May 14, 1935. F. HYMANS 2,001,361

ELEVATOR SAFETY APPARATUS

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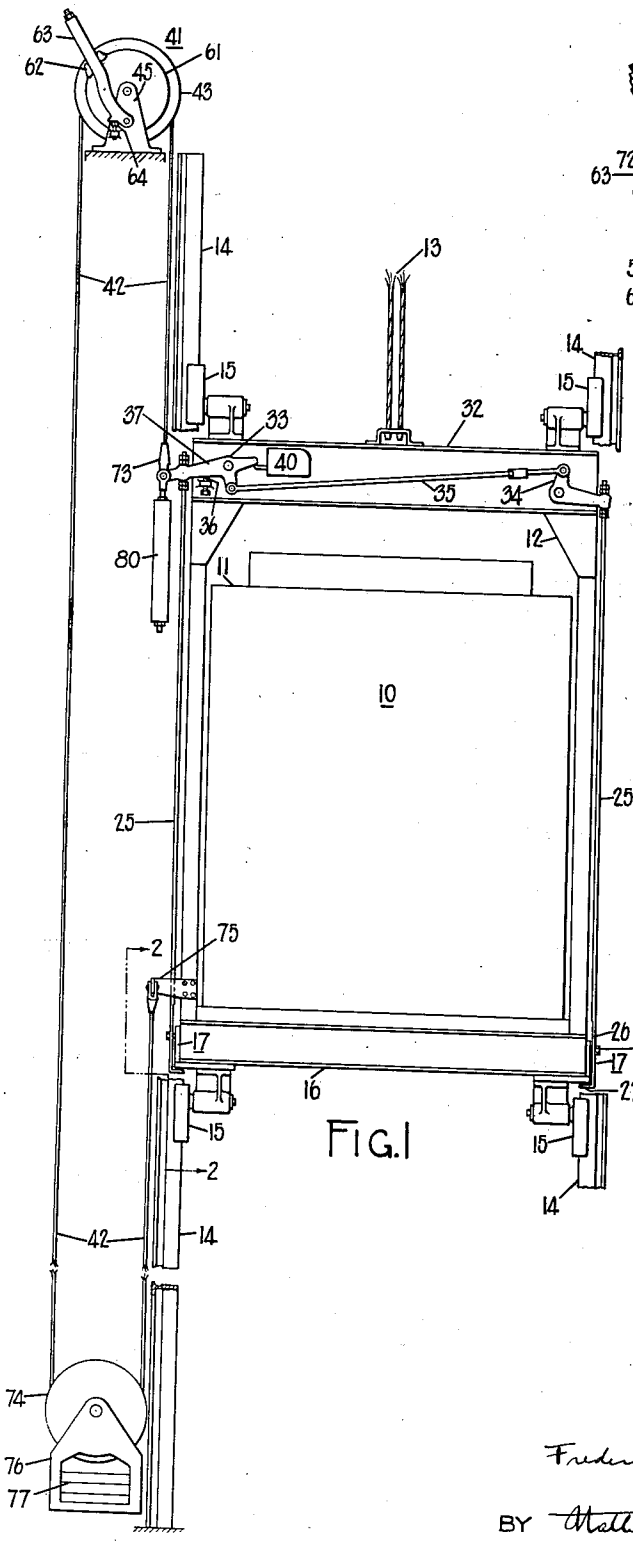

FIG. 1

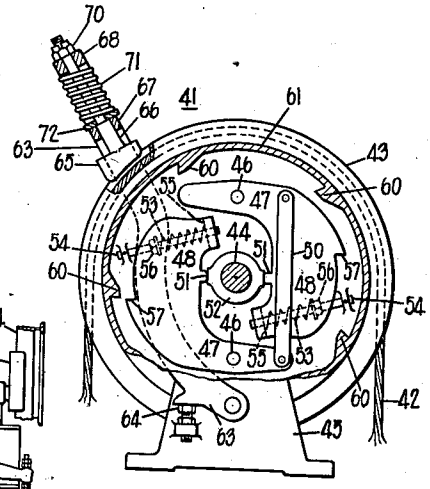

FIG. 3

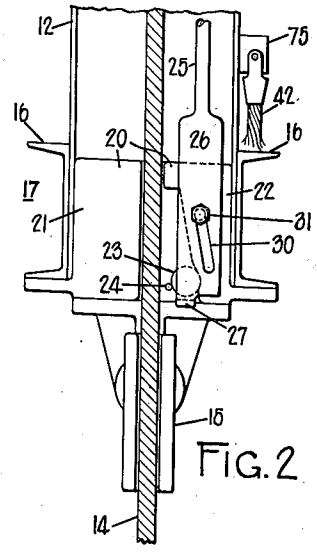

FIG. 2

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ELEVATOR SAFETY APPARATUS

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11 Claims. (Cl. 187—80)

This invention relates to elevator safety equipment.

Safety brakes and related equipment arranged to stop a movable body, such as the elevator car or counterweight, upon such body attaining a speed which is a given amount in excess of its normal full speed, are well known. In many cases, and particularly when the hoisting ropes part, it is advantageous to have these safety brakes become immediately effective to stop the movable body without waiting for the body to attain the overspeed necessary to have the speed-responsive device operate to apply the safety brakes.

One feature of the invention resides in providing immediate application of the safety brakes to stop the movable body when the body is subjected to abnormal downward acceleration, such operation being independent of the speed of the body.

A second feature of the invention resides in providing elevator safety equipment of simple character which not only is responsive to overspeed of the movable body to cause the application of the safety brakes, but also is responsive to abnormal downward acceleration of the body to cause immediate application of the safety brakes independently of the speed of the body.

Other features and advantages will become apparent from the following description and appended claims.

The invention involves providing a loop of rope throughout the height of the elevator hatchway and closed upon the movable body (hereinafter taken as the elevator car) and maintained in tension, the upper and lower bights of the rope, at the top and the bottom of the hatchway respectively, passing around suitable sheaves, with the end of the rope in the lower bight secured to the car framework and the end of the rope in the upper bight operatively connected to the actuating device of the car safety brakes. In addition, the invention involves providing a weight connected to the end of the rope in the upper bight so that at least a portion of such weight is supported by the rope, the balance of such weight being supported by the car and serving to maintain such weight and the end of the rope in the upper bight, in fixed relation to the car during normal service conditions of operation of the car, such weight, upon abnormal downward acceleration of the car, moving downwardly at an acceleration less than that of the car so that the end of the rope in the upper bight moves upwardly relative to the car thereby to move the actuating device of the car safety brakes from its non-safety-applying position to its position causing application of the car safety brakes.

In carrying out the invention, it is preferred to incorporate it, as in the embodiment illustrated, with mechanism for causing application of the car safety brakes in the event of overspeed of the car. Such mechanism usually comprises a governor at the top of the elevator hatchway driven at a speed proportional to that of the car by means of a governor roping system fastened to the car and having a loop of rope extending throughout the height of the elevator hatchway. In incorporating the invention therewith, the governor roping system is arranged so that the end of the governor rope extending from the governor at the top of the hatchway down to the car is fastened to the actuating lever of the car safety brakes. The end of the governor rope extending from the governor rope tension sheave at the bottom of the hatchway up to the car is secured to the car at some convenient point, not on the actuating lever of the car safety brakes. Part of the weight of the governor rope tension sheave is thus urging the actuating lever of the car safety brakes upwardly and thus tending to cause the application of the car safety brakes. To oppose this, a weight is suspended from the actuating lever of the car safety brakes, this weight being sufficient to overcome the upward force imparted to the actuating lever by the governor rope tension sheave, and to maintain the actuating lever in the down, non-applying position against a suitable stop, under all normal service conditions of operation of the elevator car. In the event of breakage of the hoisting cables, or of an abnormal downward acceleration of the car from any other cause, the weight suspended from the actuating lever of the car safety brakes loses its effectiveness to oppose the upward force applied thereto by the governor rope, so that the actuating lever is immediately urged upwardly. Application of the car safety brakes therefore results instantly, independently of the speed of the elevator car. In the event the car, without abnormal acceleration, attains the overspeed for which the governor is set to trip, the resulting tripping of the governor causes the governor rope to be gripped by the governor with the result that the continued downward motion of the car effects movement of the actuating lever upwardly relative to the car, and thus, in the application of the car safety brakes—in this

instance in direct response to the speed of the car.

In the drawings:—

Figure 1 is a schematic view of an elevator installation embodying the invention;

Figure 2 is an enlarged view of the car safety brake taken as indicated by the line 2—2 of Figure 1; and

Figure 3 is an enlarged view, partially in section, of the governor illustrated in Figure 1.

Referring to the drawings, elevator car 10, comprising the cab 11 and the car frame 12, is raised and lowered through the intermediary of hoisting cables 13 and is guided at either side by means of guide rails 14, with which cooperate guide shoes 15 mounted on the car frame. The lower transverse member 16 of the car frame is provided at either end with a car safety brake, generally designated 17, for gripping the guide rails and stopping the elevator car in emergencies. The car safety brakes illustrated are a form of an "instantaneous safety" commonly known as the "roll safety". Each safety brake 17 comprises a safety block 20, suitably secured to the lower transverse member 16, having a straight-sided portion 21 adjacent one side of the guide rail 14 and a bevelled portion 22 adjacent the other side of the guide rail. A knurled roller 23 is normally in an inactive position at the bottom of the bevelled portion 22 of safety block 20, as illustrated in Figure 2, where a pin 24 prevents the roller from engaging the guide rail. When car safety brake 17 is applied, roller 23 is raised by a lift rod 25, the lower end of which is flat, as at 26, and is provided with a lip 27 extending under the roller. The flat portion of the lift rod is provided with a slanted slot 30 through which extends a pin 31 so that upward motion of the lift rod leads roller 23 toward the adjacent guide rail surface. The downward motion of the elevator car at this instant causes roller 23 to be wedged between the guide rail 14 and the bevelled portion 22 of safety block 20. This action results in the guide rail 14 being clamped between roller 23 and the straight-sided portion 21 of safety block 20, and thus, in bringing the car to an immediate stop.

The lift rods 25 for the two car safety brakes 17 extend upwardly to the upper transverse member 32 of the car frame and are arranged for joint operation by means of the bell cranks 33 and 34 and the connecting rod 35. A stop 36 is provided under the actuating lever 37 of bell crank 33, with which, under ordinary service conditions, such lever is in engagement. When actuating lever 37 is raised from stop 36, the lift rods 25 are raised and the car safety brakes 17 applied. Also when actuating lever 37 is raised a suitable switch 40 is actuated to de-energize the elevator hoisting apparatus and bring such apparatus to a stop.

For applying the car safety brakes in the event of overspeed of the car, there is provided a governor, generally designated 41, which is usually positioned at the top of the hatchway and driven from the elevator car by a governor rope 42. The governor 41 illustrated comprises a sheave 43 mounted for rotation about a shaft 44, fixedly mounted upon a stationary standard 45. To sheave 43, at points 46, are pivotally mounted two arms 47, each of which has a weighted end 48. The two arms 47 are connected by an equalizing link 50, and are urged to their innermost position wherein lugs 51 on the arms engage stop surfaces formed on a hub 52 of sheave 43, by two springs 53. Each spring 53 is a helical spring positioned about a rod 54 that is secured at one end to sheave 43 and, at the other end, projects through a suitable aperture in a lip 55 formed at the weighted end 48 of arm 47, the spring 53 acting between lip 55 and a nut 56 adjustable on the rod 54. Arms 47 rotate with sheave 43 and as the speed of rotation of sheave 43 increases, the weighted ends 48 of arms 47 fly outward against the action of springs 53. When the rotation of sheave 43 is clockwise, as viewed in Figures 1 and 3, and the speed of rotation reaches a predetermined value, one or the other of the two dogs 57, each on one end of the weighted ends 48, engages with one of the lugs 60 formed around the inside of an annular shell 61. Shell 61 is rotatably mounted upon shaft 44, and as a consequence of the engagement of a dog 57 with a lug 60, shell 61 is imparted with the clockwise rotation of sheave 43. Shell 61 is coupled, as at 62, to a yoke 63 that is pivotally secured to governor standard 45 and normally is in the position illustrated in Figures 1 and 3, against a stop 64. Yoke 63 has mounted thereon a rope grip 65 for gripping the governor rope 42 in the sheave 43 when the yoke is rotated clockwise from its normal position. The rope grip is a wedge-shaped head of a bolt 66 mounted in apertures on two transverse portions 67 and 68 of yoke 63 at different radii, the head being held out of engagement with governor rope 42, when yoke 63 is in its normal position, by a nut 70 threaded on bolt 66 and engaging outer portion 68. Surrounding bolt 66 between portions 67 and 68 is a helical spring 71 under an initial compression, the inner end of spring 71 abutting against a washer 72 which, in turn, abuts against a shoulder on bolt 66. As a consequence, when shell 61 of governor 41 is rotated clockwise as a result of the attainment of the tripping speed of rotation of the governor, yoke 63 is rotated clockwise to bring rope grip 65 into engagement with governor rope 42 and to grip the governor rope between the rope grip and the governor sheave 43. A drag is thus produced upon the governor rope, and inasmuch as one end of the governor rope 42 is secured to the actuating lever 37 of the car safety brakes, the drag thus produced on the governor rope causes actuating lever 37 to be raised relatively to the car as the car descends, and thus causes the application of the car safety brakes 17. Undue strains and possible breakage of the governor rope after the drag is first produced in the governor rope, are avoided by the action of spring 71, which permits the governor rope to slip past the rope grip after the governor drag builds up to a predetermined amount.

To drive the governor so that its speed is in accordance with the speed of the elevator car, and to provide instantaneous action of the car safety brakes independently of the car speed in the event of abnormal downward acceleration of the car, the portion of governor rope 42 extending from the governor sheave 43 down to the car is secured to actuating lever 37, as at 73 in Figure 1. The portion of governor rope 42 extending from a governor rope tension sheave 74 at the bottom of the hatchway up to the car is secured to the car framework 12 in any suitable manner, such as to outwardly extending bracket 75 that is fastened to the car framework.

With this arrangement, the governor rope 42

exerts an upward pull on actuating lever 37, which pull, when the elevator car is stationary, is equal to one-half the weight of the governor rope tension sheave 74 (including the weight of the tension sheave frame 76 and weights 77) plus the weight of the unbalanced portion of the governor rope 42 on the stretch from the governor to the governor rope tension sheave. When the car is travelling in the downward direction at a uniform speed, the upward pull on actuating lever 37 exerted by the governor rope 42 is increased by the force necessary to drive the governor from the car, and when the car is accelerating at a normal rate in the downward direction, the upward pull is still further increased by the force necessary to overcome the inertia of the moving parts in the governor roping system. To overcome this upward pull of the governor rope 42 on actuating lever 37, a weight 80 is suspended therefrom, this weight being of sufficient amount to insure the overcoming of all the above specified upward forces upon the actuating lever 37 while the elevator car operates under all normal service conditions, and thus to insure the maintenance of actuating lever 37 in its down position against stop 36. Accordingly, the car safety brakes are not applied during normal service conditions.

In the event of excessive downward acceleration of the car, such as would be incident to the breaking of the hoisting cables 13, the weight 80 falls downwardly with an acceleration less than that of the car since the downward acceleration of the weight 80 is retarded by the upward pull exerted by the governor rope 42. This difference between the downward acceleration of the elevator car 10 and the downward acceleration of weight 80 results in displacement of weight 80 upwardly relative to car 10, and thus, in upward movement of the actuating lever 37 to cause the application of the car safety brakes 17.

The action of weight 80 under abnormal downward acceleration of the elevator car may be explained in another fashion by assuming that the weight 80 on the car first falls with the car at the abnormal downward acceleration thereof, with the result that the downward pull of the weight 80 on actuating lever 37 drops from its initial value to a value which is nearer to zero the nearer the abnormal downward acceleration is gravity acceleration, or a free fall. The upward pull of the governor rope 42 upon the actuating lever 37 remains effective, and in fact, under conditions of downward acceleration, is in an amount slightly larger than that when the car is stationary or moving at a uniform downward speed. Upon such abnormal downward acceleration of car this upward pull of the governor rope 42 upon the actuating lever 37 is no longer resisted by weight 80, with the result that the upward pull of the governor results in raising actuating lever 37 to cause the application of the car safety brakes.

It is to be observed that the application of the car safety brakes 17 as just described for conditions of abnormal downward acceleration of the car 10 is effected immediately and without waiting for the abnormal downward acceleration of the car to bring the car, and thus the governor 41, to the predetermined overspeed at which the governor operates to effect the application of the car safety brakes. The car is thus stopped, after the occurrence of an emergency condition giving rise to an abnormal downward acceleration of the car, immediately upon the occurrence of the condition, and in a shorter distance, from a lower speed and with less jar, than would be the case if, under such conditions, the stopping of the car was made in response to overspeed of the car.

It is to be further observed that governor 41 still remains effective as an overspeed safety device, operating in the event of overspeed of the car to grip the governor rope 42 and in this manner to cause the application of the car safety brakes.

Attention is directed to the fact that the invention is particularly useful in elevator installations of comparatively slow speed and low rise, where the amount of governor rope present is such that, even assuming a free fall of the car, the inertia of the governor roping system is inconsequential. In such installations, the force causing the application of the car safety brakes independently of the car speed in accordance with this invention, is determined by the effect of the weight 80 suspended on the actuating lever and of the weight of the governor rope tension sheave 74, including the weight of the tension sheave frame 76 and weights 77.

It is to be understood that the invention is applicable to the counterweights in a manner similar to that described for the elevator cars, and that any suitable form of governor and safety brakes may be utilized. It is also to be understood that, in practice, weight 80 may be surplus weight added to one or both of the lift rods 25 so as to simulate the effect of weight 80 suspended from the end of actuating lever 37.

What is claimed is:

1. Elevator safety equipment for a movable body in the hatchway of an elevator installation, comprising; mechanism, including a safety brake on said body, for stopping said body under emergency conditions, said mechanism also including an actuating device on said body movable from its normal, non-safety-applying position to a position causing application of said safety brake; a sheave mounted at the top of said hatchway; a loop of rope extending throughout the height of said hatchway and closed upon said body, the upper bight of said loop of rope passing over said sheave with the end of the rope in the upper bight operatively connected to said actuating device, and with the end of the rope in the lower bight secured to said body; a second sheave mounted at the bottom of said hatchway and around which the lower bight of said loop of rope passes; means maintaining said rope in tension; and weighted means on said body connected to the end of said rope in the upper bight so that at least a portion of the weight of said weighted means is supported by said rope, the balance of the weight of said weighted means being supported by said body and serving to maintain said weighted means and the end of said rope in the upper bight in fixed relation to said body during normal service conditions of operation of said movable body, said weighted means, upon abnormal downward acceleration of said movable body, moving downwardly at an acceleration less than that of said movable body so that the end of said rope in the upper bight moves upwardly relative to said body thereby to move said actuating device from its non-safety-applying position to its position causing application of said safety brake.

2. Elevator safety equipment for a movable body in the hatchway of an elevator installation, comprising; mechanism, including a safety brake on said body, for stopping said body under emergency conditions, said mechanism also including an actuating device on said body movable from its normal, non-safety-applying position to a position causing application of said safety brake; a sheave mounted upon a fixed support at the top of said hatchway; a loop of rope extending throughout the height of said hatchway and closed upon said body, the upper bight of said loop of rope passing over said sheave with the end of the rope in the upper bight operatively connected to said actuating device, and with the end of the rope in the lower bight secured to said body; a weighted tension sheave suspended from the lower bight of said loop of rope; and weighted means on said body connected to the end of said rope in the upper bight so that at least a portion of the weight of said weighted means is supported by said rope, the balance of the weight of said weighted means being supported by said body and serving to maintain said weighted means and the end of said rope in the upper bight in fixed relation to said body during normal service conditions of operation of said movable body, said weighted means, upon abnormal downward acceleration of said movable body, moving downwardly at an acceleration less than that of said movable body so that the end of the rope in the upper bight moves upwardly relative to said body and thus moves said actuating device from its non-safety-applying position to its position causing application of said safety brake.

3. Elevator safety equipment for a movable body in the hatchway of an elevator installation, comprising; mechanism, including a safety brake on said body, for stopping said body under emergency conditions, said mechanism also including an actuating device on said body movable from its normal, non-safety-applying position to a position causing application of said safety brake; a rotatable sheave mounted upon a fixed support at the top of said hatchway; a loop of rope extending throughout the height of said hatchway and closed upon said body, the upper bight of said loop of rope passing over said rotatable sheave with the end of the rope in the upper bight operatively connected to said actuating device, and with the end of the rope in the lower bight secured to said body; a weighted tension sheave suspended from the lower bight of said loop of rope; and weighted means on said body suspended from said mechanism for maintaining said actuating device in its non-safety-applying position during normal service conditions of operation of said movable body, said weighted means being ineffective to maintain said actuating device in its non-safety-apply-position upon abnormal downward acceleration of said movable body.

4. In an elevator installation; a body movable up and down in the elevator hatchway; safety brake equipment for stopping said body in emergencies independently of the hoisting rope and hoisting mechanism for said body, said equipment including a safety brake on said body, a member extending along the hatchway to be gripped by the safety brake when the safety brake is applied, and an actuating device on said body causing application of the safety brake when moved from its down position; a weight on said body suspended from said actuating device, said weight tending to maintain said actuating device in its down position; a rope in said hatchway, one end of said rope being secured to said actuating device, with said rope extending from said one end up to the top of said hatchway, passing over deflection means at the top of said hatchway, extending down to the bottom of said hatchway and thence extending up to and secured to said body; and weighted means suspended from the bight of said rope at the bottom of said hatchway.

5. In an elevator installation; a body movable up and down in the elevator hatchway; safety brake equipment for stopping said body in emergencies independently of the hoisting rope and hoisting mechanism for said body, said equipment including a safety brake on said body, a member extending along the hatchway to be gripped by the safety brake when the safety brake is applied, and an actuating device on said body causing application of the safety brake when moved from its down position; a rope in said hatchway, one end of said rope being secured to said actuating device, with said rope extending from said one end up to the top of said hatchway, passing over deflection means at the top of said hatchway, extending down to the bottom of said hatchway and thence extending up to and secured to said body; a weight on said body operatively related to the end of said rope that is secured to said actuating device so that said weight exerts a downward pull on such end of said rope and maintains said actuating device in its down position during normal operation of said body; and weighted means suspended from the bight of said rope at the bottom of said hatchway, said weight and said weighted means cooperating during abnormal downward acceleration of the car to move said actuating device from its down position to cause application of the safety brake.

6. Elevator safety equipment for stopping, immediately upon abnormal downward acceleration and independently of speed, an elevator car equipped with car safety brakes and an actuating member for causing, when raised from a down position, the application of the car safety brakes, characterized by; a loop of rope in the elevator hatchway extending from the top to the bottom thereof with the downwardly extending end of the rope secured to the actuating member and the upwardly extending end of the rope secured to the car; two rotatable sheaves, one at the top and one at the bottom of the hatchway, around which the rope passes, the upper sheave being supported by the building structure and the lower sheave being supported by the rope to serve as a tensioning sheave therefor; and a weight on the car suspended from the actuating member to oppose the upward pull exerted thereon by the end of the rope secured thereto and effective to maintain the actuating member in its down position during normal service conditions of car operation, the weight becoming ineffective immediately upon an abnormal downward acceleration being imparted to the car, so that the actuating member is immediately moved upward relative to the car to cause the application of the car safety brakes.

7. In an elevator installation of comparatively low rise and in which the normal full speed of the elevator car is comparatively slow, safety equipment for stopping the elevator car

promptly, in a short distance and before the speed of the elevator car increases to any appreciable extent, in the event of abnormal downward acceleration of the car, said safety equipment comprising; an instantaneous safety on the car for stopping the car by gripping the guide rails for the car, said safety having an actuating lever, pivotally supported on the car framework, movable from a down, non-safety-applying position to an up, safety-applying position; a rotatable sheave mounted upon a fixed support at the top of the hatchway; a weighted rotatable sheave at the bottom of the hatchway mounted to provide for vertical motion thereof; a rope in the hatchway extending from the car up to the top of the hatchway, over said rotatable sheave, down to the bottom of the hatchway, under said weighted rotatable sheave, and up to the car, the end of said rope extending from the car to the top of the hatchway being secured to said actuating lever, the other end of said rope being secured to the car framework, and said weighted rotatable sheave being supported by said rope; and a weight suspended from said actuating lever, said weight being of such amount, not less than one-half the weight of said weighted rotatable sheave, as to oppose the upward pull exerted by said rope upon said actuating lever, and to maintain said actuating lever in its down, non-safety-applying position during normal conditions of operation of the car, said weight, upon abnormal downward acceleration of the car, moving downward at an acceleration less than that of said car so that said actuating lever immediately moves from its down, non-safety-applying position to its up, safety-applying position to cause the immediate application of said instantaneous safety on the car.

8. Elevator safety equipment for a movable body in the hatchway of an elevator installation, comprising; mechanism, including a safety brake on said body, for stopping said body under emergency conditions, said mechanism also including an actuating device on said body movable from its normal, non-safety-applying position to a position causing application of said safety brake; a sheave mounted at the top of said hatchway; a loop of rope extending throughout the height of said hatchway and closed upon said body, the upper bight of said loop of rope passing over said sheave with the end of the rope in the upper bight operatively connected to said actuating device, and with the end of the rope in the lower bight secured to said body; a second sheave mounted at the bottom of said hatchway and around which the lower bight of said loop of rope passes; means maintaining said rope in tension; governor means operatively connected to one of said sheaves and responsive to rotation of such sheave incident to a predetermined overspeed of said body in the downward direction, to grip said rope; and weighted means on said body connected to the end of said rope in the upper bight so that at least a portion of the weight of said weighted means is supported by said rope, the balance of the weight of said weighted means being supported by said body and serving to maintain said weighted means and the end of said rope in the upper bight in fixed relation to said body during normal service conditions of operation of said movable body, the end of said rope in the upper bight, upon said predetermined overspeed of said movable body in the downward direction and the consequent gripping of said rope by said governor means, moving upwardly relative to said movable body in response to the gripping of said rope and the continued downward motion of said movable body, to move said actuating device from its non-safety-applying position to its position causing application of said safety brake, said weighted means, upon abnormal downward acceleration of said movable body, moving downwardly at an acceleration less than that of said movable body so that the end of said rope in the upper bight moves upwardly relative to said body thereby to move said actuating device from its non-safety-applying position to its position causing application of said safety brake.

9. Elevator safety equipment for a movable body in the hatchway of an elevator installation, comprising; mechanism, including a safety brake on said body, for stopping said body under emergency conditions, said mechanism also including an actuating device on said body movable from its normal, non-safety-applying position to a position causing application of said safety brake; a governor mounted upon a fixed support at the top of said hatchway, said governor having a rotatable sheave by which it is driven; governor roping for driving said governor in accordance with the speed of said body and for moving said actuating device to its safety-applying position when, in response to a predetermined overspeed of the body in the downward direction, said governor trips, said roping being a loop of rope extending throughout the height of said hatchway and closed upon said body, the upper bight of said loop of rope passing over said governor sheave with the end of the rope in the upper bight operatively connected to said actuating device, and with the end of the rope in the lower bight secured to said body; a weighted tension sheave suspended from the lower bight of said loop of rope; and weighted means on said body suspended from said mechanism for maintaining said actuating device in its non-safety-applying position during normal service conditions of operation of said movable body, said weighted means being ineffective to maintain said actuating device in its non-safety-applying position upon abnormal downward acceleration of said movable body.

10. In an elevator installation; a body movable up and down the elevator hatchway; safety brake equipment for stopping said body in emergencies independently of the hoisting rope and hoisting mechanism for said body, said equipment including a safety brake on said body, a member extending along the hatchway to be gripped by the safety brake when the safety brake is applied, and an actuating device on said body causing application of the safety brake when moved from its down position; a weight on said body suspended from said actuating device, said weight tending to maintain said actuating device in its down position; governor means, including a governor rope in said hatchway, a governor sheave over which said governor rope passes, and mechanism responsive to rotation of the governor sheave at a predetermined speed in a given direction for gripping the governor rope, one end of said governor rope being secured to said actuating device, with said governor rope extending from said one end up to the top of said hatchway, passing over said governor sheave, extending down to the bottom of said hatchway and thence extending up to and secured to said body, so that said

governor rope drives said governor sheave in accordance with the speed and direction of motion of said body, said governor mechanism gripping said governor rope when said body, moving in the down direction, attains a given speed in excess of its normal full speed; and weighted means suspended from the bight of said governor rope at the bottom of said hatchway.

11. In an elevator installation of comparatively low rise and in which the normal full speed of the elevator car is comparatively slow, safety equipment for stopping the elevator car promptly in the event of excessive downward speed of the car and also for stopping the elevator car promptly, in a short distance and before the speed of the elevator car increases to any appreciable extent, in the event of abnormal downward acceleration of the car, said safety equipment comprising; an instantaneous safety on the car for stopping the car by gripping the guide rails for the car, said safety having an actuating lever, pivotally supported on the car framework, movable from a down, non-safety-applying position to an up, safety-applying position; an elevator overspeed governor at the top of the elevator hatchway; a governor rope in the hatchway; a weighted rotatable sheave at the bottom of the hatchway mounted to provide for vertical motion thereof, said governor having a governor sheave by which it is driven by said governor rope and also having means actuated at a certain speed and direction of rotation of said governor sheave to grip said governor rope, and said governor rope in the hatchway extending from the car up to the top of the hatchway, over said governor sheave, down to the bottom of the hatchway, under said weighted rotatable sheave, and up to the car, the end of said governor rope extending from the car to the top of the hatchway being secured to said actuating lever, the other end of said governor rope being secured to the car framework, said weighted rotatable sheave being supported by said governor rope, and said governor rope driving said governor sheave, and thus said governor, in accordance with the speed and direction of motion of the car and so that excessive downward speed of the car causes said governor to grip said governor rope; and a weight suspended from said actuating lever, said weight being of such amount, not less than one-half the weight of said weighted rotatable sheave, as to oppose the upward pull exerted by said governor rope upon said actuating lever, and to maintain said actuating lever in its down, non-safety-applying position during normal conditions of operation of the car; whereby, upon excessive downward speed of the car and the consequent gripping of said governor rope, said actuating lever is immediately moved from its down, non-safety-applying position to its up, safety-applying position to cause the immediate application of the instantaneous safety on the car, and whereby, upon abnormal downward acceleration of the car, said weight moves downward at an acceleration less than that of the car, so that said actuating lever is immediately moved from its down, non-safety-applying position to its up, safety-applying position to cause the immediate application of the instantaneous safety on the car.

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