G. JOHN.

RETARDING DEVICE FOR PLUNGER ELEVATORS.

APPLICATION FILED NOV. 15, 1904.

986,392. **Patented Mar. 7, 1911.**

Fig. 1,

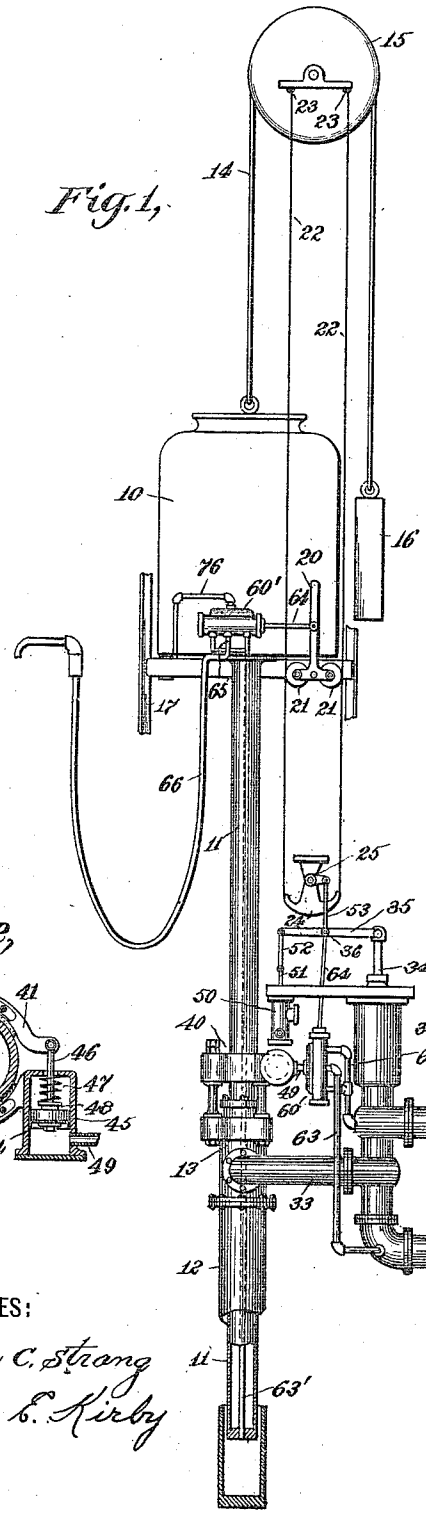


Fig. 4,

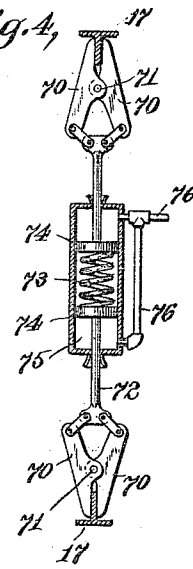


Fig. 5,

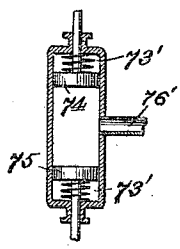


Fig. 2,

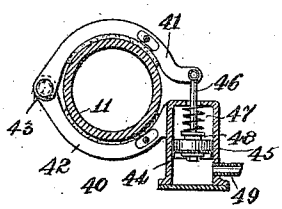
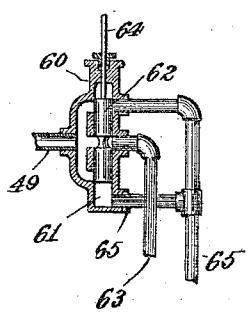


Fig. 3,



WITNESSES:

Walter C. Strang

Henry E. Kirby

INVENTOR

Griffith John

BY

E. W. Marshall

ATTORNEY

UNITED STATES PATENT OFFICE.

GRIFFITH JOHN, OF YONKERS, NEW YORK, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF EAST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

RETARDING DEVICE FOR PLUNGER-ELEVATORS.

986,392. Specification of Letters Patent. Patented Mar. 7, 1911.

Application filed November 15, 1904. Serial No. 232,856.

To all whom it may concern:

Be it known that I, GRIFFITH JOHN, a subject of the King of Great Britain, and a resident of Yonkers, in the county of Westchester and State of New York, 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. A part of this figure is shown in section. Fig. 2 is an enlarged plan view of a part of the apparatus which I use. Fig. 3 is a sectional view of an auxiliary valve which I use in carrying out my invention. Fig. 4 is a plan view partly in section of a part of my apparatus. Fig. 5 is a sectional view of a modification of a part of the mechanism which is shown in Fig. 4.

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 into 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 they pass over the tilting sheaves 21, 21.

30 designates a main 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 main or reversing valve and is connected in the usual manner by pipes, which are not shown, to the main valve in such a way that whenever its valve stem 51 is manually moved it will cause the stem 34 of the main valve to have a movement corresponding to that which is given it by hand. The valve stem 34 of the main valve is connected to an arm 35 which is attached to the stem 51 of the pilot valve by means of a connecting link 52 and is also connected to the pivoted segment 24 by means of a connecting rod 53 and a lever 25 which is rigidly connected to the pivoted segment 24. By means of this arrangement the main valve 30 may be controlled by the operator in the car. Whenever he moves the lever 20 to the left or to the right, he thereby moves the stem 51 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 main valve 30 and as this valve controls the supply or exhaust to the cylinder 12, he is thereby able to cause the plunger and its connected car to move up and down.

The above is well known in the art and needs no further description here, and 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 used 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 end of jaw 42 is extended and enlarged to form a cylinder 44 in which a piston 45 is arranged to move. A rod 46 is attached to the end of jaw 41 and is connected to the piston 45 in the cylinder 44. Between the piston and the end of the cylinder is a spring 47 which, as shown, has a tendency to squeeze the jaws 41 and 42 together against the plunger 11. The nut or nuts 48 may be supplied to regulate the pressure of this spring. A pipe 49 affords communication with the lower end of the cylinder 44 and when pressure is admitted through this pipe it will counter-act the effect of the spring 47.

I will now describe the auxiliary valve 60 which is shown in Fig. 3. It comprises a cylinder 61 in which a piston 62 is arranged to be moved up or down. When this piston is in its central position it affords communication between the pipe 49 and the pipe 63 which may be connected to the exhaust pipe 32 of the main valve, but whenever it is moved either up or down by its stem 64 it shuts off the port leading to the pipe 63, and affords communication between the pipe 49 and the pipe 65 which may be connected to a course of hydraulic pressure through the pipe 31. The valve stem 64 is shown connected to the arm 35 at 36. It will be seen that as the pipe 49 is connected to the cylinder 44 on the brake or retarding device 40, this cylinder 44 will be opened to the exhaust whenever the pivoted segment is in its central position or will have pressure admitted to it whenever the pivoted segment is moved either to one side or the other, and that the position of the auxiliary valve will depend on the position of the operating lever 20 in the car.

When the operator desires the car to move and for that reason actuates the lever 20 to one side or the other, he thereby through its connection which I have already described causes the main valve to be opened in one direction or the other and at the same time causes the valve stem 64 of the auxiliary valve 60 to be moved up or down. This will cause the latter to open the ports between the pressure supply and the cylinder 44 and will therefore release the pressure of the jaws 41 and 42 upon the plunger and allow it to run freely through them. Now when the operator desires the car to stop and for that reason brings the operating lever 20 back to its central position, he thereby moves the piston 62 of the auxiliary valve 60 back to its central position so that it will shut off the pressure in the cylinder 44 and open the same to the exhaust. At the same time the main valve 30 will be moved back to its central position to close the ports to the cylinder 12. As the pressure is released from cylinder 44 of the retarding device, the spring 47 will apply the jaws 41 and 42 to 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 11 is a yielding one produced by the spring 47 which may be regulated by the nut 48, and the jaws as they grip the plunger will tend to destroy all liability of the plunger to vibrate up and down as it comes to rest.

While I have shown the auxiliary valve connected to the supply and exhaust pipes which lead to the main or reversing valve 30 of the elevator, this is but one of the many ways in which it may be used.

I will now describe the part of my invention which is illustrated in Fig. 4. In this case the jaws 70, 70 may be attached to the car 10. These jaws may be pivoted together at 71 and arranged to grip the guides 17, 17 The pressure of these jaws on the guides 17 may be obtained by a toggle movement like that illustrated in Fig. 4, in which the rods 72, 72 are pressed apart by means of a spring 73. On the ends of the rods, pistons 74, 74 are shown which are surrounded by the cylinder 75. This cylinder has a pipe 76 leading from its outside ends to an auxiliary valve 60′ like that shown in Fig. 3 and already described, but in this case preferably placed upon the car. When pressure is admitted to the ends of this cylinder, it will counter-act the effect of spring 73 and relieve the pressure of the jaws 70, 70 from the guides 17, 17.

In Fig. 1, I have shown a small pipe 63′ extending through the plunger 11 and leading from the cylinder 12 to the elevator car 10, where it is connected to the outside ports of the auxiliary valve 60′. The central port of the auxiliary valve 60′ is in this case connected to a flexible tube 66 leading away from the car and adapted to take off the discharge or exhaust from the cylinder 75. The stem 64 of the valve 60′ may be in this case connected to the lever 20 in the car so that whenever the operator moves this handle to start or to stop the elevator, he thereby moves the piston 62 of the auxiliary valve. The pipe 76 which connects with the ends of the cylinder 75 is connected to the single central port which is shown in one side of the auxiliary valve 60′. When the device is arranged as shown in Fig. 4, the pipes are so connected as to have the pipe 76 normally open to the exhaust when the lever 20 is in its central position, so that the jaws 70, 70 are pressed against the guides 17, 17 by means of the spring 73 but are released from the guides by means of the pressure which may be led up through the plunger by means of the small pipe 63′ and which passes through the auxiliary valve 60′ and the pipe

76 to the ends of the cylinder 75 whenever the lever is moved to one side or the other and thereby releases the pressure of the jaws 70, 70 upon the guides 17, 17. It is evident that the pressure of the jaws 70, 70 upon the guides 17, 17 may be produced by means of the hydraulic pressure and be released by means of springs. If it is desired to have this done, the cylinder 75 may have springs 73′, 73′ tending to push its pistons 74, 74 together and may have a pipe 76′ leading to the space between the pistons. Such an arrangement is shown in Fig. 5. The operation of this part of my invention is obvious, for whenever the operator moves the lever 20 in either direction to start the car up, or down, he thereby moves the piston of auxiliary valve 60. The pressure pipe 63′ will in this case be connected to the center port of the auxiliary valve and the exhaust to the outside ports, so that when the operator moves the lever 20 away from its central position, the pressure of the jaws 70, 70 on the guides 17 is thereby released, so that the car may travel freely up or down. Now when the operator brings the lever 20 back to center, the pressure will again apply the jaws 70, 70 to the guides and thereby produce the desired braking or retarding effect upon the car.

When a retarding or braking device of this kind is used, a car running at high speed may be brought to rest quickly and gently within a short space of travel. The retarding devices become effective the moment the operator moves the controlling device to center, so that they may begin their retarding tendency while the main valve is closing. It is also possible with this arrangement to use a heavier counterweight than could be used without it and it is thereby possible to increase the efficiency of the apparatus, as with a heavier counterweight the same car and load can be lifted with a plunger of smaller diameter or with lower water pressure.

Having described my invention what I claim is:

1. In an elevator, the combination with a car, plunger and receiving cylinder, of brake apparatus associated with the plunger, main valve apparatus for controlling the flow of motor-fluid to and from said cylinder, an auxiliary valve for controlling the application of motor-fluid to said brake device independently of said main valve apparatus, additional brake apparatus carried by the car, an additional valve for controlling the operation of said additional brake apparatus, and a lever in said car connected to said main valve apparatus, said auxiliary valve and said additional valve, to secure the operation thereof from a single point.

2. In a hydraulic elevator, the combination of a plunger and a car, a retarding device for the plunger, a retarding device for the car, fluid pressure means for operating said devices, and a means operable from the car for controlling the operation of both the retarding devices the said means comprising an element common to the controlling means of both said devices.

3. In a hydraulic elevator, the combination of a car and a plunger for lifting the car, a valve mechanism for controlling the plunger, a retarding device on the car, a retarding device on the plunger, yielding means for actuating the retarding devices in one direction and fluid pressure means for actuating them in the other direction, and auxiliary valves for controlling the fluid pressure and a device for operating said valves from the car.

4. In a hydraulic elevator, the combination with a car, plunger and cylinder, of retarding apparatus, and means permitting the transmission of pressure through said plunger to operate said retarding apparatus.

5. In a hydraulic elevator, the combination with a car, plunger, cylinder and controlling apparatus, of retarding mechanism, and means controlled from the car for permitting the application of fluid-pressure through said plunger through said cylinder to operate the retarding mechanism.

6. In a hydraulic elevator, the combination with an elevator car, plunger, cylinder and controlling apparatus, of retarding apparatus, a duct within the plunger, and a valve for controlling the transmission of fluid-pressure from said cylinder through said duct to said retarding apparatus to operate the latter.

7. In a hydraulic elevator, the combination of a plunger and a car, a retarding device on the car actuated by fluid pressure, a pressure pipe inside of the plunger and a valve between the retarding device and the pressure pipe for controlling the retarding device.

8. In a hydraulic elevator, the combination with a car, plunger, cylinder and change-valve apparatus, of a retarding device carried with the car, a pressure pipe extending longitudinally through the plunger, and a valve between the pressure pipe and the retarding device for controlling the fluid-pressure to the latter.

9. In a hydraulic elevator, the combination with a car, plunger, cylinder and change valve apparatus, of a retarding device for the car, a fluid-pressure duct extending through the plunger, a controlling valve connected between said duct and said retarding device, and means for operating both the change valve apparatus and the said controlling valve from a single point.

10. In a hydraulic elevator, the combination with a car, of a cylinder, a plunger, change-valve apparatus controlling the supply of fluid pressure to the cylinder and

plunger, a hydraulically operated retarding device carried by the car, a hydraulically operated stationary retarding device, connections from said change-valve apparatus and from said retarding devices to a common source of fluid pressure, and a means operable within the car for controlling the operation of the change valve apparatus and the retarding devices the said means comprising an element common to the means for operating the change valve apparatus and the retarding devices.

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

GRIFFITH JOHN.

Witnesses:
OTTO T. SMITH,
ERNEST W. MARSHALL.