No. 676,152. Patented June 11, 1901.

C. R. PRATT.

ELEVATOR SAFETY DEVICE.

(Application filed Aug. 3, 1900.)

(No Model.) 2 Sheets—Sheet 1.

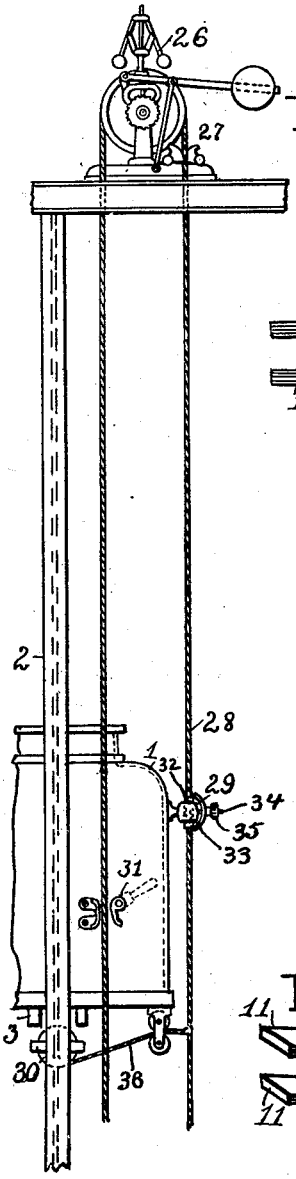
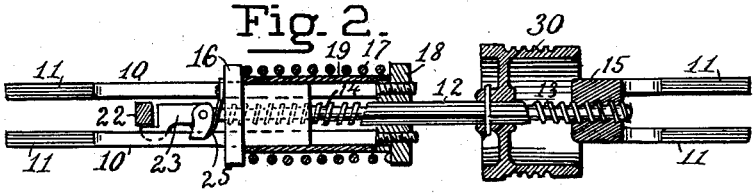


Fig. 1.

Fig. 2.



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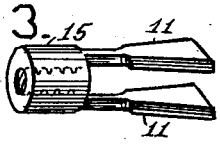

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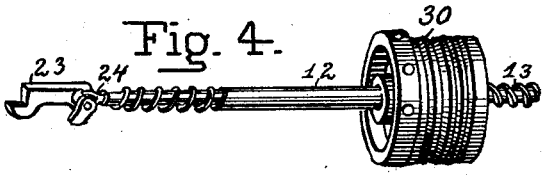

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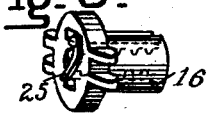

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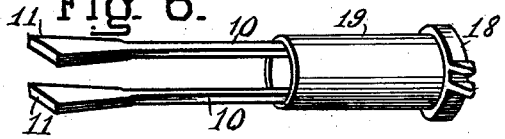

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No. 676,152. Patented June 11, 1901.

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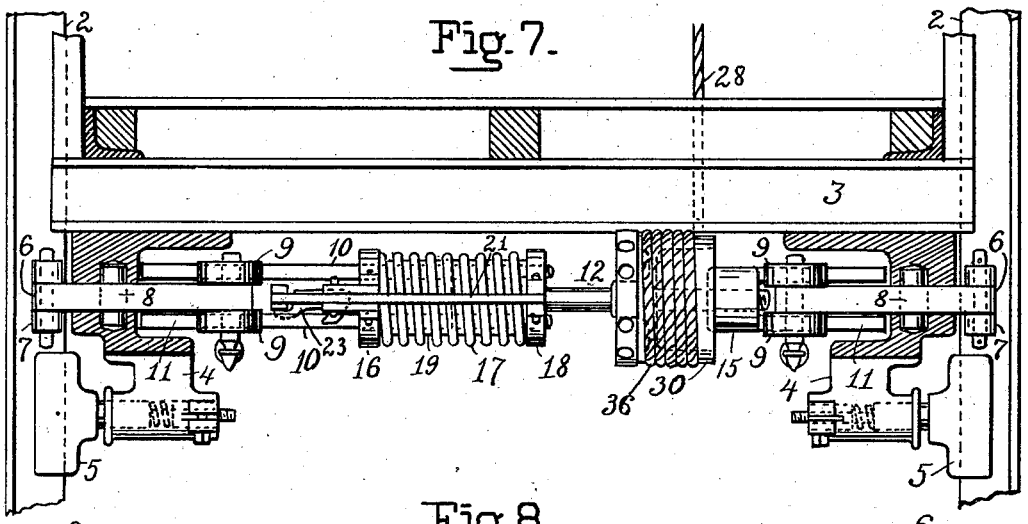
(No Model.) 2 Sheets—Sheet 2.

Fig. 7.



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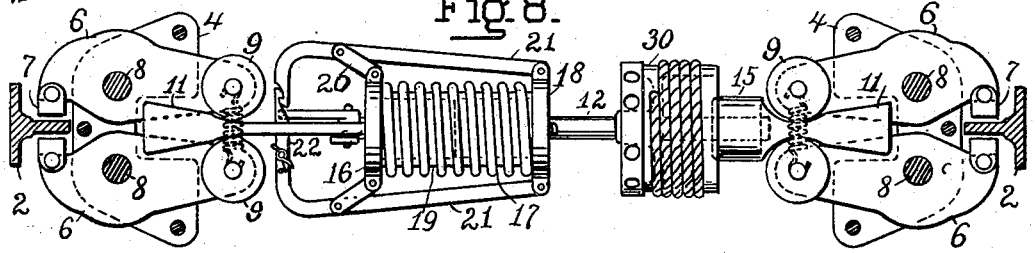

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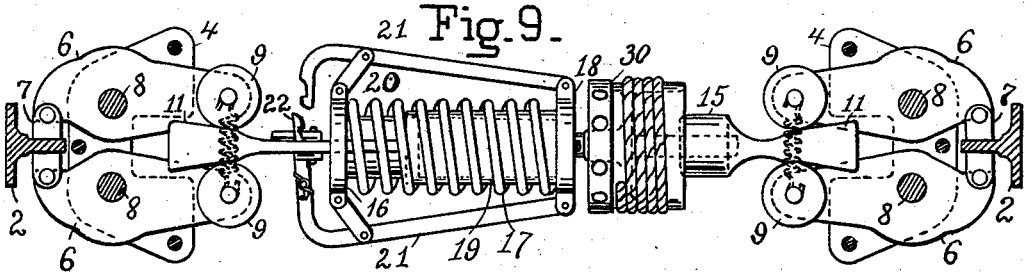
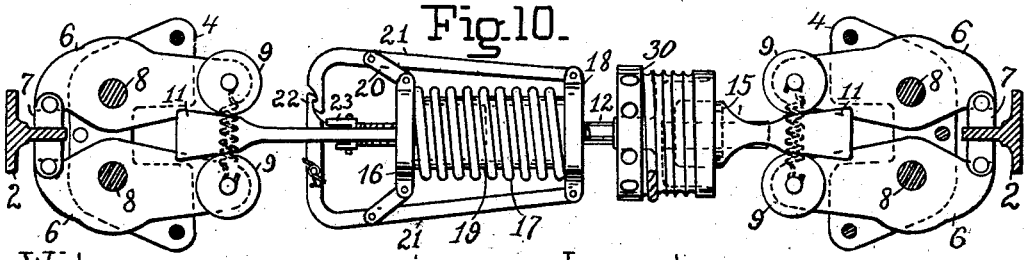


Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES R. PRATT, OF MONTCLAIR, NEW JERSEY.

ELEVATOR SAFETY DEVICE.

SPECIFICATION forming part of Letters Patent No. 676,152, dated June 11, 1901.

Application filed August 3, 1900. Serial No. 25,755. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. PRATT, a citizen of the United States of America, and a resident of Montclair, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Elevator Safety Devices, of which the following is a specification.

My invention relates to what are known as "safety devices" for elevators, and has for its object to stop the car when its speed has risen above a predetermined point from any cause whatever without any danger of sudden jar or shock.

Other details of my invention will be more fully set forth in the detailed description.

In the accompanying two sheets of drawings, which form a part of this specification, Figure 1 is an elevation of an elevator car and hoistway to which my invention is applied. Fig. 2 is an elevation, partly in section, of the train of mechanical elements between the gripping-jaws. Figs. 3, 4, 5, and 6 are details of the train of elements. Fig. 7 is an elevation, partly broken away, showing the floor of a car, hoistway-guides, and the parts of the safety which are located beneath the car. Fig. 8 is a top view of the safety with the brackets above the jaws removed, showing the mainspring set and latched and the other parts also in their normal position. Fig. 9 is a similar view showing the position of the parts immediately after the safety commences to operate. Fig. 10 is a similar view showing the position of the parts when the safety has fully operated.

The car 1 travels in the hoistway on the guides 2. Channel-beams 3 underlie the floor of the car and constitute the lower cross-head. Brackets 4 are attached to these beams and carry the lower guide-shoes 5. The pairs of gripping-jaws are also carried by these brackets. As the brackets are fixed in their relation to the car, they may properly be considered as a part thereof. Each pair of jaws consists of two levers 6 and shoes 7, which engage the guide-rails. The levers are mounted on pivots 8, which are carried by the brackets. On the inner ends of the levers are rolls 9, there being two rolls on opposite sides of each lever.

Between the two pairs of gripping-jaws is a train of mechanical elements, through which the jaws are simultaneously operated. At one end of this train of elements is a pair of wedge-rods 10, terminating in wedges 11, and at the other end a pair of wedges 11, which engage the rolls of the gripping-jaws. In the train of elements between the two pairs of wedges is a screw-shaft 12, with a right-hand screw 13 on one end and a left-hand screw 14 on the other end. The right-hand screw engages a nut 15, to which the wedge-rods at the right are directly attached. The left-hand screw engages a nut 16, to which the wedge-rods at the left are indirectly connected through a cushioning-spring 17. The screws and nuts constitute a mechanical power. The wedge-rods at the left pass through holes in the nut 16 and are attached to a collar 18, which is loose on the screw-shaft. The spring lies between the nut 16 and the collar 18. A sleeve 19 also lies between the nut and collar and serves as a positive means of transmitting the power from the screw-shaft to the wedges after the spring is fully compressed or in event of the breakage of the spring.

The nut 16 and the collar 18 are connected together by two pairs of toggles, with short links 20 hinged to the nut and longer links 21 hinged to the collar. The longer links have bent ends, which when the spring is set are latched together by a latch or trigger 22.

A push-bar 23 engages a latch. This push-bar is hinged to a swivel-piece 24 on the end of the screw-shaft and is provided with lugs, which fork the lower wedge-rods and keep the push-bar from rotating with the screw-shaft. A light spring 25, which is supported by the head of the nut 16, normally presses against one of the lugs of the push-bar and holds it horizontally and in a position to engage the latch and release the mainspring.

A centrifugal governor 26 is preferably, though not necessarily, mounted on the overhead beams of the hoistway and controls a grip or brake 27 for the governor-rope 28, which is operated whenever the speed exceeds that for which the governor is adjusted. A governor-rope runs over the driving-sheaves of the governor and is attached to the car by a latched connection, which is so adjusted that it will give way whenever there is any

strain upon the rope above what is required to cause it to travel with the car and rotate the governor. A branch 36 from the governor-rope is led to a drum 30 on the screw-shaft of the safety device. The latched connection consists of an eye 29, attached to the car, through which the governor-rope passes. The eye is large enough to permit a button 32 on the rope to pass through. Normally the ends of the button are engaged by the ends of a bent spring 33, which is supported from the eye by a screw 34 and nut 35. The tension of the spring is sufficient to keep the button in place in the eye under ordinary conditions and cause the rope to travel with the car; but in event of the rope being clutched when the car is traveling in either direction the spring gives way and permits the button to pull out from the eye.

The operation of the device described above is as follows: Upon the elevator moving beyond the predetermined speed the governor will act and through the described mechanism will clutch the rope 28, thereby turning the drum 30. The first revolution of the drum will cause the screw-shaft 12 to trip the latch which holds the spring compressed. The spring will at once operate to throw the collar 18 to the right, thus drawing to the right the wedge at the left, looking at Figs. 8 and 9, and will move to the left the nut 16, thus drawing to the left the wedge at the right, looking at Figs. 8 and 9, until the full limit of power of the spring is reached, or, in other words, the wedges will be moved to apply the pressure proportionally to the force of the spring. This is intended to be merely a checking and not a stopping pressure, and it will be observed that in the first or preliminary application of power the wedges are not operated by the right-and-left screw mechanism. Upon the further descent of the car the drum will continue to revolve and through the medium of the right and left screw-threads on the screw-shaft and the nuts 15 and 16 the wedges will be drawn together, thus positively applying greater and greater pressure as the car continues its movement; but in so moving the spring will be compressed between the nut 16 and the collar 18. Therefore while the action of the wedges is positive and while the wedges are moved by a positively-acting mechanical power, nevertheless the pressure is a yielding or cushioned one, or, in other words, the spring 17 has ceased its function as an operating device and performs the entirely different function of being the relief device. If the spring 17 becomes compressed to its limit and the car is nevertheless continuing its motion, the sleeve 19 comes into play, and through it the transmission of the power independent of the spring is given, so that the jaws will continue to tighten so long as the motion of the car continues and the screw-shaft is rotated. In the normal operation this sleeve is not required.

It will be seen from the foregoing description that no matter whether the car is lightly or heavily loaded it may be stopped with the minimum amount of jar or shock and the minimum danger of breaking the apparatus, because the jaws are applied at first with a merely retarding pressure and then with a steady increasing positive pressure, which, nevertheless, is cushioned, so that the jaws will slip on the guide-rails before the danger-point is reached and while slipping will cause greater pressure to be applied, but still gradual and still a cushioned pressure, up to the limit of the compression of the spring. The result is a gradual and easy stopping of the car under all conditions of load and speed. It will be noted, too, that the positive actuating device and the spring are in series between the sets of jaws. Consequently upon the operation of either force is transmitted through the other, and it will be further noted that but a single operating device is necessary—*i. e.*, the shaft and its connections, which perform the double function of releasing the spring and positively operating the jaws, thus avoiding the necessity of a change from one set of apparatus to another. I may dispense with the feature of having the jaws operated by a spring and use said spring as a cushioning-spring. Such construction would be more especially adapted for cars carrying heavy loads and at slow speeds, where the instantaneous gripping of the rails is not so important.

In the ordinary use to which elevators are put it has been found that a light-loaded overbalanced car while being driven down by its hoisting apparatus may have the safety device accidentally operated. To apply the full power of the safety device, therefore, would be to cause a dangerously sudden stop. To avoid such a possibility, I use the preliminary spring-pressure to operate the jaws in the first instance, while no time is lost, as the positive device begins to operate at the same instant, the effect of the action of the spring in the first instance being to check or retard without stopping the car. When the safety has operated, it is restored to its original position by first rotating the screw-shaft by hand in the same direction in which it was revolved in applying the gripping power to reset and latch the spring in case it was not revolved sufficiently to do this in its automatic operation. Then the screw-shaft is rotated in the opposite direction until the jaws are opened free from the guides and the slack rope from the governor is taken up on the drums. This rotation of the screw-shaft is effected by levers which are inserted in holes in the rim of the drum.

Conditions sometimes arise when it is desirable to operate the safety device from the car—as, for example, when there is a failure of the controlling apparatus—since serious consequences would result from a sudden stoppage of the car from its normal speed at

the end of the hoistway. Means are consequently provided for operating the safety device by hand from within the car. This means is a manually-operated clamp 31 for the section of the governor-rope which travels oppositely to the car.

What I claim, and desire to secure by Letters Patent, is—

1. In a safety device for elevators the combination of gripping-jaws mounted on the car and adapted to engage the guide-rails, positive means for operating said gripping-jaws, and a device interposed between said positive means and said gripping-jaws whereby the power is transmitted from said positive means to said jaws with an increasing, but yielding, pressure.

2. In a safety device the combination of gripping-jaws mounted on the car and adapted to engage the guide-rails, positive means for actuating said gripping-jaws, and a spring against the force of which said positive means act.

3. In a safety device for elevators the combination of pairs of gripping-jaws mounted on the car, a normally-compressed spring, connections whereby said spring on its release will operate the jaws and positive means for operating said jaws, said spring-actuated and positive devices being arranged in series between the pairs of jaws.

4. The combination of the gripping-jaws mounted on the car, a normally-compressed spring adapted when released to primarily operate said jaws, and a positive mechanism for releasing said spring, said positive mechanism subsequently acting to further and positively operate said jaws.

5. The combination of the gripping-jaws mounted on the car, a normally-compressed spring adapted when released to primarily operate said jaws, and a positive mechanism for releasing said spring, said mechanism subsequently acting to recompress said spring and to further and positively operate said jaws.

6. The combination of the elevator-guides, the car and two pairs of gripping-jaws thereon adapted to engage said guides, relatively movable parts connected with so as to actuate said jaws, a normally-compressed spring interposed between said parts and means whereby, on undue motion of the car, either ascending or descending, the spring is first released to separate said relatively movable parts to throw said jaws into engagement with the guides, and whereby, upon further movement of the car, said parts are drawn together, said spring compressed and said jaws brought into closer and yielding contact with the guides, substantially as described.

Signed by me in New York city, New York, the 2d day of August, 1900.

CHARLES R. PRATT.

Witnesses:
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