, substantially as set forth.

3. In a door operating device for elevator wells, the combination of two pivoted levers, one of said levers having a connection at one end with the door, a spring having its opposite ends connected to the respective levers, and opposite inclines carried by the elevator cage, adapted to respectively engage the lever other than the door lever upon the ascent or descent of the elevator cage to turn the last referred to lever upon its pivot, substantially as set forth.

4. In a door operating device for elevator wells, the combination of a frame, two levers pivoted to the frame, one of said levers having a connection at one end with the door, and the other lever provided at its edge with a projecting lug, a spring having its opposite ends connected to the respective levers, a second spring attached at one end to the lever

other than the door lever and at its opposite end to the frame, and means carried by the elevator cage for engaging the last referred to lever and turning it upon its pivot, upon the ascent or descent of the elevator cage, substantially as set forth.

5. In a door operating device for elevator wells, the combination of door operating mechanism, a frame carried by the elevator cage, a second frame movable in the first-named frame, and provided with oppositely inclined surfaces, and means for throwing the inner frame into operative position to engage the door operating mechanism, substantially as set forth.

6. In a door operating device for elevator wells, the combination of door operating mechanism, a rigid frame carried by the elevator cage, the inner faces of the sides of said frame provided with upwardly and forwardly inclined grooves, a second frame within the first-named frame, provided with projections fitting the grooves, and means for moving the inner frame within the outer, for bringing said inner frame into operative position, substantially as set forth.

7. In a door operating device for elevator wells, the combination of a sliding door, a swiveled sleeve connected with the door, a pivoted lever having its upper end passing freely through the sleeve, and means for turning said lever upon its pivot, substantially as set forth.

8. The combination of a plate adapted to be secured to a door and to form one section of a latch casing, said plate provided with apertures in longitudinal alignment, a cover forming the other section of the casing, said cover provided with opposite inwardly-extending slotted flanges, and also provided with a projecting post adapted to be in register with one of the longitudinally aligned apertures, a latch pivoted within the casing, a bar having one end extending through one of the slots of the flange and pivoted to the latch, and means for actuating said bar, substantially as set forth.

9. In a door operating device for elevator wells, the combination of a frame provided at opposite points with projecting lugs, a lever pivoted to the frame, said lever having a connection with the door, and a spring having one end connected to the lever and its opposite end to one of the projecting lugs, substantially as set forth.

10. In a door operating device for elevator wells, the combination of a frame provided at opposite points with projecting lugs, two levers pivoted to the frame, one of said levers having a connection at one end with the door, and the other lever provided at its end with a lug projecting from that edge which is the greatest distance from the door, a spring having its opposite ends connected to the respective levers, a second spring attached at one end to the lever other than the door lever and at its opposite end to one of the lugs of the frame, and means carried by the elevator cage for engaging the last referred to lever and turning it upon its pivot, upon the ascent or descent of the elevator cage, substantially as set forth.

11. The combination, of two pivoted levers, one of said levers having a connection with the door to be operated, a yielding connection between the levers, and means carried by the cage for engaging the lever mechanism, and thereby operating the yielding connection, whereby the door through the lever connected therewith, is opened, substantially as set forth.

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

JOHN P. RUNKEL.

Witnesses:

ARTHUR L. MORSELL,

ANNA V. FAUST.