(No Model.) 2 Sheets—Sheet 1.

R. C. SMITH.

ELEVATOR.

No. 490,370. Patented Jan. 24, 1893.

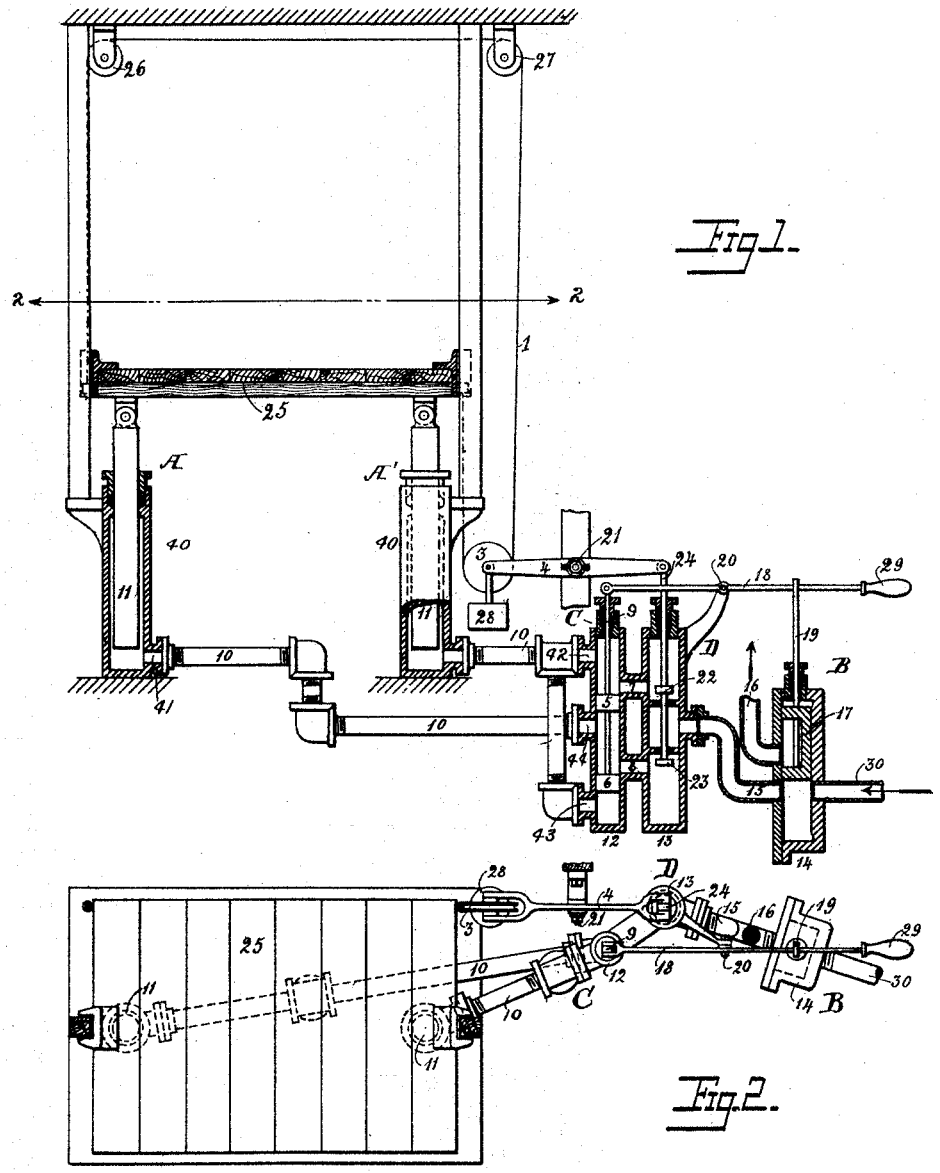

Fig. 1.

Fig. 2.

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Fig. 3.

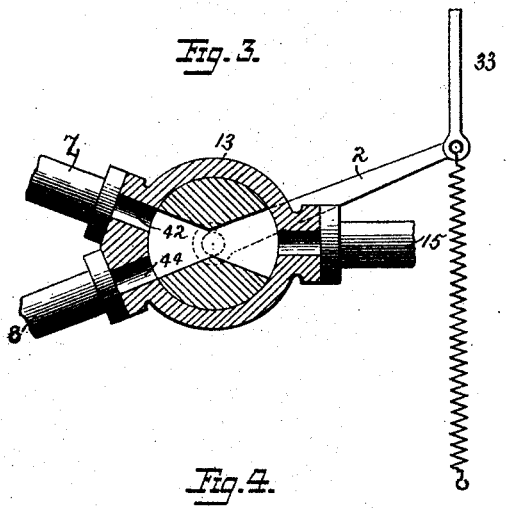
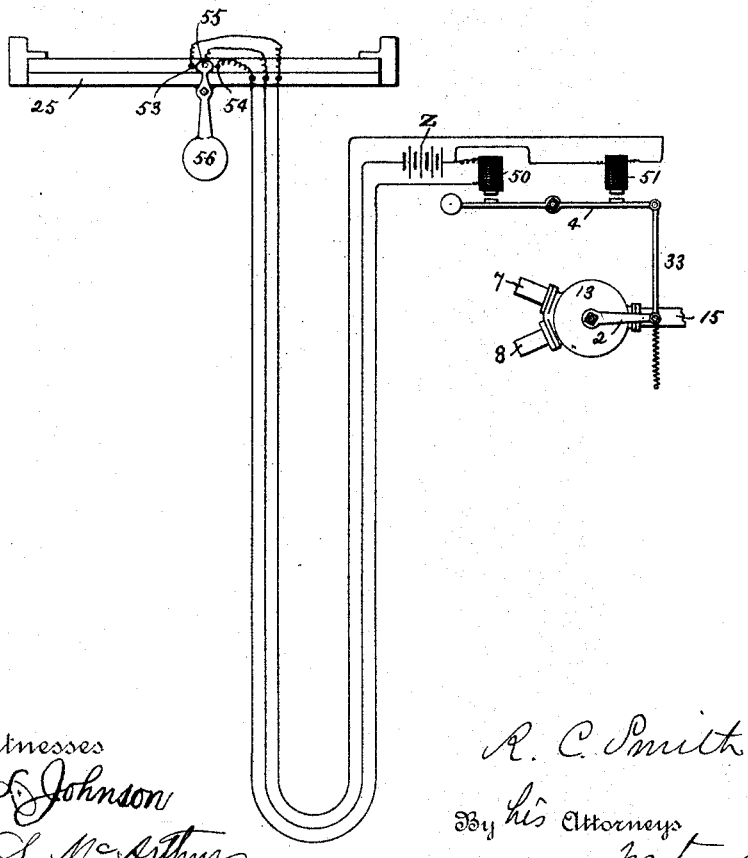


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

RUDOLPH C. SMITH, OF YONKERS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL COMPANY, OF ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 490,370, dated January 24, 1893.

Application filed April 20, 1889. Serial No. 308,001. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH C. SMITH, a citizen of the United States, and a resident of Yonkers, Westchester county, New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to that class of elevators in which the cage or platform is operated by two independent engines, and my invention consists of means fully set forth hereinafter whereby to maintain the operations of the engines in unison, and prevent one from moving faster than the other, so as to change the level position of the platform.

In the accompanying drawings:—Figure 1, is an elevation in part section of sufficient of an elevator to illustrate my invention. Fig. 2, is a plan view of the parts shown in Fig. 1, in section on the line 2—2, Fig. 1. Fig. 3, is a sectional view illustrating a modified form of equalizing valve device. Fig. 4, is an elevation illustrating another form of connection between the platform and the equalizing valve.

In the class of elevating apparatus to which my improvement appertains, the platform 25, is connected to be operated by two elevator engines A, A′, of any suitable construction and is supported either from the usual flexible suspensories or directly by plunger pistons. In the construction shown each engine consists of a vertical cylinder 40, provided with a plunger piston 11, to the upper end of which the platform is jointed near one side, and the motor fluid passes into the cylinder as well as out of the cylinder, through a pipe 10, communicating with a port 41, and with the two pipes 10, 10, is combined the stopping and starting valve device B, which controls the flow of motor fluid, (as water under pressure,) from the supply pipe 30, to the pipes 10 and from the latter to the discharge pipe 16. As shown the stopping and starting valve device consists of a casing 14, provided with a D valve 17, and communicating with the supply pipe 30, discharge pipe 16, and with a pipe 15, through which the water may pass back and forth between the said valve device and the engines.

Between the valve device B, and the engines is interposed a reversing valve which may be a check valve or positively operated valve of any suitable construction. As shown the said reversing valve device consists of a cylinder 12, in communication with the pipe 15, through two separated ports 7 and 8, and provided with two ports 42, 43, one near each end and with an intermediate port 44, the latter communicating with the pipe 10 of the engine A and the ports 42, 43, communicating both with the pipe 10 of the engine A′. In the casing 12 is a valve having two pistons 5, 6, each connected to the same stem 9, which may be operated by means of a lever 18, provided with a handle 29, or by any other suitable device. The pistons 5, 6, are so arranged that when the piston 6, is below the port 8, the piston 5 will be below the port 7, as shown in Fig. 1, and the motor fluid will pass through the port 44, and pipe 10, to the engine A, and also through the port 42, and other pipe 10, to the engine A′, and the plungers 11, will be raised, carrying with them the cage. When the pistons 5, 6, are raised to positions above the ports 7 and 8, the water can escape from the engine A, through its pipe 10, and port 44, to the port 7, while the water from the engine A′, will escape therefrom through its pipe 10, and the lower branch thereof to the port 43 and port 8.

In order that the motor fluid may be admitted to the ports 7 and 8, when the valve is depressed as shown in Fig. 1, but cut off from said ports 7 and 8, and the latter opened when the valves 5, 6, are elevated, and to thus insure a unison of operation of the different pistons the valve of the device C is connected with the stopping and starting valve 17. Thus the stem 19 of the valve 17 is perforated for the passage of the lever 18, so that when the pistons 5 and 6, are depressed, the valve 17 is raised to admit the motor fluid to the pipe 15, but when the valves 5 and 6, are raised, the valve 17, is lowered to cut off the fluid supply and permit the water from the ports 7 and 8, to flow through the pipe 15 and valve 17 to the exhaust pipe 16.

The parts above described may be constructed in any suitable or well known manner, so as to perform the functions above set forth.

In the class of elevators of which that above described is an illustration, the leakage of the packings of one of the engines, or any inequality in the channels or passages obstructing those of one engine more than the other, will result in applying more pressure to the piston or plunger of one engine than the other in ascending, or restricting the discharge from one or the other in descending, so that the pistons or plungers instead of working exactly in unison will vary slightly in their movements, so that one piston or plunger will get ahead of the other and the platform will be tilted to a greater or less extent, often with serious results. To prevent such results I combine with the engines an equalizing valve device, the valve of which is so connected with the platform or other moving part of the apparatus, that any change from a level position of the platform will vary the position of the valve of said device, and reduce or increase the pressure, or enlarge or restrict the openings communicating with one of the engines, and so vary the action upon the pistons as to restore them to their normal positions. Thus in the construction shown in Fig. 1, a cable 1, is connected at one end to one side of the platform, and at the other to the other side, and passes over two elevated guide pulleys 26, 27, and hangs downward in the form of a loop in which is suspended a loose pulley 3, carried by a lever 4, centrally pivoted to a suitable support and connected at its opposite end with the valve of the equalizing device D. The said equalizing device D, may consist of any suitable cut off valve device, constructed to throttle the flow toward one of the engines whenever the valve is moved from its mid position, in which the flow to both engines is unobstructed. As shown in Figs. 1 and 2 the said equalizing device consists of a cylinder 13, closed at both ends, communicating at one side with the two ports 7 and 8, leading to the reversing valve device, and mid-way at the opposite side with the pipe 15, leading to the stopping and starting valve device, and provided between the ports 7 and 8 with two ports controlled by the disks 22, 23, upon the stem 24, of the equalizing valve. In its normal position, that is, when the motor fluid is passing regularly to or from both engines, each of the disks 22, 23, is away from its port, so as to permit the fluid to pass freely, but the shifting of the valve in either direction will throttle one of the ports and relieve or maintain fully open the other, so that the motor fluid will pass under full pressure to the engine in connection with the open port, but will be throttled in passing to the other engine, the speed of movement of which will be thereby reduced. Thus in the construction shown in Figs. 1 and 2, if for any reason the engine A, operates at a greater speed than the engine A′, the platform 25 instead of remaining level will be lifted at the left side or end to a greater extent than at the opposite side, thus paying out the cable 1, extending the loop thereof and permitting a descent of the pulley 3, and of the left end of the lever 4, so that the valve of the equalizing device is raised, leaving a free passage for the fluid under the disk 22, and to the engine A′, which will operate at its normal speed, but throttling the passage controlled by the disk 23, and reducing the flow and the pressure of the fluid passing to the engine A, reducing its speed until the platform is again level, in assuming which position the pulley 3, and the left hand end of the lever 4, will be raised, and the valve of the equalizing device will be brought to its mid-position. A like result will ensue if the engine A, fails to move as rapidly as the engine A′, except that in this case the left hand end of the lever 4, will be lifted and the passage controlled by the disk 22, will be throttled. During these operations the stopping and starting device and the reversing valve device may be shifted by hand or in any other suitable manner to stop, start and reverse the movements of the platform as required, the equalizing valve device at all times being controlled and operated automatically upon any change from the level position of the platform.

The stopping and starting valve device B, may sometimes be dispensed with, the supply communicating directly with the pipe 15, and the valve device C, serving to arrest and start the engines by carrying the pistons 5 and 6 to and from the ports 7 and 8, so as to close and uncover the same.

Another form of equalizing valve is illustrated in Fig. 3, which shows a valve casing 13, in the form of a cylinder, having a plug valve provided with a transverse passage x, widened at one end to maintain constant communication with the pipe 15, and at the other to communicate simultaneously with both ports 42, 44, but to throttle one of said ports as the valve is turned in either direction from the mid-position. An arm 2, extending from the valve is connected by a rod 33, with the lever 4, or other appliance for changing the position of the valve on any change of the platform from its level position.

In Fig. 4, is shown an electrical connection between the platform and the equalizing valve, the latter constructed as shown in Fig. 3. In this case the lever 4, is provided with armatures co-operating with electro magnets 50, 51, connected to the battery Z, and with contact points 53, 54 and 55, upon the cage, which is provided with a pivoted and weighted switch 56, so suspended as to maintain constant contact with the contact point 55, and to shift its position to contact also with the point 53, when the left hand end of the platform is lifted, and with the point 54, when the right hand end is lifted. In either case the change in the level of the platform completes the circuit between the point 55, and one of the other points energizes one of the magnets and shifts the position of the equalizing valve.

Without limiting myself to the precise construction and arrangement of parts shown, I claim:—

1. The combination with the platform of a plurality of elevating cylinders A, A′, a separate supply and discharge pipe to each cylinder, a valve device C, connected with both of said pipes having valves controlling the flow thereof, a valve device D, controlling separate ports communicating with the valve device C, and connections between the platform and the valve device D, arranged to shift the latter according as the platform moves from a horizontal position, substantially as described.

2. The combination of the platform, elevating cylinders A, A′, valve devices D, C, a valve device B, controlling the inlet and discharge from the valve device D, and connections between the valve of the device D, and the platform to shift said valve as the platform moves from a horizontal position, substantially as described.

3. The combination of the platform with a pair of elevating cylinders, a valve device D, a valve device C, having ports 42, 43 and 44, in communication with said cylinders and ports 7 and 8, in communication with said valve device D, and a valve arranged to put the port 7 alternately in communication with ports 42 and 44, and the port 8, alternately in communication with the ports 43 and 44, and a valve for controlling the flow through the ports 7 and 8, said latter valve being connected to the platform and controlled by the inclination thereof, substantially as described.

4. The combination of the platform, the elevating cylinders, the valve device C, having ports 42, 43, and 44, the valve device D, having ports 7 and 8, communicating with the valve device C, the valves of the valve devices C and D; the lever connected to said valve of the device D, and having a pulley 3, and a rope or cable passing around said pulley and connected to the platform, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RUDOLPH C. SMITH.

Witnesses:
EDWD. K. ANDERTON,
KENNERLEY BRYAN.