(No Model.)

C. R. OTIS.

ELEVATOR.

No. 271,353. Patented Jan. 30, 1883.

Fig. 1.

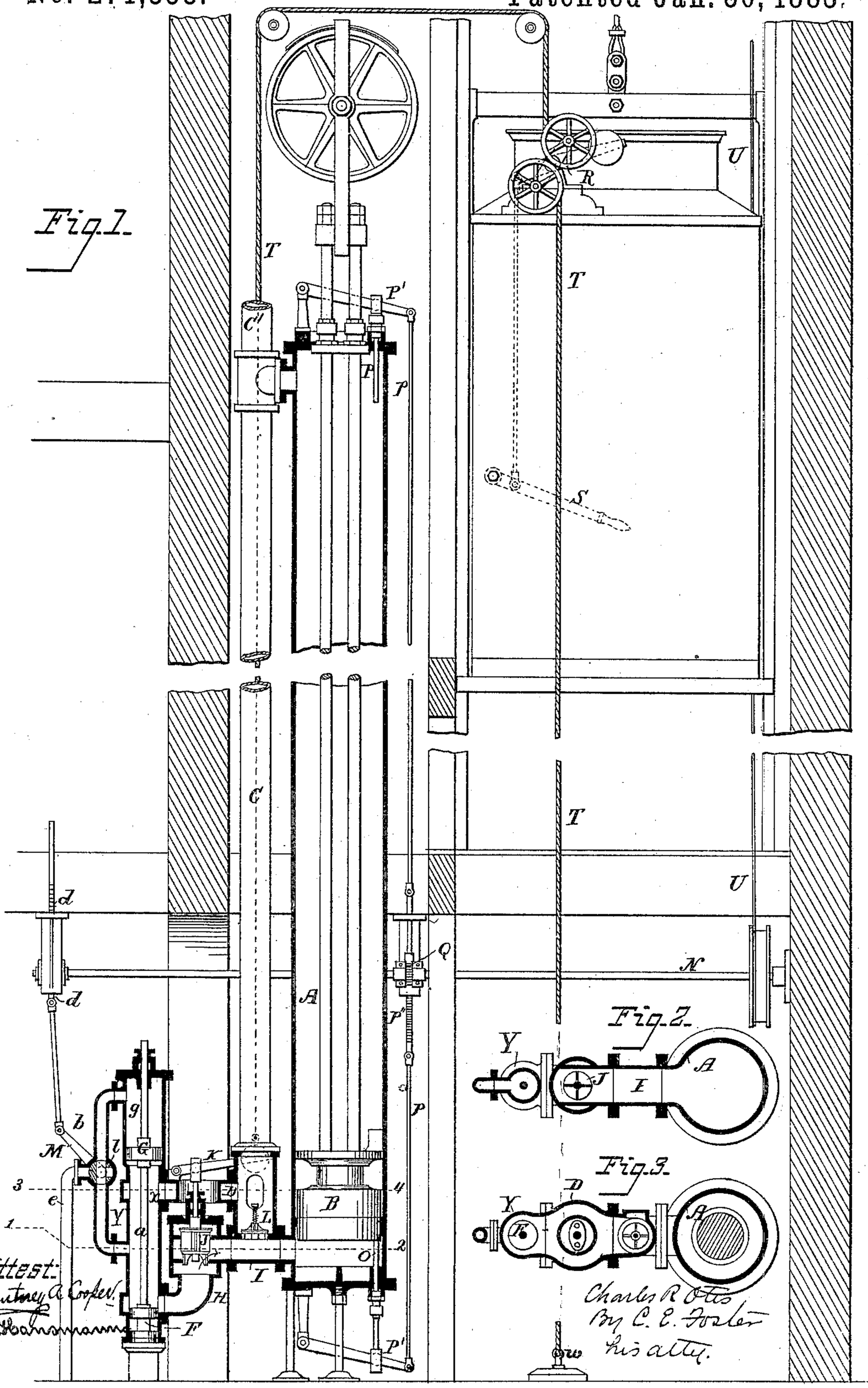

Fig. 2.

Fig. 3.

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By C. E. Foster
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UNITED STATES PATENT OFFICE.

CHARLES R. OTIS, OF YONKERS, NEW YORK.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 271,353, dated January 30, 1883.

Application filed March 26, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. OTIS, of Yonkers, Westchester county, New York, have invented certain Improvements in Elevators, of which the following is the specification.

My invention relates to that class of elevators in which the piston is moved by the action of water or other fluid under pressure; and the objects of my invention are to reduce the labor of actuating and operating the valve, to improve the construction and operation of the valve appliances, and to enable the operator, with little exertion and by the use of simple appliances, to perfectly control the movements of the cage, especially to graduate the initial and terminal movements, so as to avoid shocks and abrupt action, while stopping and starting as quickly as may be desired.

In the drawings, Figure 1 is an elevation, in section, of part of a "Baldwin elevator," showing an improved valve device and operating appliances. Fig. 2 is a sectional plan on the line 1 2, Fig. 1. Fig. 3 is a sectional plan on the line 3 4, Fig. 1.

A represents the water-cylinder of the elevator; B, the piston; C I, the circulating-pipe; Y, the casing of the main piston-valve F, enlarged in diameter at the upper end to receive a piston, G, secured to the valve-stem *a*. D is a pipe, shown as annular in form, through which is a communication between the valve-chamber *x* and the lower end of the portion C of the circulating-pipe; and H is a lateral branch forming a communication between the circulating-pipe and the lower end of the valve-chamber. The pressure-fluid is admitted to the circulating-pipe, as usual, through a supply-pipe, C′. An ordinary relief-valve, L, may be arranged to close an opening between the branch I and pipe C.

At the junction of the branches H I is a chest receiving a loaded stop-valve, J, which, when down, cuts off the passage of water from the valve-casing Y to the cylinder beneath the piston B, preventing any movement of the latter. When the valve J is raised the water can flow from above the piston B, through the pipe C, branch D, valve-chamber *x*, and branches H I, to the cylinder below the piston. By raising the valve F to a point above the branch H, and also elevating the valve J, the water can escape from below the piston B, which will then descend, raising the cage, which is connected to the machine so as to be operated in any suitable manner.

The stop-valve J is so balanced as to be moved easily from the cage, and, it will be seen, will control all the movements except those depending upon the reversing of the valve F. As shown, the valve J is operated by a weighted lever, K, and a rope, T, connected to said lever, and passing over guide-pulleys and downward between the pulleys of a swinging pulley-frame, R, pivoted to the side of the cage and operated from within the cage by a hand-lever, S, the lower end of the rope being secured to an eye-bolt, *w*, at the bottom of the well. By depressing the lever S the rope T is tightened, raising the lever K and valve J, the weight of the lever K depressing the valve when the lever S is released. The operator can thus in the easiest possible manner operate the valve J and graduate the speed of the cage, and stop and start the same by movements much less in extent than those usually required to adjust the main valve.

Should the rope or other valve-actuating device break, the weight on the lever K will instantly throw down the valve and stop the movement of the piston B.

When the machine is small, or but little power is applied to raise the cage, or when the connections with the valve F are direct and such as to be easily manipulated, the said valve may be operated from the cage in any ordinary manner, the valve J alone being operated to stop and start the elevator going in either direction, and the valve F being operated only when the motion must be reversed; but in operating elevators of great power having large valves, or in moving valves where complex operating appliances are necessitated by the location of the valve devices in respect to the cage, the labor is very severe, especially when the elevator requires to be frequently started and stopped. Moreover, as higher buildings are built and space requires to be economized, it is necessary to increase the speed of elevators, and as a consequence they

must be stopped and started quickly and run rapidly between stations. With the ordinary arrangement for operating the main valve directly by the attendant within the cage, the stopping and starting movements are abrupt and accompanied by jolts and jars, which are wearing upon the apparatus and unpleasant to the occupants of the cage, it being almost impossible to manipulate a rope passing through the cage, as usual, so as to graduate the movements with any nicety. The same results ensue with other operating devices heretofore employed. To obviate these objections I combine with the main valve F any suitable engine whereby the same may be thrown from one position to another, and I regulate such engine by means of appliances extending to the cage and by a lever or equivalent device within the cage, the only exertion upon the part of the operator being that necessary to turn the valve or cock by which the motion of the engine is regulated. Various appliances may be used for thus operating the valve F. In the drawings I have shown one whereby the pressure of the water from the supply-pipe C′ is made the medium of throwing the valve. To effect this a circulating-pipe, *b*, is extended from the chamber *g* above the piston G to the chamber *x* above the valve F, and in the pipe is put a valve-chest containing a three-way-valve cock, *l*, and having a side outlet connecting with a discharge-pipe, *e*.

The cock is to be operated in any suitable manner from the cage—for instance, by the rotation of the shaft N, carrying a pinion gearing with a rack-bar, *d*, connected to the arm M of the cock *l*. A rope, U, passing round a pulley on the shaft N and round a pulley at the top of the well and through the cage, serves as a means for rotating the shaft and turning the cock *l* to different positions. When the parts are in the position shown the water-pressure will be upon the top of the valve F and on both sides of the piston G, thus maintaining the valve F in position. By depressing the arm M the chamber *g* is put in communication with the discharge *e*, and, owing to the area of the piston G being greater than that of the valve F, the piston will be raised, elevating the valve F and opening the discharge. By bringing the cock *l* to the position shown the water will be admitted to both sides of the piston, and, pressing on the top of the valve F, will throw the latter downward until the discharge-outlet is closed. It will be seen that in this manner the position of the main valve may be reversed with no material exertion on the part of the operator, regardless of the size of the valve, the power required to move it, or the situation of the valve in respect to the cage.

As the reversing of the motion does not require the same nice manipulation as is requisite in stopping and starting, I employ the usual rope passing through the cage for the purpose, as described.

Any suitable form of main-valve device may be employed, and the piston, if the same is used, may be placed in a cylinder independent of the valve-chest, and may be of suitable diameter in proportion to the pressure of the motor-fluid and its mode of application, it only being necessary that sufficient power be obtained and applied to move the main valve without any other exertion by the operator than is necessary to stop and start the valve-actuating device.

The shifting of the valve F may be effected automatically by any suitable devices constructed and arranged to be operated from the car or any other moving part of the apparatus as the car reaches the limit of its motion in either direction. Thus rods O P, extending through stuffing-boxes in the heads of the cylinder A, may be arranged to be struck by the piston as it approaches either head, and thereby rotate the shaft N through the medium of levers P′ P′, connected by rods *p* to a rack-bar, P″, gearing with a pinion, Q, on said shaft. In place of this device, balls may be arranged on the hand-rope U so as to be struck by lugs or projections of the car when the latter reaches the end of its movement in either direction, thus turning the shaft N.

Where the cage reciprocates continuously from the top to the bottom of the well, the automatic shifting of the valve F and reversing of the motion leave nothing for the attendant to do but stop, start, and regulate the speed of the cage, all of which is effected by the adjustment of the stop-valve J. It is not necessary, however, to employ the automatic devices, for the reversing can be effected, when desired, by the operator.

It will be apparent that the stop-valve J may be used in connection with the main valves, constructed and operated differently from that described, and that the main valve may be used with or without the automatic reversing apparatus, and that a separate valve-operating engine controlled from the cage may be used with any kind of valve which requires to be operated from the cage. Whatever may be the special appliances used, the results of my improvement are most important, as the operator by means of the lever S can graduate the valve-shifting movements with the greatest nicety, stopping and starting the cage quickly, yet without any abrupt jerks, while he is relieved of the labor heretofore required to reverse the main valve.

Without limiting myself to the devices shown, I claim—

1. In a hydraulic elevator having a valve, substantially as shown, an independent engine operating such valve, and means within reach and control from the cage for putting such engine into and out of operation, substantially as described.

2. In a hydraulic elevator having a valve, substantially as shown, an independent engine operating such valve, and means within reach and control from the cage for putting such engine into and out of operation, substantially

as described, and appliances for automatically stopping and starting the cage as it approaches the limit of its movement in either direction, up or down, substantially as set forth.

3. In a hydraulic elevator, the combination, with the main reversing-valve of an elevator, of a piston connected to said valve, and appliances whereby the motor-fluid may be brought to press upon one or both sides of the piston at the will of the operator in the cage, substantially as set forth.

4. The combination of the casing Y, cylinder A and lateral pipes, main valve F, piston G, larger in area than said valve-pipe *b*, valve-cock *l*, and operating appliances, substantially as specified.

5. The combination, with the cylinder and main reversing-valve of an elevator, of a stop-valve arranged between the main valve and cylinder to open and close communication between the ends of the cylinder, and appliances whereby said valve may be operated from the cage, substantially as set forth.

6. The combination, with the main-valve casing communicating with the circulating-pipes of a hydraulic elevator, of a weighted stop-valve arranged in said circulation, and operating-rope extending to the cage, substantially as set forth.

7. The combination, with the cylinder A and valve appliances, substantially as described, of the rods O P, levers P′, rack connected thereto, shaft N, connected to the valve-cock *l* of the valve appliances, and provided with a pinion engaging with said rack, substantially as set forth.

8. In a hydraulic elevator, the combination, with the cylinder A, the valve, and appliances for throwing the valve automatically, of the devices for operating said valve from the cage, substantially as set forth.

9. In a hydraulic elevator, the combination of the main valve and devices for operating the same, the valve *l* for controlling the same, and the device for shifting such valve automatically by the action of the apparatus as the cage reaches the limit of its movement, substantially as set forth.

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

CHAS. R. OTIS.

Witnesses:
JOHN MCMAHON,
F. P. HOENEMAN.