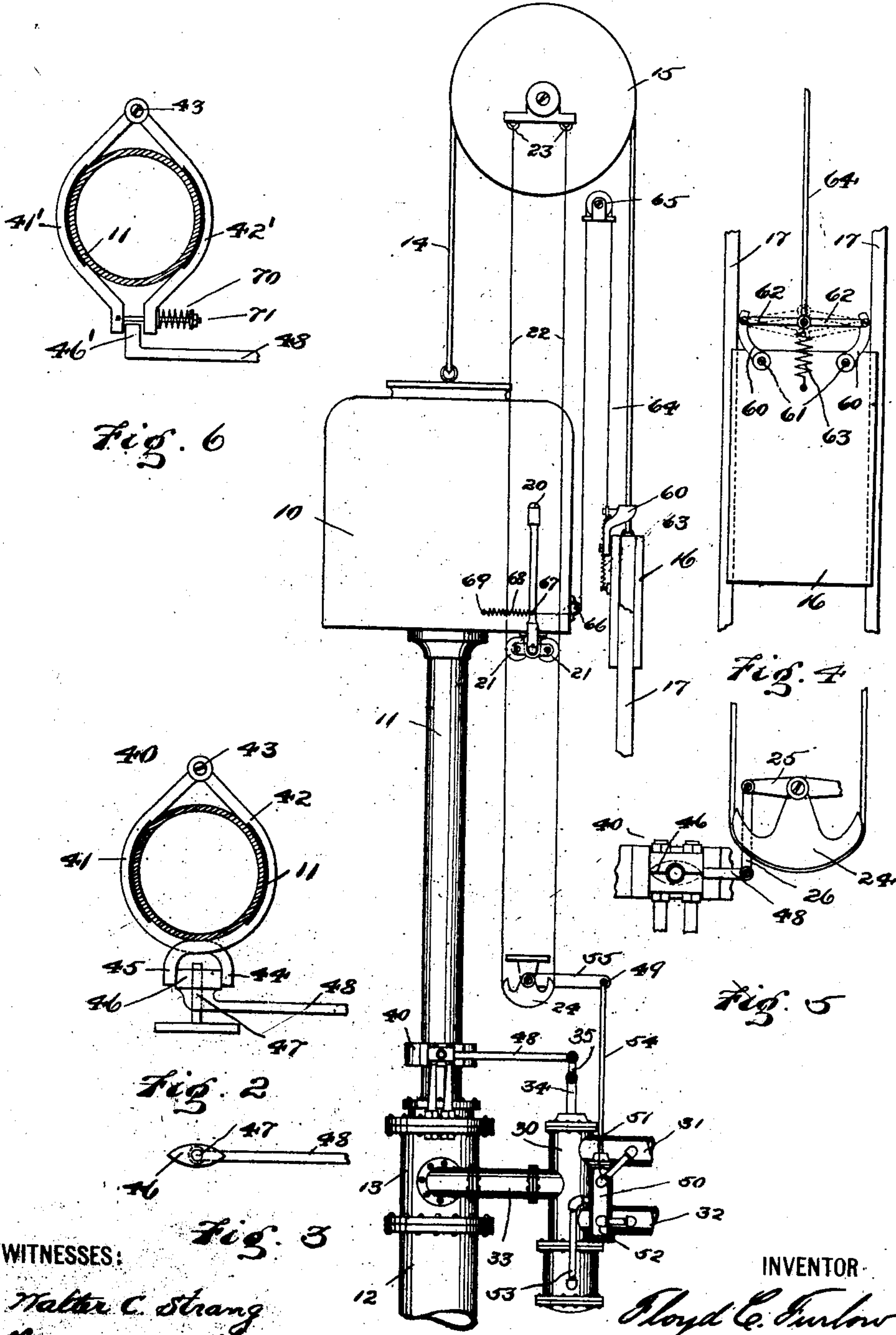


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F. C. FURLOW.
RETARDING DEVICE FOR PLUNGER ELEVATORS.
APPLICATION FILED OCT. 31, 1904.



WITNESSES:
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Fig. 1

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RETARDING DEVICE FOR PLUNGER-ELEVATORS.

No. 810,404.

Specification of Letters Patent.

Patented Jan. 23, 1906

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To all whom it may concern:

Be it known that I, FLOYD C. FURLOW, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Retarding Devices for Plunger-Elevators, of which the following is a specification.

My invention relates to retarding devices for plunger-elevators; and its object is to provide means for overcoming the momentum of such elevators.

Like characters of reference designate corresponding parts in all of the figures, in which—

Figure 1 shows in side elevation a plunger-elevator embodying my invention. Fig. 2 is an enlarged plan view of the part of the apparatus which I use in carrying out my invention. In this figure the plunger is shown in cross-section. Fig. 3 is a side view of one of the parts shown in Fig. 2. Fig. 4 is a side elevation of a counterweight with a part of the invention attached thereto. Fig. 5 is a view of certain parts in side elevation of a modification of my invention. Fig. 6 shows another modification.

Referring now to the drawings, 10 designates an elevator-car, which is attached to the top of a plunger 11.

12 is a hydraulic cylinder, in which the plunger 11 runs through a cylinder-head and stuffing-box 13.

A rope or cable 14 is attached to the top of the car and runs up over a sheave 15, which is situated at the top of the elevator-hatchway. The rope or cable 14 passes over this sheave and down to a counterweight 16. In the car 10 is placed an operating-lever 20, which is arranged to move tilting sheaves 21 21. Two operating-ropes 22 22 are attached to fixtures 23 23 at the top of the hatchway and descend to a point near the bottom of the hatchway, where they pass under a pivoted segment 24, to which they are attached. Between the supports at the top of the hatchway and the segment 24 these ropes 22 22 pass around the tilting sheaves 21 21.

30 designates a three-way or reversing valve, which is connected to the cylinder-head 13 below its stuffing-box by a pipe 33. This valve is arranged to close the ports leading to the pipe 33 or to open them, so that

they afford communication between it and either the pipe 31 or the pipe 32. These pipes 31 and 32 are connected, respectively, to a source of hydraulic power and to an exhaust. A pilot-valve 50 is situated near this three-way or reversing valve and is connected to the supply-pipe at 51 and to the exhaust-pipe at 52. It is also connected to one end of the reversing-valve 30 at 53. The valve-stem 54 of this valve is connected to an arm 55, which is attached to the segment 24. It is so arranged that when the operator in the car moves the lever 20 to the left or to the right he thereby moves the valve-stem 54 of the pilot-valve up or down. The pilot-valve is arranged to actuate the main valve in either direction to cause it to open or close its ports by moving its pistons, which are connected to the main-valve stem 34. In this way the operator has complete control of the valve 30, and as this valve controls the supply or exhaust to the hydraulic cylinder 12 he therefore is able to cause the plunger and its connected car to move up or down and to stop.

The above is well known in the art and needs no further description, but is merely illustrative of one type of construction to which the invention may be applied. It has been found difficult in operating elevators of this type to bring them to rest within a short distance, especially when they are made for high speeds and high rises. Whenever such an elevator is used for a high rise, it is found desirable to have the counterweight 16 of considerable weight to partially balance the weight of the plunger 11, which increases the difficulty of stopping the movement accurately. Above the stuffing-box and cylinder-head 13 I place a retarding device or brake 40. This retarding device or brake may be supported by some part of the cylinder-head or any stationary fixture near the top of the cylinder 12 and below the lower limit of the travel of the car 10. This retarding device or brake is shown clearly in Fig. 2. It comprises two jaws, 41 and 42, which are pivoted to a fixed point 43. These two jaws surround the plunger 11. The outer ends of the jaws 41 42 are arranged to cross each other, as shown at 44 and 45. The cam 46 is pivoted between these two projecting ends of the jaws at 47. It has an attached arm or level 48 extending to one side. This lever

may be attached, as shown in Fig. 1, to the main-valve stem 34 by means of a connecting-link 35. The shape of the cam 46 is shown more clearly in Fig. 3. In the arrangement shown it is so arranged that when the lever 48 is in its central position the cam 46 spreads the projecting ends 44 45 of the jaws 41 42 apart, and this squeezes the jaws against the plunger 11.

When the operator desires to move the car and for that reason moves the lever 20 to one side or the other, he thereby through its connections, which we have already described, causes the main or reversing valve to be opened in one direction or the other, in which case its stem 34 will be moved up or down. This valve-stem 34 is connected to the lever 48 and will therefore cause the cam 46 to be turned in one direction or the other and to thereby release the pressure of the jaws 41 42 upon the plunger and allow the plunger to run freely through them. Now when the operator desires to stop the car and for that reason causes the main valve 30 and its stem 34 to be brought back to their central position the cam 46 will again be brought into such position as to cause it to push the projecting ends 44 45 of the jaws 41 42 apart, and therefore to apply them to the plunger with considerable pressure. This will produce the desired retarding or braking effect and cause the car to come to rest quickly. The stop will also be a gentle one without jar or shock, as the pressure of the jaws 41 42 against the plunger will tend to destroy all liability of the plunger to vibrate up and down as it comes to rest.

I will now describe the part of my invention which is illustrated in Fig. 4. In this case two brake-shoes 60 60 are pivoted to the counterweight 16 at 61 61. Two toggle-arms 62 62 are attached to these brake-shoes in such a manner as to press them against the counterweight-guides 17 17 when they are in a horizontal position and to release the brake-shoes whenever they are moved either up or down, as indicated by the dotted lines, so that they produce a toggle motion. A spring 63 is attached to the counterweight and to the arms 62 62 in such a way as to have a tendency to pull these arms down. A rope or cable 64 is also attached to the arms 62 62. This rope passes over a fixed sheave 65 at the top of the elevator-hatchway, thence down and under another sheave 66, which is attached to the side of the elevator-car 10, and over to the operating-lever 20, to which it is attached at the point 67. A spring 68 is also attached to this lever at the same point 37 and also to the elevator-car at 69. This spring 68 is arranged to counteract the effect of spring 63 on the counterweight. When the lever 20 in the car is in its central or stop position, the arms 62 62 will be in their horizontal position, as shown in the drawings, so

that they press the brake-shoes 60 60 against the counterweight-guides 17 17. When, however, the operator moves the lever 20 to the left or to the right, he thereby moves the toggle-arms 62 62 up or down, and thereby releases the pressure of the brake-shoes on the guides. The operation of this part of my invention is obvious, for when the operator moves the lever 20 in either direction to start the car up or down he thereby releases the brake-shoes 60 60 on the counterweight-guides, which allows the counterweight to travel freely down and up. When the operator brings the lever 20 back to center, the toggle-arms 62 62 press the brake-shoes against the counterweight-guides 17 17, and thereby produce a braking or retarding effect upon the counterweight 16. In this way the momentum of the counterweight is overcome, and it has no tendency to jump as it comes to rest.

In Fig. 5 a modification of my invention is shown. In this case the retarding device or brake 40 on the plunger 11, instead of being connected to the stem 34 of the main valve, may be connected to the segment 24 by means of a lever 25 and a connecting-rod 26, which may communicate the movement of the segment to the lever 48, and thus apply the retarding device or brake to the plunger directly without the intervention of the valve mechanism.

It is sometimes desirable to apply the retarding device or brake 40 by a spring, in which case the pressure which it exerts upon the plunger will be a yielding one and may be adjusted at will. Such an arrangement is shown in Fig. 6, in which case the jaws 41' and 42' are applied by a spring 70, which may be regulated by nuts 71 to give the jaws sufficient braking effect upon the plunger 11. The cam 46' in this case would be turned around, so that it would spread the projecting ends of the jaws 41' 42' only when the lever 48 was not in its horizontal position.

When a retarding or braking device of this kind is used, a car running at high speed can be brought to rest quickly and gently within a short space of travel. It is also possible to use a heavier counterweight than would be possible without it, especially when a retarding device is placed upon the counterweight, and it is thereby possible to increase the efficiency of the apparatus, and with the heavier counterweight the same car and load can be lifted with a plunger of smaller diameter or lower water-pressure.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a hydraulic elevator, the combination with a plunger and a car, of a retarding device for such plunger; and means controlled from the car for applying and releasing such retarding device.

2. In a hydraulic elevator, the combination with a car and a plunger, of a retarding device for such plunger, and means within the control of the operator on the car for applying and releasing such retarding device.

3. In a hydraulic elevator, the combination with a plunger and a car, of a retarding device for the plunger, and means controlled from the car for starting and stopping said car and for applying and releasing said retarding device.

4. In a hydraulic elevator, the combination with a plunger and a valve, of a retarding device for the plunger, said retarding device being actuated by the movement of the valve.

5. In a hydraulic elevator, the combination of a plunger, a car attached to the plunger, a valve, a retarding device for the plunger actuated by the valve, and means for controlling said valve from the car.

6. In a hydraulic elevator, the combination of a plunger, a reversing-valve for controlling the movement of the said plunger, a retarding device for the plunger, means controlled from the car for actuating said reversing-valve, and connections from the said valve to the retarding device for actuating the same.

7. In a hydraulic elevator system, the combination of a plunger, a car attached to the plunger, a counterweight attached to the car, a retarding device for the plunger, a retarding device on the counterweight, and a single means for actuating said retarding devices from the car.

8. In a hydraulic elevator the combination of a plunger and a car, a retarding device for the plunger, and means situated upon the car for controlling the starting, stopping and reversing the movement of the car and actuating the retarding device at the same time.

9. The combination with a car, of a counterweight and a plunger connected respectively to the top and bottom of the car, a gripping device for the plunger, means for controlling the movements of the car and plunger, and means for operating said gripping device and controlling means from the car.

10. The combination with a car, of a counterweight, a plunger for said car, means for controlling the movement of the car and plunger, a brake for said plunger, and a single means for operating said controlling means, and a lever for actuating said operating means.

11. The combination with a car, of a counterweight, a plunger connected to the car, means for controlling the movement of said car and plunger, a brake for said counterweight, and means for operating said brake and controlling means from the car.

12. In an elevator, the combination with a car and means for moving same, of a counter-

weight, a retarding device for the counterweight, and means for positively actuating said retarding device.

13. In an elevator, the combination with a car and means for moving same, of a counterweight, a retarding device for the counterweight, and means controlled from the car for applying and releasing such retarding device.

14. In an elevator, the combination with a car, of a counterweight therefor, a retarding device for such counterweight, and means within the control of the operator on the car for applying and releasing such retarding device.

15. In an elevator, the combination with a car and its counterweight, of a retarding device for the counterweight, and means controlled from the car for starting and stopping said car and for applying and releasing said retarding device.

16. In a hydraulic elevator, the combination with a car and a plunger, of a counterweight, valve mechanism for controlling the movement of said car and plunger, a brake for the counterweight, connections for operating said valve mechanism and said brake, and a single means for actuating said connections from the car.

17. In a hydraulic elevator, the combination with a car and a plunger, of a counterweight, a brake for said counterweight, and means actuated from the car for controlling the starting, stopping and reversing of the movement of the car and plunger and actuating said brake substantially at the same time.

18. In an elevator, the combination with a car and a counterweight connected thereto, of guides for said counterweight, brake-shoes, a toggle connected to the brake-shoes, a resilient means for normally holding said brake-shoes away from the guides, and means actuated from the car for operating said toggle against the action of said resilient means to apply said brake-shoes to stop the car and counterweight.

19. In an elevator, the combination with a car and its counterweight, of a brake for the counterweight, brake-applying means, a spring for normally holding said brake and brake-applying means in releasing position, a flexible connection between the brake-applying means and the car, a device on the car for exerting a pull on said flexible connection to effect the application of the brake on the counterweight, and a spring connected to said device to counteract the spring on the counterweight.

20. In a hydraulic elevator, the combination with a plunger and a car, of a gripping device for said plunger, and means for releasing and controlling the application of said gripping device from the car.

21. In a hydraulic elevator, the combination with a plunger and a car, of a brake for

said plunger, means for controlling the movement of the car, and means connected to the car for operating said brake to release or apply the same.

22. In a hydraulic elevator, the combination with a plunger and a car, of a brake for said plunger, and a cam actuated from the car for operating said brake.

23. In a hydraulic elevator, the combination with a plunger and a car, of a brake for said plunger, lugs extending from said brake, a cam for coacting with said lugs to apply the brake, and means operated from the car for moving said cam.

24. In a hydraulic elevator, the combination with a plunger and a car, of a cylinder for said plunger, means for controlling the flow of fluid to said cylinder, and means actuated from the car for operating said fluid-controlling means and for applying said brake.

25. In a hydraulic elevator, the combination with a plunger and a car, of a cylinder for said plunger, fluid-controlling means for said plunger, a brake for the plunger and mounted on the cylinder, and means actuated from the car for operating said fluid-controlling means and applying and releasing said brake.

26. In a hydraulic elevator, the combination with a plunger and a car, of a retarding device for such plunger, means for applying said retarding device, and manually-operable means for positively actuating said retarding-device-applying means.

27. In a hydraulic elevator, the combination with a plunger and a car, of means for controlling the movement of the same, a brake for the plunger, and manual means for applying and releasing said brake.

28. In a hydraulic elevator, the combination with a plunger and a car, of a cylinder for the plunger, a valve for controlling the movements of the plunger in the cylinder, a brake for the plunger, and means connected to said valve for applying and releasing said brake.

29. In a hydraulic elevator, the combination with a plunger and a car, of a cylinder for said plunger, a reversing-valve for controlling the movements of said plunger and car, a pilot-valve for controlling said main valve, a brake for the plunger, means connected to said reversing-valve for applying and releasing said brake-applying means, and means actuated from the car for operating said pilot-valve.

30. In a hydraulic elevator, the combination with a plunger and a car, of pivoted braking-jaws for said plunger, a resilient means for applying said braking-jaws to the plunger, a cam arranged to coact with said jaws to release the same, and means for actuating said cam.

31. In a hydraulic elevator, the combina-

tion with a plunger and a car attached thereto, of means for controlling the movements of the car and plunger, pivoted braking-jaws for the plunger, means for applying and releasing said jaws, means for operating said controlling means and brake-applying means, and a single device for actuating said operating means.

32. In a hydraulic elevator, the combination with a car and a plunger, of a counterweight, a brake for the counterweight, a brake for the plunger, means for operating said brakes, and a single device for actuating said operating means.

33. In a hydraulic elevator, the combination with a car, of a plunger attached thereto, a counterweight, a brake for the counterweight, an additional brake for the plunger, individual applying means for said brakes, means for operating both of said applying means, and a single means on the car for actuating said operating means.

34. In a hydraulic elevator, the combination with a car and plunger, of a counterweight connected to the car, guides for said counterweight, a brake on the counterweight arranged to coact with said guides, a resilient means for normally holding said brake in releasing position, means actuated from the car for operating said brake to apply the same, and a resilient means on the car connected to said brake-operating means for counteracting the resilient means on the counterweight to hold the brake-operating means in normal position.

35. In a hydraulic elevator, the combination with a car, of a plunger attached thereto, a counterweight connected to the car, guides for the counterweight, brake-shoes on the counterweight to be applied to said guides, a toggle for operating said brake-shoes, a spring connecting the counterweight and toggle-joint for holding the brake-shoes in releasing position, means actuated from the car for operating said toggle to apply said brake-shoes, and a spring to counteract the spring on the counterweight to hold the toggle-operating means in normal position.

36. In a hydraulic elevator, the combination with a car and its plunger, of a counterweight, means for controlling the movements of the car and plunger, a retarding device for the counterweight, a retarding device for the plunger, means for operating said controlling means and actuating means, and a single means for actuating said operating means.

37. In a hydraulic elevator, the combination with a car, of a plunger attached thereto, a counterweight connected to the car, a cylinder for the plunger, a reversing-valve for controlling said plunger, a brake for the counterweight, an additional brake for the plunger, means for operating said reversing-valve and brakes, and mechanism on the car for actuating said operating means.

38. In a hydraulic elevator, the combination with a car and a plunger attached thereto, of a counterweight connected to the car, a cylinder for the plunger, a main valve for controlling said plunger, a pilot-valve for controlling said main valve, brakes for the counterweight and plunger, individual means for applying the same, and means controlled from the car to effect the starting or stopping

of the car and the release or application of said brakes.

In witness whereof I have subscribed my name in the presence of two subscribing witnesses.

FLOYD C. FURLOW.

Witnesses:

JESSE H. VAN ALSTINE,
HENRY E. KIRBY.