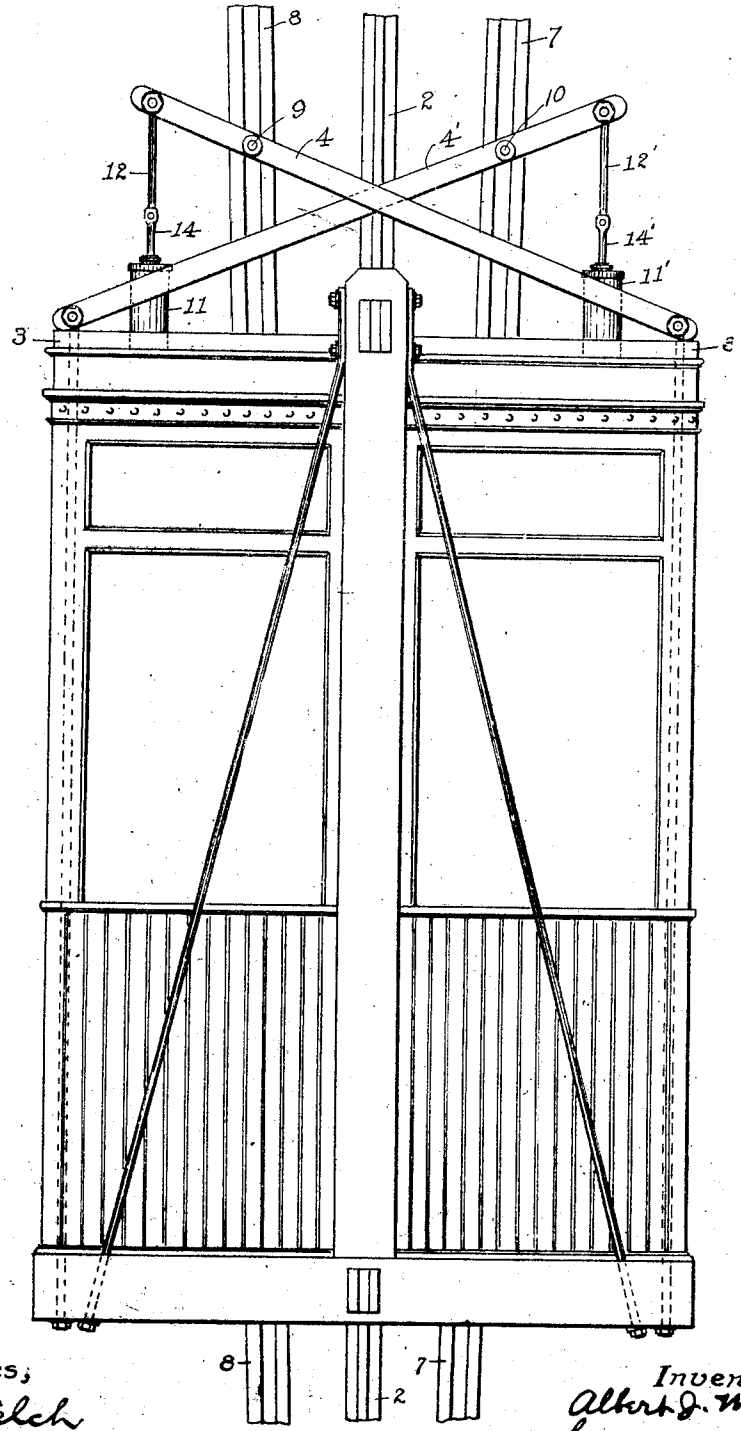
No. 827,109. PATENTED JULY 31, 1906.

A. J. MYER.

ELEVATOR.

APPLICATION FILED MAR. 10, 1905.

2 SHEETS—SHEET 1.



Witnesses;
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—Fig. 1.—

Inventor;
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his attorneys

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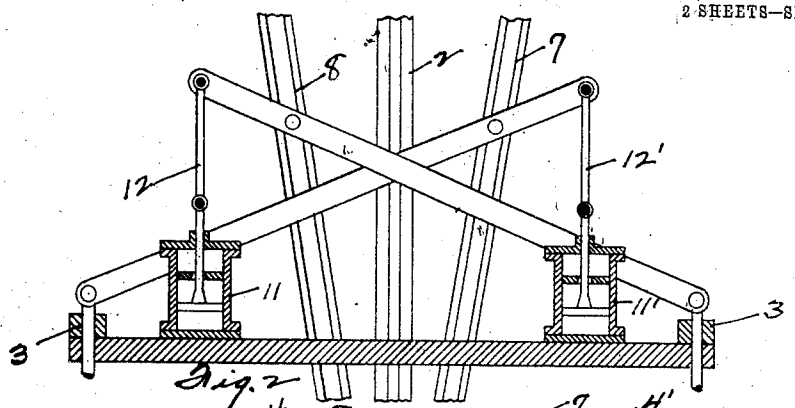

Fig. 2

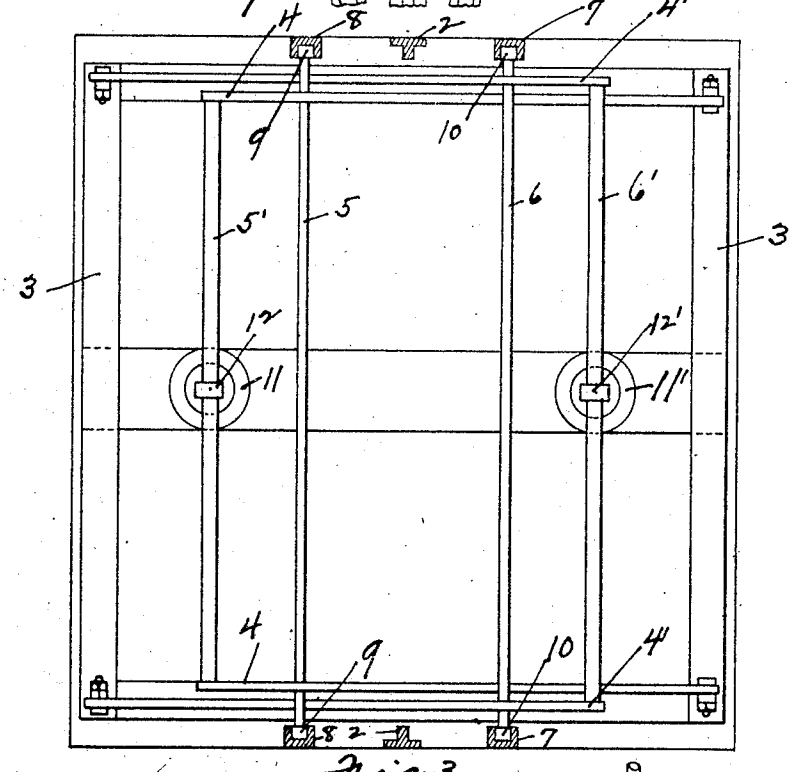

Fig. 3

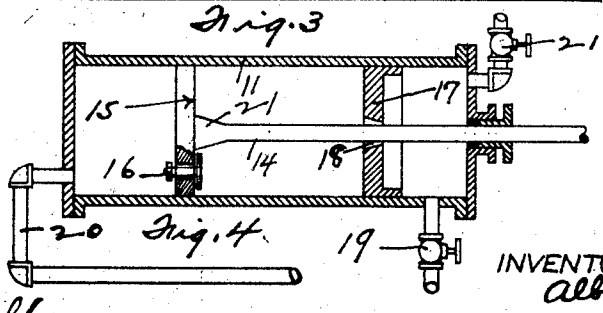

Fig. 4

WITNESSES:

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UNITED STATES PATENT OFFICE.

ALBERT J. MYER, OF LAKE VIEW, NEW YORK

ELEVATOR.

No. 827,109. Specification of Letters Patent. Patented July 31, 1906.

Application filed March 10, 1905. Serial No. 249,405.

To all whom it may concern:

Be it known that I, ALBERT J. MYER, a citizen of the United States, residing at Lake View, in the county of Erie and State of New York, have invented new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to elevators, and more particularly to apparatus for limiting the speed of the elevator.

The object of my invention is to provide means for limiting the movement of the elevator, particularly in its downward movement, to a predetermined maximum of speed.

To that end my apparatus consists in employing the inertia of a liquid to actuate means which will retard or stop the descent of the car, provided it moves at a speed greater than a predetermined maximum speed. Furthermore, to cushion the descent of the car I provide means whereby during the last few feet of descent—say six or eight feet—the car is retarded by resistance increasing rapidly and reaching the point when the resistance will stop the car absolutely as it reaches the bottom of the shaft and without shock.

In the drawings herewith, in which like characters of reference indicate corresponding parts, Figure 1 is a side elevation of a car provided with my invention and also showing the side wall and guides of the elevator-shaft. Fig. 2 is a detail of my retarding mechanism, showing the cylinders in section. Fig. 3 is a plan view. Fig. 4 is a central vertical section, on a larger scale, of one of my controlling-cylinders.

1 is an elevator-car which travels in the elevator shaft or well in vertical guides, one of which is shown at 2, secured in the usual manner to the side walls of the elevator-shaft. Pivoted rigidly to plates 3 3 on the top of the elevator-car are levers 4 4′. These levers 4 4′ are pivoted in pairs oppositely to each other. The levers 4 4 are secured together by cross-bars 5 5′, and the levers 4′ 4′ are secured together by cross-bars 6 6′.

Mounted upon the side walls of the shaft are inclined guides 7 and 8. These guides are made up of two plates, with an intervening space or a single grooved plate. In the grooves or spaces between the sides of these plates travel rollers 9 and 10. These rollers 9 and 10 are pivotally mounted upon the ends of the cross-bars 5 and 6, respectively. Secured to the elevator-car body are controlling-cylinders 11 11′. Pivoted to the pistons of these controlling-cylinders are connecting-rods 12 12′, and these rods 12 12′ are in turn pivoted to the cross-bars 5′ and 6′, respectively. It will now be seen that as the car moves downwardly the pivoted levers 4 and 4′ will be raised, lifting the cross-bars 5′ and 6′, and consequently raising the pistons of the controlling-cylinders.

The controlling-cylinders, as shown, are of special construction. By reference to Fig. 4 they will be explained.

11 is the cylinder, which is secured to the elevator-car.

14 is the piston-rod pivoted to the connecting-bar 12 or 12′, which in turn is pivoted to a cross-bar 5′ or 6′, as the case may be.

15 is the piston-head, which is a good fit in the cylinder 11. A valve 16 is provided in the head 15 to permit return of liquid which may leak past the piston-head.

17 is a diaphragm rigidly secured to the walls of the cylinder 11. This diaphragm has a central opening 18 of a diameter in excess of the diameter of the piston-rod 14 for purposes soon explained. A cock 19 is placed at or near the upper end of the cylinder to determine when the cylinder is properly filled with liquid. A pipe 20 connects with the bottom of the cylinder and extends up to about the height of the cylinder. This is a vent-pipe for the lower part of the cylinder. The cylinder is filled from a connection and valve 21. The cylinder should be filled to such a point that when the piston-head is at the bottom of the cylinder the liquid will entirely fill the space between the piston-head 15 and the diaphragm 17, and a trifle more, enough more to at least cover the diaphragm 17. It will now be evident that the rapidity of movement of the piston-head 15 in the cylinder 11 will depend on two things—viz., first, the inertia of the liquid in the cylinder; second, the difference in diameter between the piston-rod 14 and the opening of the diaphragm 17, and having a liquid of known fluidity or inertia the speed of the piston may always be determined (with reference to the speed of the elevator) by the size of the central opening in the diaphragm 17. The portion of the piston-rod 14 next the head 15, or that portion of the piston which would travel through the annular opening 18, is tapered, as shown in exaggerated form at 21. This portion of the piston-rod is a frustum of a cone, the smaller portion of which is the

diameter of the piston-rod 14 and the larger diameter of which equals the diameter of the opening 18 in the diaphragm 17. Now as the lower end of the piston-rod is made a frustum of a cone with diameter increasing from the diameter of the piston-rod 14 to the diameter of the opening in the diaphragm 17 it will be seen that the speed ranges from the established maximum to zero while the piston is traveling the length of the frustum of the cone 21.

It will be noted that the cone is exaggerated both in length and diameter in the drawings to illustrate the construction.

I will now describe the operation of my apparatus. With every normal movement of the car the friction-rollers will travel in the inclined guides 7 and 8 and cause the pistons of the cylinders 11 11′ to make regular strokes. The size of the opening in the diaphragm 17 is so proportioned with the inertia of the liquid in the cylinders 11 11′ that so long as the imposed maximum limit of speed is not exceeded the friction of the rollers 9 and 10 on the walls of the guides 7 and 8 will not retard the motion. But assume the maximum limit to be exceeded, the inertia of the liquid in passing through the opening of the diaphragm 17 will so retard the movement of the piston-rod 14 as to cause the rollers 9 and 10 to bear against the guides 7 and 8 with so much force that the movement of the car will be retarded. If the car 1 is cut loose from its cable and allowed to fall, the speed of the fall will be limited by the inertia of the liquid in the cylinder 11 and the size of the opening in the diaphragm 17, and as the car approaches the bottom the frustum of a cone 21 will reduce the speed of the car to zero.

It will be noted that as a safety appliance my invention is in operation at all times when the elevator is being moved. It is therefore more than a safety apparatus to be merely called into action in the event of an emergency, (and probably be rusted or stuck so as to fail to respond,) but it is a governing apparatus, governing the speed of the elevator at all times. It is therefore not a mere safety appliance, and while it meets all conditions in case of accident it so governs the elevator at all times as to materially reduce the likelihood of accident.

What I claim is—

1. In combination with an elevator-car, a guide secured rigidly to the elevator-shaft, said guide being inclined to the line of movement of said car, a roller engaged by said guide and carried by said car, a governing-cylinder rigidly mounted upon said car, the piston of said cylinder being connected to said roller and reciprocated thereby, a liquid in said cylinder and a fixed diaphragm in said cylinder having a passage-way for said liquid of a size determined by the inertia of said liquid and by the angle of incline of said guide, whereby said roller will ride comparatively freely upon said guide when said car moves not faster that its predetermined limit, and whereby, when the car exceeds in speed said predetermined limit, said roller will engage said guide frictionally to limit the speed of said car to said predetermined limit, and means for further limiting the flow of said liquid progressively when said car is within a few feet of the bottom of the shaft until the car is brought to a standstill just before reaching the bottom of the shaft.

2. In combination of an elevator-car, guides rigidly mounted oppositely upon the sides of the shaft at an angle with the line of movement of said car, rollers traveling in said guides, rods carrying said rollers, levers secured to said rods, and said levers being pivoted to said car, governing-cylinders mounted rigidly upon said car, connecting-rods pivoted to said rods and to the pistons of said cylinders, a liquid in said cylinders, fixed diaphragms in said cylinders having passage-ways of predetermined size to allow the pistons of said cylinders to move without producing substantial friction upon said guides when said car moves at normal speed, and to produce friction upon said guides to limit the movement of the car to substantially normal speed.

3. In combination with a car, inclines, rollers, a governing-cylinder, a piston in said cylinder reciprocated by the engagement of said rollers with said guides when the car is moved, a fixed diaphragm in said cylinder, having a passage-way of predetermined size, and a liquid in said cylinder, whereby when said piston is moved, said liquid is forced through said vent at a speed sufficient to permit the piston to move substantially without friction upon said guides when said car moves at normal speed, and whereby the inertia of said liquid will hold said piston against rapid movement when the said car moves at abnormal speed.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

ALBERT J. MYER.

Witnesses:

MARY A. LARERY,

SAMUEL M. WELCH.