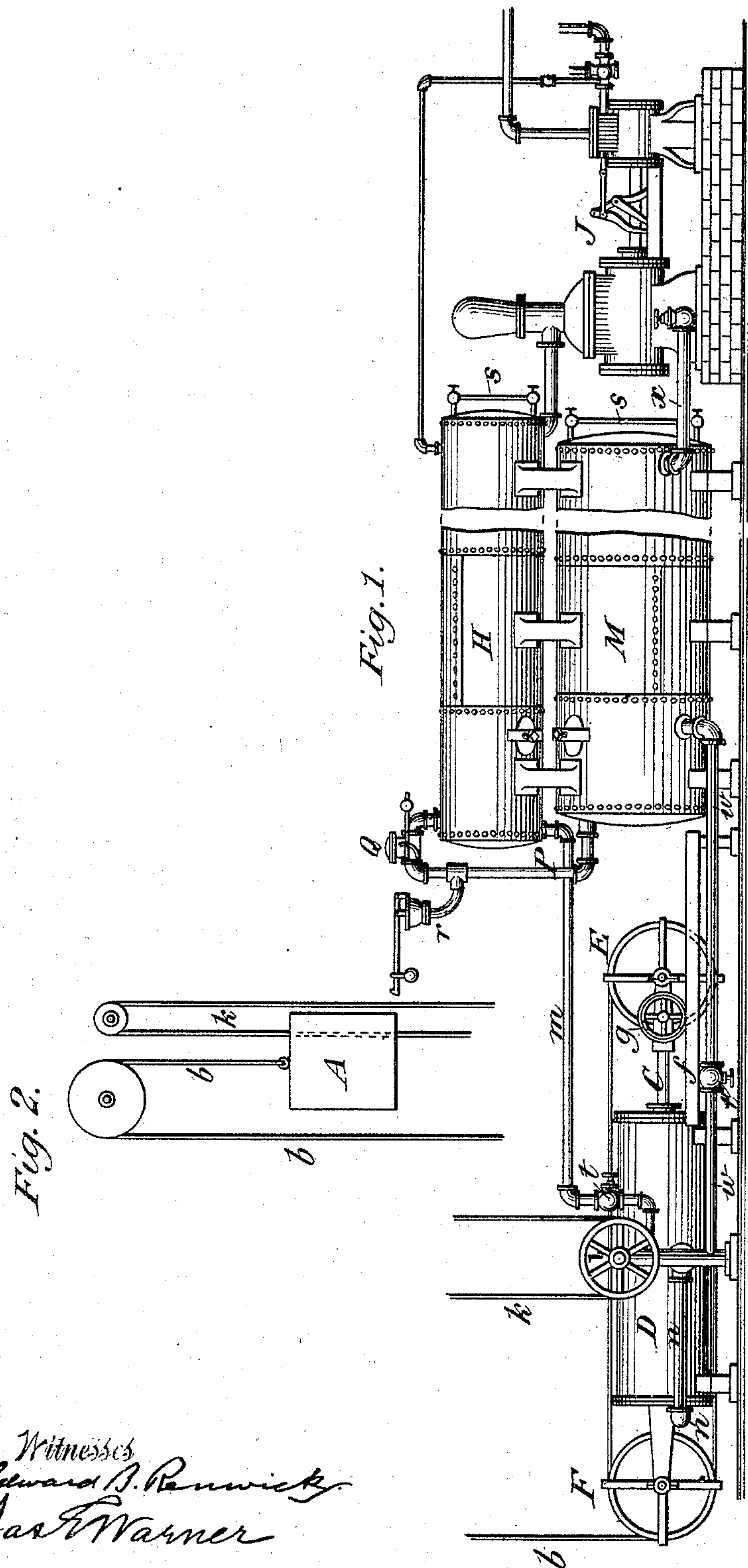


(No Model.)

W. W. RENWICK.  
ELEVATOR FOR PASSENGERS AND FREIGHT.

No. 495,616.

Patented Apr. 18, 1893.



Witnesses  
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# UNITED STATES PATENT OFFICE.

WILLIAM WHETTEN RENWICK, OF MILLBURN, NEW JERSEY.

## ELEVATOR FOR PASSENGERS AND FREIGHT.

SPECIFICATION forming part of Letters Patent No. 495,616, dated April 18, 1893.

Application filed September 8, 1892. Serial No. 445,355. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM WHETTEN RENWICK, of Millburn, in the county of Essex and State of New Jersey, have made a new and useful invention of an Improvement in Elevators for Passengers and Freight; and I do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description and specification of the same.

My invention has reference to the means of counterpoising the weight of the elevator car in that class of hydraulic elevators in which a single acting pressure cylinder is used. The weight of the car (and its appurtenances) of elevators has heretofore been counterbalanced to the required extent by a counterpoise weight connected with the car by ropes extended over pulleys so that the counterpoise weight moves in the reverse direction to that of the car. When the force operating the elevator is water acting in a cylinder under the pressure of compressed air, this system of counterbalancing the weight is attended with the defect that the momentum of the counterpoise weight tends to cause it to continue its movement after the supply valve of the hydraulic elevator cylinder is closed, and consequently the elevator car totters or vibrates on such occasions.

The object of the present invention is to enable a moving counterpoise weight and its attendant momentum to be dispensed with, and it consists of a certain combination of devices by which the weight of the elevator car of an elevator operated by water under the pressure of compressed air in a closed supply tank is counterbalanced in whole or in part by subjecting the water discharging from the elevator cylinder into a closed discharge tank to the pressure of air in the latter reduced below that in the supply tank by the operation of a reducing valve. The said combination is recited in the claim at the close of this specification.

In order that the said invention may be fully understood, I have represented in the accompanying drawings and will proceed to describe the best form of apparatus which I have thus far devised for practicing the invention; it being understood that the apparatus may be modified as circumstances or

the views of users or makers may render expedient.

In the said drawings, Figure 1 represents a side elevation of the said apparatus without the elevator car and the greater portions of the connecting ropes. Fig. 2 represents upon a smaller scale the elevator car and sufficient portions of the connecting ropes and pulleys to enable their operation to be understood.

The elevator car, A, may be of any desirable construction and may be guided by guides in the usual manner. It is connected by means of the hoisting ropes, *b* (one or more), with the piston rod, C, of the hoisting piston of the hydraulic cylinder D, which I prefer to be arranged horizontally; the said hoisting ropes being conducted over the traveling pulleys, E, and the fixed pulleys, F, in the usual manner common with such elevators so as to multiply the extent of movement of the piston. The weight of the traveling pulleys E when arranged to move horizontally may be supported in the usual way by wheels running upon guides, as illustrated in the drawings; there being one guide *f*, and one carrying wheel *g*, at each side of the gang of pulleys. The hydraulic cylinder, D, is a single acting one; that is to say the water under pressure is supplied to one side only of the piston in said cylinder, and is discharged from the same side of the piston into a discharge tank without acting upon the opposite side of said piston. The water, by which the piston of the hydraulic cylinder, D, is operated, is delivered from a pressure supply tank, H, by means of a pipe, *m* to the valve chest, I, of the cylinder, and passes thence to the pressure side of the piston by the pipe *n*. The pressure tank is preferably a closed one, in which the requisite pressure is obtained by compressed air. The delivery of water to the cylinder and its discharge therefrom are regulated by a valve working in the said valve chest I. This valve and the valve port may be of the usual piston variety used with single acting elevator cylinders, and as such valves are well known to makers of elevators it is not deemed necessary to describe and represent one in detail. The pressure supply tank, H, is supplied with water by means of an ordinary steam pump J; and the water in said pressure supply tank is subjected to the pressure of air compressed therein, some one



of the customary provisions for making good the leakage of air from the pressure tank of the elevator being used. The cylinder valve for supplying and discharging the water may  
 5 be operated from the car, A, in the usual manner by means of a hand rope, *k*, connected with the valve operating shaft by a pulley *l*. The apparatus thus far described is substantially the same as elevator apparatuses in common  
 10 use with single acting hydraulic cylinders supplied with water under the pressure of compressed air.

The valve chest is connected by a pipe, *w*, with the discharge tank M, which, instead of  
 15 being in open connection with the atmosphere, is closed so as to contain compressed air which exerts pressure upon the discharging water when the valve is moved to the position for discharging the water from the cylinder, and thus  
 20 causes the discharging water to exert pressure upon the piston during the descent of the car. This pressure discharge tank also is connected with the pump J by the suction pipe, *x*, so that the discharged water may be pumped  
 25 back into the pressure supply tank H. The closed pressure discharge tank, M, is connected with the upper part of the closed pressure supply tank, H, by means of a connecting pipe, P, and an automatic reducing valve, Q,  
 30 of any of the ordinary constructions employed to reduce the pressure of steam flowing from a high pressure to a lower one; and as such reducing valves are well known as common articles of trade, it is not deemed necessary  
 35 to describe and represent one in detail. This construction enables the pressure of the air in the closed pressure discharge tank to be maintained automatically notwithstanding leakage, and without the employment of a spe-  
 40 cial air forcing pump for such purpose. I prefer to apply to the closed pressure discharge tank an ordinary safety valve so as to prevent excess of pressure therein; and the safety valve may be connected, as at *r*, with the tank  
 45 connecting pipe P. I also prefer to apply water gages, *s*, *s*, to the closed tanks, and to insert stop valves, *t*, *t'*, in the supply and discharge pipes, *m*, *w*, so that the water in the tanks may be shut off from the hydraulic cyl-

inder, D, when the piston is to be packed or  
 at other required times.

In operating with this apparatus, the pressure in the pressure discharge tank, M, is maintained at the tension required to cause the pressure of the water upon the piston during  
 55 the discharge of the water to counterbalance to the required extent the weight of the elevator car; it being understood that a sufficient portion of the weight of the car must remain uncounterbalanced to cause the car  
 60 to descend, so that the water is forced from the cylinder D into the pressure discharge tank M. The pressure of the air in the pressure supply tank H, on the other hand, should be sufficient to raise the car with its load at  
 65 the required speed; such pressure being varied as usual in different elevators to suit the area of the cylinder, the stroke of the piston and the maximum weight to be raised. By adjusting the pressure in the closed pressure  
 70 discharge tank, operating upon the piston of the hydraulic cylinder during the descent of the car, the effect of the weight of the car may be opposed or counterbalanced to any desirable extent without the use of a counter-  
 75 poise weight. The force exerted by so much of the weight of the descending car as is employed in forcing the discharging water into the pressure discharge tank is utilized, because the pump is supplied from the same  
 80 pressure discharge tank with water under pressure, and therefore has to overcome only the difference of the pressures existing in the two closed tanks.

I claim as my invention—

85 The combination substantially as before set forth of the single acting hydraulic cylinder with its piston and valve, the closed pressure supply tank, the closed pressure discharge tank, and the connecting pipe and reducing  
 90 valve by which the said two tanks are connected.

In witness whereof I have hereto set my hand.

WILLIAM WHETTEN RENWICK.

Witnesses:

W. L. COULTER,  
 J. G. DUNBAR.