No. 743,923. PATENTED NOV. 10, 1903.

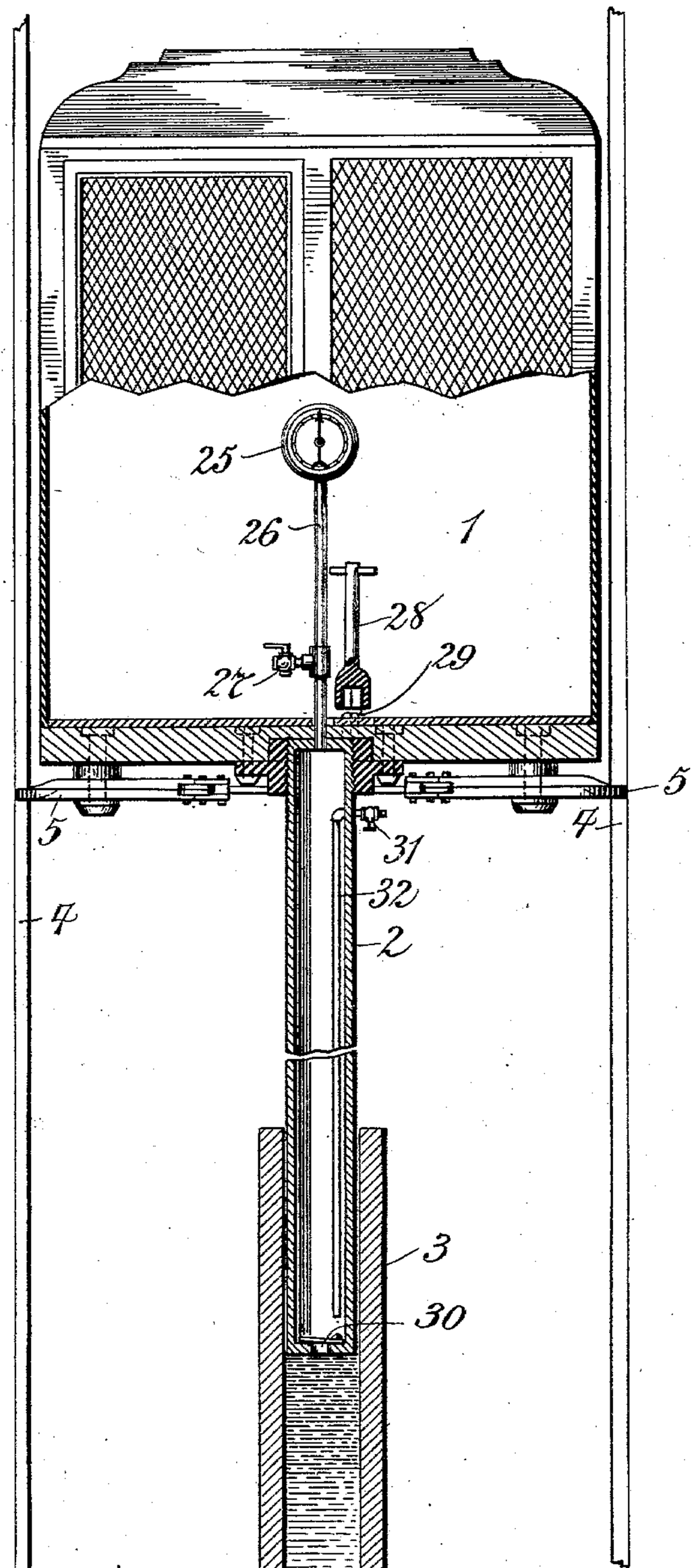
F. D. POTTER.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED MAR. 4, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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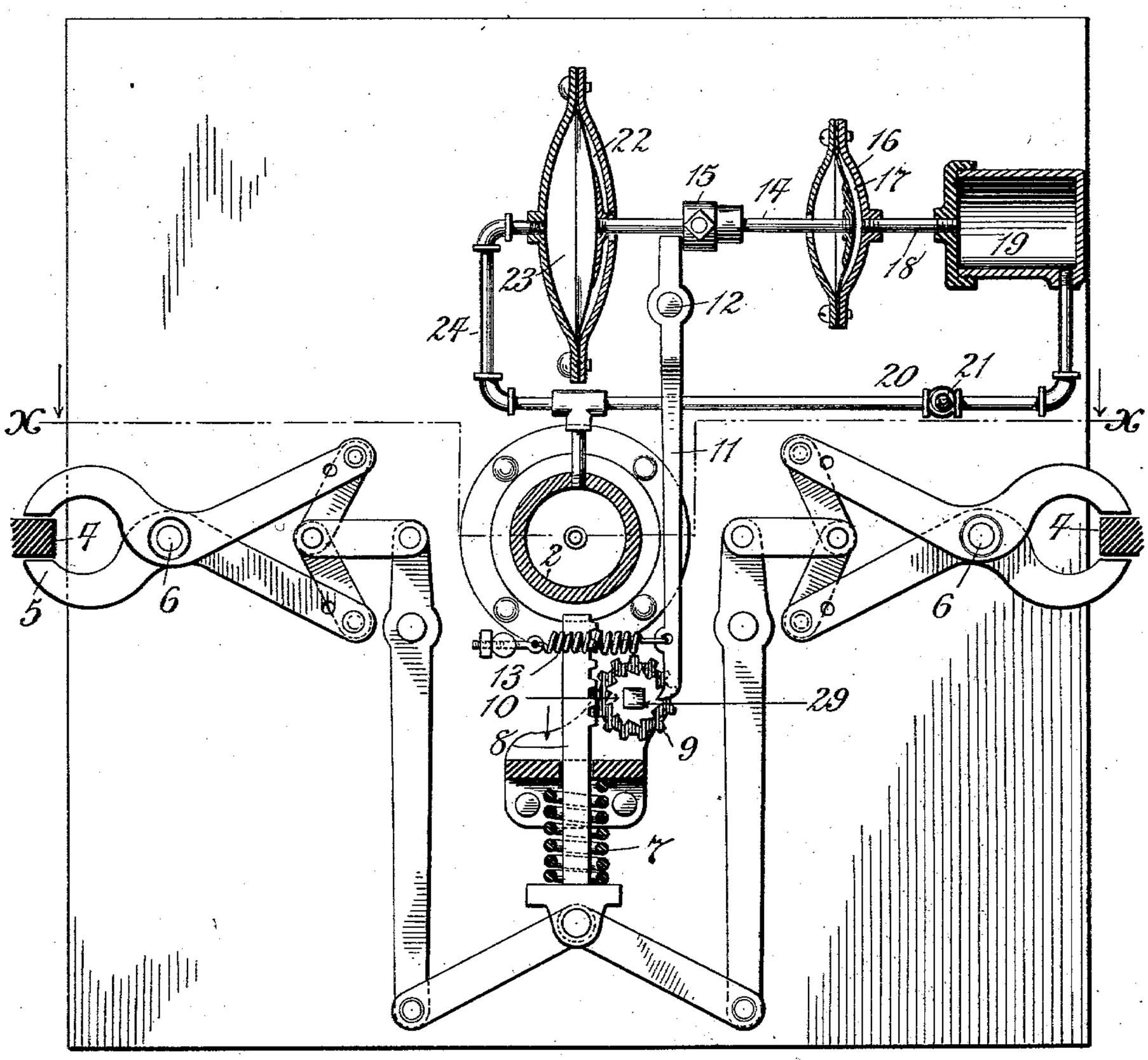
NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2



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No. 743,923. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

FREDERIC D. POTTER, OF LINDEN, NEW JERSEY.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 743,923, dated November 10, 1903.

Application filed March 4, 1903. Serial No. 146,073. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC D. POTTER, a citizen of the United States, residing in Linden, county of Union, and State of New Jersey, have invented a certain new and useful Improvement in Safety Devices for Elevators, of which the following is a specification.

This invention has relation to that form of elevator in which the car is supported upon a vertical plunger moving in a vertical cylinder; and the object of the invention is the provision of means for holding and supporting the elevator-car in case of fracture of the cylinder.

The invention is illustrated in a preferred form in the accompanying drawings, wherein—

Figure 1 is a vertical sectional view on the line *x x* in Fig. 2, and Fig. 2 is a horizontal section on a plane immediately below the car-floor.

As ordinarily constructed elevators of the class above named are provided with counterweights of sufficient size not only to balance the weight of the car, but also to partly balance that of the plunger. It is obvious that in case the plunger should break the counterweight would throw the car to the top of the shaft with disastrous results and that the lower fragment of the plunger continuing to move upward and being unrestrained at its upper end would very probably create damage in the shaft. My invention obviates both of these difficulties.

In the drawings the car is shown at 1, supported by a hollow steel plunger 2, which moves within a cylinder 3 in the usual manner.

It is of the essence of this invention that the hollow plunger shall be filled with fluid under compression and that means shall be provided for supporting the car, which means are normally prevented from operation by the pressure of the fluid within the plunger. I have shown a preferred means so operated in the drawings, which I shall now describe.

The usual guides for the car are shown at 4 in Fig. 2, and beneath the car I mount two pairs of jaws 5, pivoted, as at 6, and adapted to be forcibly closed upon the guides 4 by appropiate levers under the influence of a spring 7 or equivalent means.

As shown in Fig. 2, the spring 7 acts, through toggle jaws and levers acting on both sides thereof, to close the jaws 5. The rack-bar 8 is attached to the aforesaid lever system, so as to move in the direction of the arrow in Fig. 2 when the jaws are closed. The rack 8 engages with the pinion 9, to which is attached the ratchet 10, controlled by the pawl 11, pivoted at 12. The pawl is held normally in engagement with the ratchet 10 by the spring 13.

My invention involves in its preferred form the use of means tending constantly to push the pawl 11 out of engagement with the ratchet 10, and this means is combined with a device for preventing operation of said means as long as the predetermined fluid-pressure is preserved within the plunger 2. With these ends in view I use a reciprocating rod 14, carrying an adjustable abutment 15, so arranged as to press upon the pawl 11 for causing disengagement with the ratchet 10 when said rod and abutment are pushed to the left in Fig. 2. The preferred means employed for so pushing the rod 14 consists of a diaphragm 16 within an appropriate chamber 17, which communicates by a pipe 18 with a chamber 19. This chamber 19 is supplied with fluid under pressure (preferably air) from the plunger 2 through a pipe 20, into which is inserted a check-valve 21, permitting air to enter the chamber 19, but not to leave it.

It is obvious that if the plunger 2 is filled with compressed air under a pressure of, say, two hundred pounds to the inch the chamber 19 will be charged with air at the same pressure; but in case of failure of pressure in the plunger 2 the check-valve 21 will prevent a like fall of pressure in the chamber 19. The device for counteracting the tendency of the diaphragm 16 preferably comprises a diaphragm 22 within an appropriate chamber 23. This chamber communicates with the plunger 2 by means of the pipe 24. Normally the pressure per square inch is equal on the left of diaphragm 22 and on the right of diaphragm 16; but since the diaphragm 22 is the

larger of the two it determines the position of the abutment 15, and thus insures engagement between the pawl 11 and ratchet 10.

The arrangement shown permits of a considerable loss of pressure in the plunger 2 and the chamber 23 by reason of leakage before the diaphragm 16 is able to overpower the diaphragm 22, and thus such variations in pressure as cannot be avoided in practice will not cause danger of accidental and inopportune operation of the jaws 5.

In Fig. 1 there is shown a pressure-gage 25, which connects with the plunger 2 by the pipe 26, whereby the operator can ascertain how nearly any reduction in pressure is approaching the critical condition which causes operation of the clutch. The pressure can always be brought back to a safe amount by an air-compressor connected to the valve 27.

It is to be understood that the diaphragm 16 and its associated parts can be replaced by any desired device causing constant pressure against the diaphragm 22 without departing from this invention.

After operation of the safety-jaws their grip can be released by applying an appropriate key 28 to a square 29 from the pinion and ratchet 9 and 10.

I prefer to employ an opening 30, preferably covered with a flat valve, at the bottom of the plunger 2, as shown in Fig. 1. The water in the cylinder 3 will be prevented from entering the plunger in any material quantity by the compressed air within the plunger, and in case of entrance of water to an undesirable extent the same may be blown out by opening the valve 31 in the pipe 32 within the plunger.

Supposing the plunger to be broken at any time, the fluid under pressure therein will be liberated and the following actions will be produced: The pressure in the chamber 23 will fall to atmosphere and the diaphragm 16, pushing the abutment 15 to the left in Fig. 2, will throw the pawl 11 out of engagement with the ratchet, permitting the spring 7 to apply the jaws 5 to the guides 4, thus holding the car rigidly in place in the shaft. At the same time the water under pressure in the cylinder 3 will be forced through the opening 30, allowing the plunger 2 to sink without further damage than the overflow of water from the cylinder. Thus neither the car nor the broken plunger will cause disaster.

Many changes may be made in the various possible arrangements which I have set forth without departing from this invention, and I am not to be understood as limiting myself to the details herein shown and described.

What I claim is—

1. An elevator-car, a hollow plunger containing fluid under constant pressure supporting said car and means for raising said plunger; in combination with means on the car controlled by said fluid under pressure for securing the car in its shaft, substantially as described.

2. An elevator-car, a hollow plunger supporting the same and a hydraulic cylinder within which said plunger can move said plunger containing fluid under a constant pressure, by leakage of which the faults in the plunger can be detected.

3. An elevator-car, a hollow plunger supporting the same and means for raising said plunger; in combination with securing means for the car adapted for operation by fluid under pressure and connecting-pipes connecting said means with the interior of said plunger, substantially as described.

4. In an elevator, a hollow car-supporting plunger containing fluid normally under constant pressure, a hydraulic cylinder therefor, and a valve admitting water to said plunger when the interior fluid-pressure permits, substantially as described.

5. In an elevator, a hollow car-supporting plunger, a hydraulic cylinder therefor, a valve admitting water to said plunger and a blow-off pipe leading from a point within and near the bottom of said plunger to the exterior thereof, substantially as described.

6. An elevator-car, a hollow plunger supporting the same, a securing means for the car carried thereby, means for operating said securing means, a device for restraining said operating means and a device controlled by fluid-pressure within said plunger for removing said restraining device, substantially as described.

7. An elevator-car, a hollow plunger supporting the same, a securing means for the car carried thereby, means tending constantly to operate said securing means, a device tending constantly to free said operating means and a pressure device controlled by fluid-pressure within said plunger for normally preventing action of said tripping device, substantially as described.

8. An elevator-car, a hollow plunger supporting the same, a safety device controlled by fluid-pressure within said plunger, a connecting-valve for applying a fluid-compressor to said plunger and a gage connected to said plunger for measuring the fluid-pressure within it, substantially as described.

9. An elevator-car, guides therefor, movable jaws for gripping said guides, a hollow plunger containing a fluid under constant pressure supporting the car, means for operating the gripping-jaws and a device operated by the fluid-pressure in said plunger for controlling said operating means, substantially as described.

10. An elevator-car, a safety device thereon, a tripping device therefor, a hollow plunger supporting the car, a diaphragm and fluid-reservoir tending to operate the trip-

ping device and a second opposing diaphragm operated by fluid-pressure within said plunger, substantially as described.

11. An elevator-car, a safety device therefor, a tripping device therefor, a hollow plunger supporting the car, a fluid-reservoir communicating with said plunger through a check-valve, a diaphragm operated by pressure in said reservoir for moving the tripping device, and a larger diaphragm connected directly with said plunger and opposing the tendency of the smaller diaphragm, substantially as described.

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