R. C. SMITH.

SAFETY CLUTCH FOR ELEVATOR SAFETY AND OTHER DEVICES.

APPLICATION FILED MAY 28, 1915.

1,302,601.

Patented May 6, 1919.

2 SHEETS—SHEET 1.

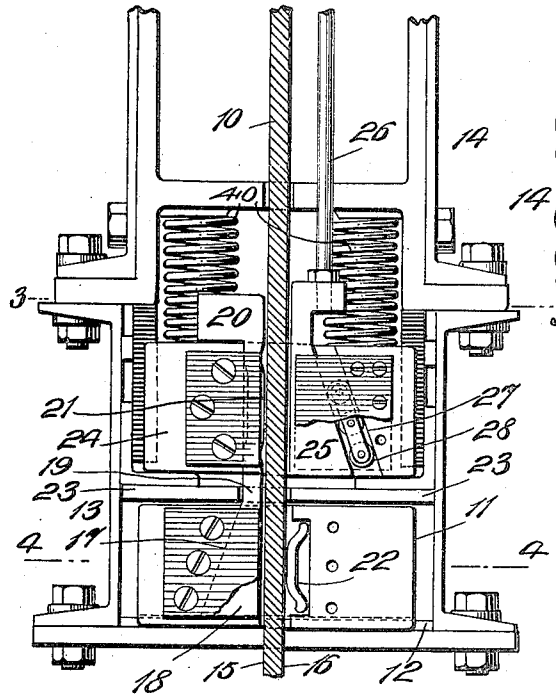


Fig. 1.

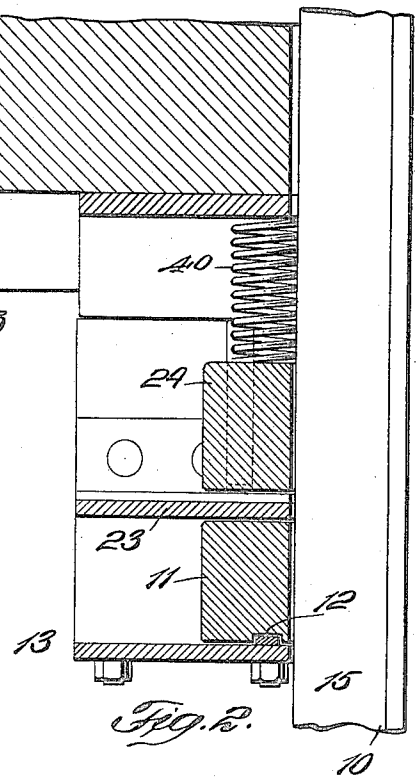


Fig. 2.

Fig. 3.

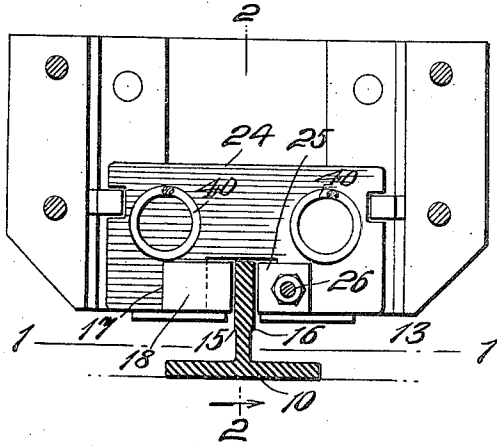
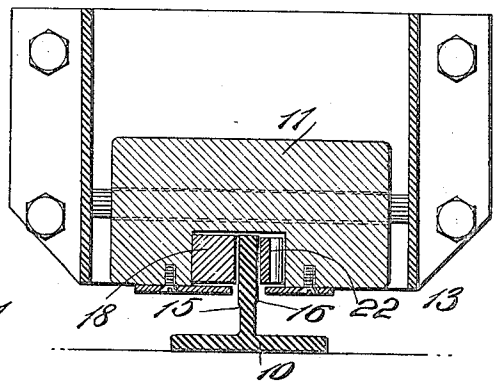


Fig. 4.



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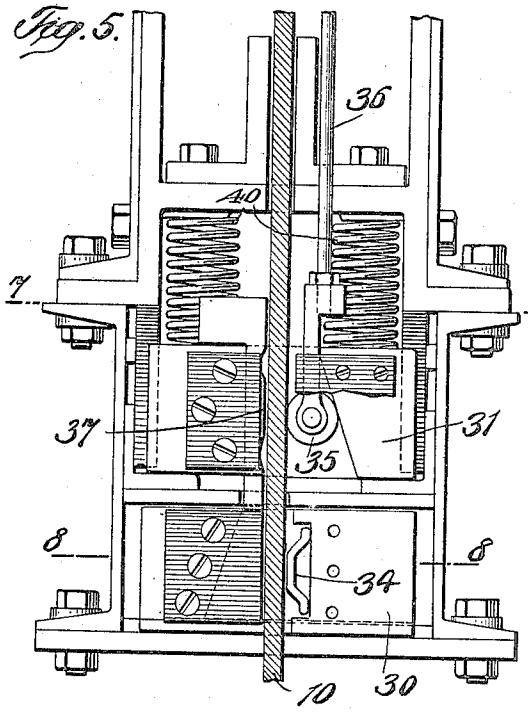
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2 SHEETS—SHEET 2.

Fig. 5.



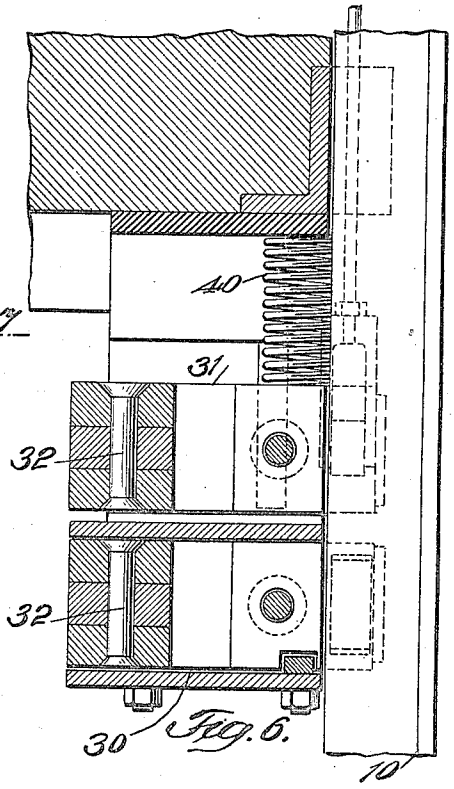


Fig. 6.

Fig. 7.

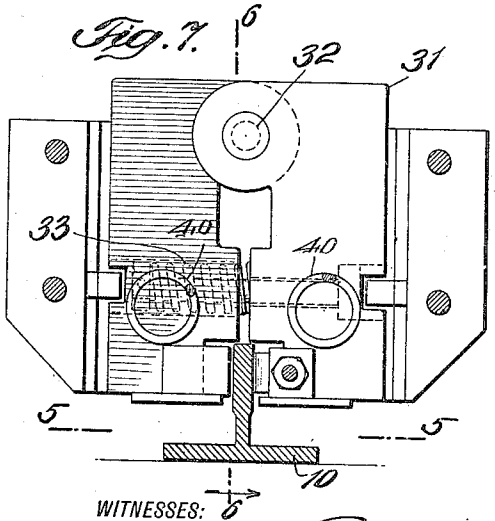
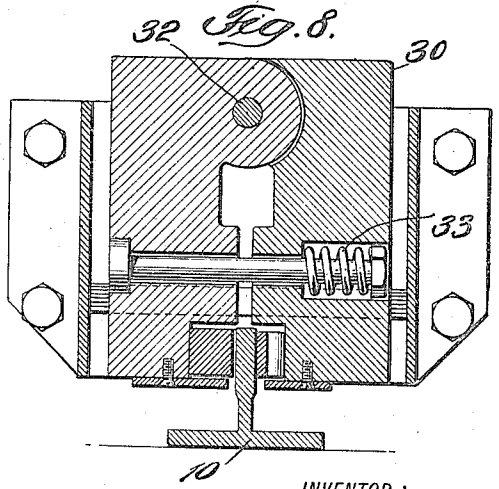


Fig. 8.



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UNITED STATES PATENT OFFICE.

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SAFETY-CLUTCH FOR ELEVATOR SAFETY AND OTHER DEVICES.

1,302,601. Specification of Letters Patent. Patented May 6, 1919.

Application filed May 28, 1915. Serial No. 30,909.

To all whom it may concern:

Be it known that I, RUDOLPH C. SMITH, a citizen of the United States, and a resident of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Safety-Clutches for Elevator Safety and other Devices, of which the following is a specification.

My invention relates to improvements in safety clutches for elevator safety devices, and clutches and brakes applicable to other vehicles of transportation, in which one frictional safety grip or brake contact block takes only part of the total load, while the balance is carried automatically on another frictional clutch or brake contact block until the accelerating and frictional force balance, and the objects of my improvement are to provide and insure a proper gradual stopping and starting by the action of the automatic clutches or brake contact blocks embodying the essential operative principle of that which is set forth in the patent issued to me May 11, 1915, No. 1,138,902.

I attain these objects by the mechanism and means illustrated in the accompanying drawings, in which a spring is used to determine the ratio of adhesion of the frictional resistance device to the total load.

Figure 1 is a vertical end view, partly broken away, and Fig. 2 is a vertical section of the safety clutch applied on the bottom of the suspension frame of an elevator cage, the section being on the dotted line 2—2 of Fig. 3; Fig. 3 is a horizontal top view of the upper clutch 15; Fig. 4 is a horizontal section on the line 4—4 of Fig. 1, and Figs. 5 to 8 inclusive are views corresponding with Figs. 1 to 4 inclusive and illustrate a modified form of the invention.

I ordinarily make the gripping device as shown in Fig. 1, which illustrates a stationary rail 10 and a frame 11 slidable on and guided by the rail 10. The rail 10 is shown as an ordinary T-rail, such as is used to guide the elevator car in the elevator shaft. The frame 11 is horizontally movable on proper guide bars 12 in the frame 13. The box-like frame 13 is bolted to the lower cross beams 14 forming the main support underneath the elevator platform, commonly called the "safety plank", in proper position to allow the slidable frame 11 to be clamped, with proper friction means, to the rail 10. The frame 11 is shown as formed with contact block surfaces fitting upon the sides 15, 16 of the said rail 10, whereby said rail is permitted to serve as a guide for said frame 13 attached to the bottom cross beam of the suspension frame of the elevator cage. The movable frame 11 has at one end at one side of said surface 15 a recess whose outer wall affords a wedge surface 17. Upon the side 15 of the rail 10 is arranged the wedge 18, whose main portion is confined within said recess of said frame 11, and adapted to engage said wedge surface 17, and which wedge 18 has an extension 19 engaging the side 15 of the rail 10, and at the other end thereof a shoulder 20. The flat extension 19 is shaped as a spring 21 in its upper part. Upon the other side of the rail 10 a friction surface is obtained by means of the spring 22 which is seated in a recess in one side of the frame 11 and acts against the rail 10 and when pressed against the rail 10 acts against the other side of said frame 11 (which engages the wedge 18) by reason of the fact that it is supported by the solid body of said frame 11. The spring 22 is properly proportioned to have sufficient strength to safely stand the stress of carrying part of the load, and this part so carried is determined by the degree of deflection of the spring.

The frame 13 is of box-formation and contains a separator or partition 23 which divides the frame into an upper compartment and a lower compartment, the frame 11 being within the lower compartment and an independent frame 24 being within the upper compartment, and said separator or partition 23 acts as a support for the elevator cage, in connection with the friction contacts. When the car starts to fall upon the breaking of the hoisting cable or to accelerate beyond a predetermined speed the coiled springs 40 mounted upon said frame 24 are compressed by the weight of the car and press the frame 24 against the separator or partition 23. At this period it will be understood that the frame 11 is firmly engaged with the wedge 18 and that the spring 21 is against the side 15 of the guide rail 10. There is limited freedom of movement within the upper and lower compartments of the frame 13 for said frame to be moved in the compression of the springs 40 and the wedging of the frame 11 against

the wedge 18. When the elevator car moves relatively to the wedge 18 the springs 40 are compressed and the separator or partition 23 descends against the frame 11 and binds said frame against the wedge 18 and also effects a compression and therefore deflection of the spring 22.

An independent frame 24 of U-shape, similar to that of frame 11, is capable of a limited slidable movement vertically, and the wedge 25 may be tightened in said frame 24 by power applied to the rod 26 or by any other suitable power connection. When the wedge 25 is moved upward in the arrangement shown in Fig. 1, its lower inclined face wedges against the inclined face 27 of the frame 24 on the rollers 28 between the back of the wedge and the sloping surface 27 of the frame 24, and this causes one leg of the frame 24 to firmly press against the extension 19 of the wedge 18 and deflect the spring 21 against the side 15 of the rail 10, with the result that the body or frame 11 being in a downward motion, and the wedge 18 being retarded by the action of the clutch frame 24, the inclined surface 17 of the clutch frame 11, will move into firm engagement with the inclined face of the wedge 18 and that any further acceleration in the movement of the frame 11 will be prevented, this being due to the wedges, which serve as brakes, being compounded, and to the consequent balancing of the accelerating and retarding forces acting against the frame or body 11; and the frame or body 11 will under the condition stated continue in motion with uniform velocity, since the retarding and accelerating forces remain automatically in equilibrium. The features as fully described in my patent No. 1,138,902 of my invention establish the correct friction or, as frequently stated, adhesion between the bodies or frames 11 and 24 and rail 10 to balance the accelerating and retarding forces. The springs 40 are, as above indicated, compressed during the movement of the elevator car relative to the car brake, and these springs, when the pressure is relieved therefrom, permit the quick release of the springs 21, 22 from the rail 10.

The object of my present improvement is to produce this automatic action by a less costly and more efficient device or mechanism than that shown in the drawings of my aforesaid patent dated May 11, 1915, and this automatic action in accordance with my present invention is brought about by combining the spring 21 with the wedge 25 or the spring 22 with a wedge 18 or by a combination of these features or coöperative elements thereof.

Figs. 5, 6, 7 and 8 illustrate a further embodiment of my invention and show an arrangement of the elevator safety clutch contacts in which frames 30, 31 afford the contact surfaces and are connected and guided in their movement on pivots 32, each pair of said frames having a spring 33 under compression and acting to bring the contact surfaces of the frames to bear on opposite sides of the guide rail 10 when the lower frame 30 is by the descending car wedged against the wedge corresponding with the wedge 18 of Fig. 1 and deflects the spring 34, the latter spring corresponding with the spring 22, shown in Fig. 1. In Figs. 1 to 4 inclusive the lower and upper frames 11, 24 are in the form of solid blocks grooved to receive the flange of the guide-rail and the wedge and spring features described, while in Figs. 5 to 8 inclusive the lower and upper frames 30, 31 are in pivoted together sections having wedge and spring features corresponding with the wedge and spring features shown in Figs. 1 to 4 inclusive, plus the additional feature of the springs 33 in one part of the frames 30, 31 causing the headed bolts on which said springs are mounted, as shown in Fig. 8, to force the other part or member of said frames toward the adjacent side of the guide rail 10, with the result that the spring 37 formed on the extension of the wedge corresponding with the wedge 18 of Fig. 1 is compressed against said side of the guide rail, so that the guide rail is gripped between the roller 35 and coöperating wedge surface on one side and by a spring 37 on the other side. The result of the operation of the mechanism just described is the same as the result of the operation of the mechanism disclosed in Figs. 1 to 4 inclusive. The roller 35 and its coöperating wedge surface on one side of the rail 10 effects a force corresponding with the compression force of the spring 37 at the other side of said rail.

The roller carriage 28, Fig. 1 will force the wedge toward the guide rail for frictional contact, when the wedge 25 is pulled upward.

If in case of excessive speed, for instance, a speed governor arranged in the ordinary manner, causes the roller 35 to be moved upward, when connected to the rod 36, Fig. 5, into contact with the inclined face of the wedge 31 on the one side, and the guide rail on the other side, the inclination of the wedge is such that when this contact is established, the roller will continue to move upwardly, until the accelerating force and frictional forces are equal. In doing this it first forces the wedge to engage the guide rail and causes the friction clamp 31 to compress the spring 37 so that the guide rail is gripped between the wedge on one side and the friction clamp on the other side with a force corresponding to the spring compression, so that it is an easy matter to provide by a predetermined strength of the spring and by the proper action of the

wedge which continues to tighten, to automatically place the accelerating force in equilibrium with the other forces and provide for a gradual stopping or starting of the motion.

A decided advantage of this arrangement lies in the fact that no special means are required to release the safety from the guides after it has acted. Assuming that the action occurred on account of breakage of the hoisting ropes, it is only necessary to replace these and start the elevator machine on the up motion. The pull on the hoisting ropes will automatically release the safety from the guide rails and the parts will automatically return to their normal position.

This safety can readily be arranged to act in either the up or down direction of car travel, and provisions may be made to enable the operator to manually trip it.

It is obvious that many variations may be made in the construction of the details of the structure.

I do not desire to limit my invention to the details of construction shown, because obviously the invention is generic in character and these details may be modified in many ways without departing from the spirit or scope of my invention, as claimed.

What I claim, is:

1. In a car-supported, cable-controlled, rail-side, wedge, car brake and catch, the combination of a series of pairs of jaws at one and the same end of the car brake, the pairs of jaws being superposed, one above the other, members adapted to be wedged between the safety or guide rail and one of the jaws of each pair of jaws, one member suspended from the pair of superposed jaws and the other member adapted to be connected to the cable that controls the application of the car brake to the rail; resilient members, to engage the rail, one of the said members being carried in the part of the suspended wedge member that is in the superposed jaw, and the other resilient member carried in the face of an underneath jaw.

2. In a car-supported, cable-controlled, rail-side, wedge, car brake and catch, the combination of a frame, adapted to be supported on the car; a series of pairs of jaws at one and the same end of the car brake, the pairs of jaws being superposed, one above the other, in the frame, and the pairs of jaws and frame being capable of having a vertical movement relatively to each other; members adapted to be wedged between the safety or guide rail and one of the jaws of each pair of jaws, one member being suspended from one of the superposed jaws, and the other member adapted to be connected to the cable that controls the application of the jaws to engage the rail; resilient members, also to engage the rail, one of the resilient members being carried in the part of the suspended wedge member that is in the superposed jaw, and the other resilient member carried in the face of the underneath jaw; and still another resilient member, placed between the frame and the superposed pair of jaws, and adapted to serve as a cushion between the frame and the jaws, upon the engagement of the jaws with the rail and the weight of the frame is placed on the jaws, and to aid in the release of the jaws from their engagement with the rail upon the weight of the frame being lifted off of the jaws.

3. In a car supported car brake, a series of pairs of pivoted jaws at one and the same end of the car brake, one pair superposed above the other pair, members adapted to be wedged between the safety or guide rail and one of the jaws of each pair of jaws, tending to move the said one of the jaws of each pair of jaws away from the rail, and resilient members opposing the said movement of the said one of the jaws, and tending to move the other jaw of each pair of jaws toward the rail, and still other resilient members between the jaws, and adapted to be pressed into frictional engagement with the rail upon the actuation of the brake to engage the rail.

4. In a car supported car brake, a series of pairs of vertically pivoted jaws at one and the same end of the car brake, the pairs of jaws being superposed, one pair above the other pair, members adapted to be wedged between the safety or guide rail and one of the jaws of each pair of jaws, tending to move the said one of the jaws of each pair of jaws away from the rail, the said members comprising a wedge, suspended from the superposed pair of jaws, and resilient members opposing the said movement of the said one of the jaws, and tending to move the other jaw of each pair of jaws toward the rail, and still other resilient members between the jaws, and adapted to be pressed into frictional engagement with the rail, one of the last mentioned resilient members being carried by the said suspended wedge member.

5. In a car supported car brake, a series of pairs of vertically pivoted jaws at one and the same end of the car brake, the pairs of jaws being superposed, one pair above the other pair, members adapted to be wedged between the safety or guide rail and one of the jaws of each pair of jaws, tending to move the said one of the jaws of each pair of jaws away from the rail, the said members comprising a wedge, suspended from the superposed pair of jaws, and a roller adapted to be connected to a speed-controlled governor, and a resilient member opposing the said movement of the said one of the jaws, and tending to move the other jaw of each pair of jaws toward the rail,

and still other resilient members between the jaws, adapted to be pressed into frictional engagement with the rail, one of the last mentioned resilient members being carried by the said suspended wedge member, and the other of the last mentioned resilient members being carried in the face of the jaw that is opposite to the wedge.

6. In a car brake and catch, the combination of a frame, adapted to be supported by the car; a series of pairs of vertically pivoted jaws at one and the same end of the brake, the pairs of jaws being superposed one above the other, and adapted to be actuated to clamp the guide or safety rail; a partition plate, in the frame, and horizontally placed between the pairs of jaws, the frame, and jaws and plate being arranged to be moved vertically relatively to each other; springs, placed between the frame and the superposed pairs of jaws, and adapted to function as a cushion between the frame and jaws upon the engagement of jaws with the rail and the placing of the weight of the frame on the jaws, and to serve to aid the release or disengagement of the jaws from the rail upon the weight of the frame being lifted off of the jaws; a wedge member, suspended from one of the superposed jaws and adapted to be wedged between one of the lower jaws and the rail; and a roller member, adapted to be connected to a speed-controlled governor for the application of the brake, and to be wedged between one of the superposed jaws and the rail; springs, one carried in the face of the said lower one of the jaws, and the other in a part of the suspended wedge member, the springs being adapted frictionally to engage the rail upon the application of the jaws thereto; and still other springs, opposing the movement of the said jaws away from the rail by the wedging of the wedge members, and tending to move the other jaws toward the rail.

Signed at New York city, in the county of New York and State of New York, this 27th day of May A. D. 1915.

RUDOLPH C. SMITH.

Witnesses:
ARTHUR MARION,
CHAS. C. GILL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."