

(No Model.)

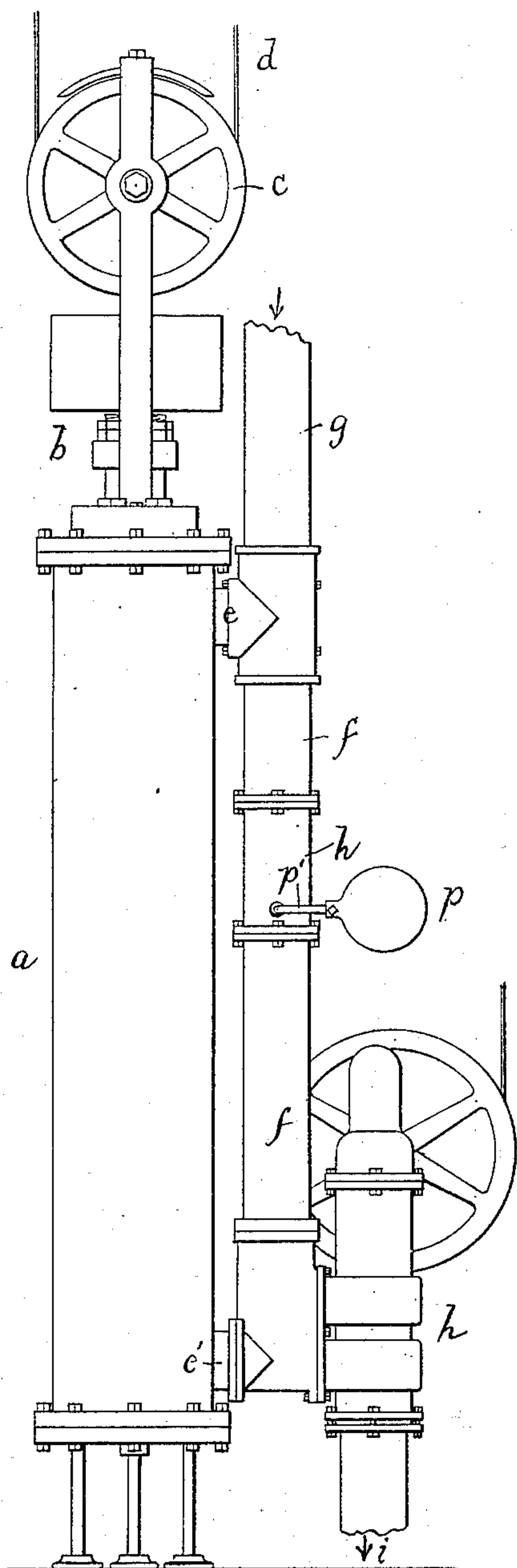
Q. N. EVANS.

REGULATOR FOR HYDRAULIC ELEVATORS.

No. 327,074.

Patented Sept. 29, 1885.

Fig:1.



Witnesses.

B. J. Hayes

John F. C. Prentiss

Fig: 2

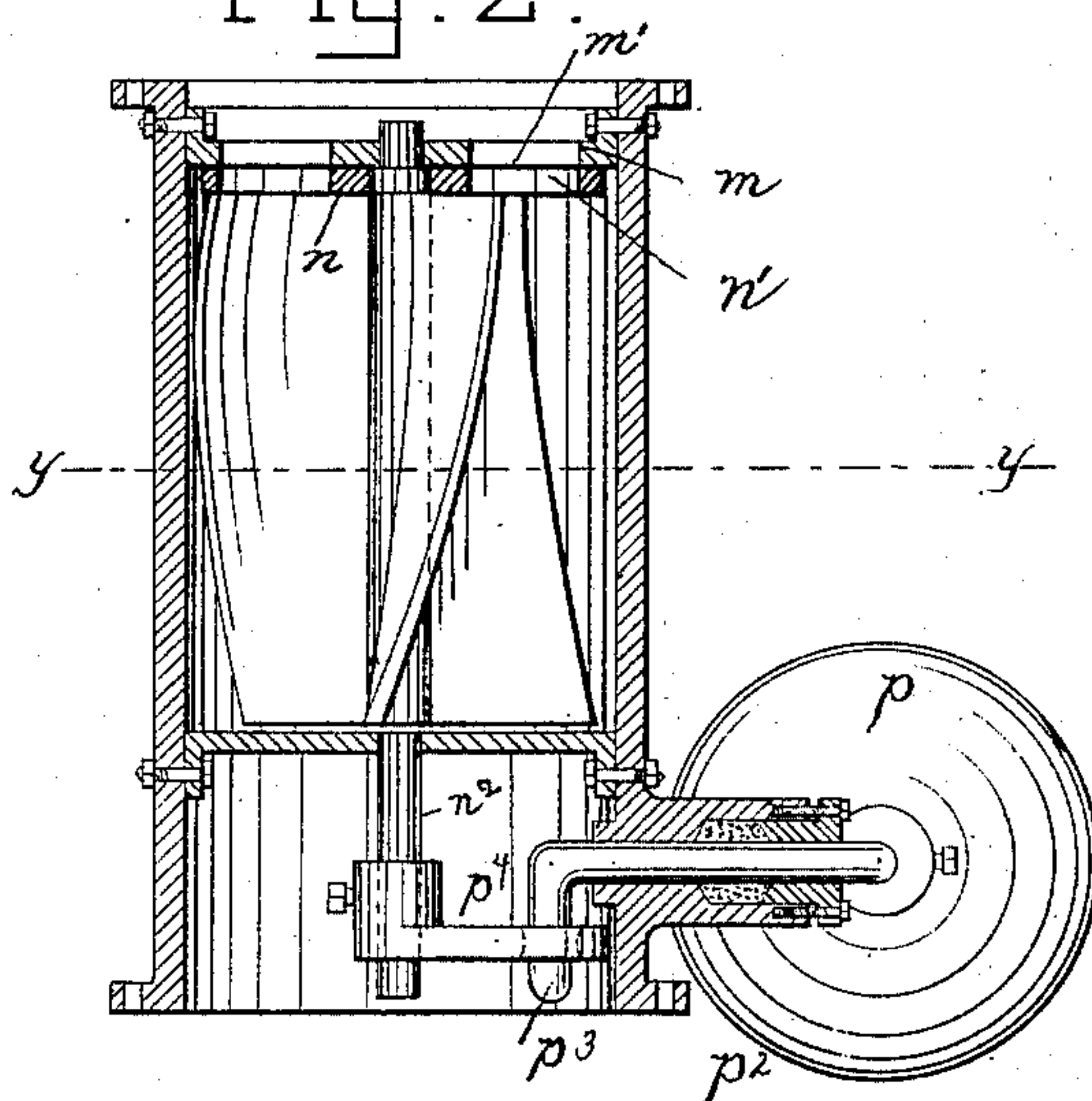


Fig:3.

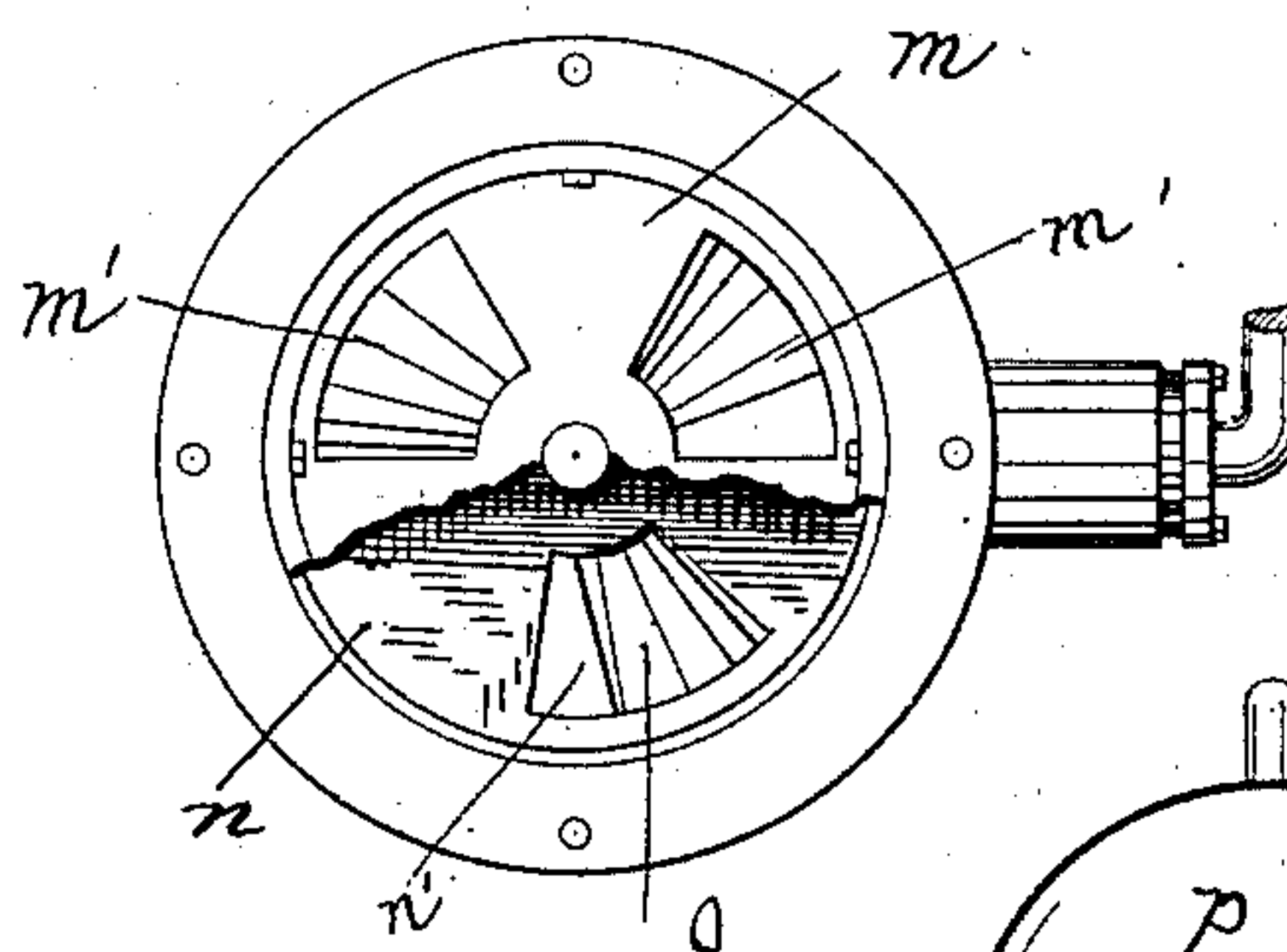
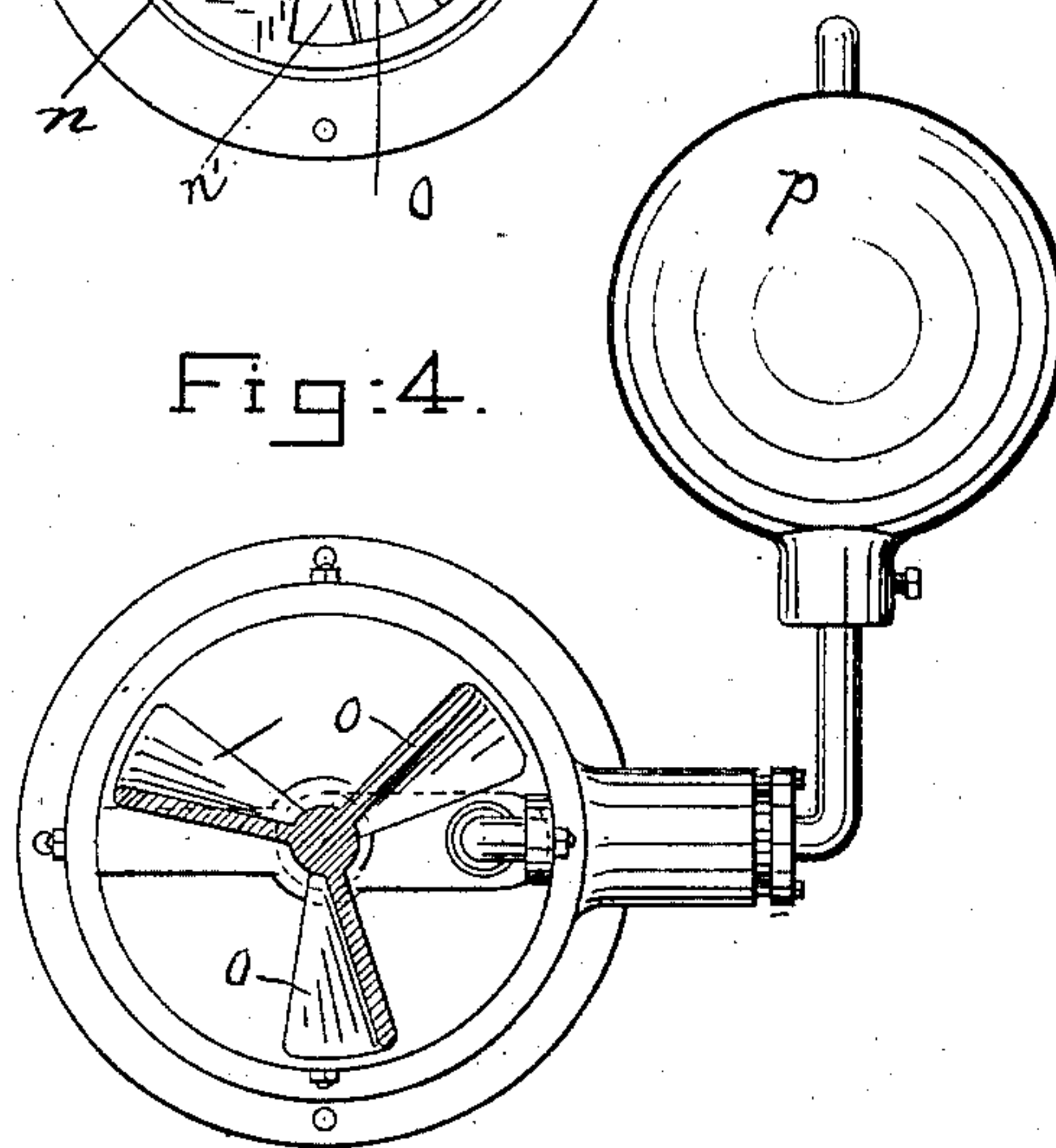


Fig:4.



Inventor.

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UNITED STATES PATENT OFFICE.

QUIMBY N. EVANS, OF BOSTON, MASSACHUSETTS.

REGULATOR FOR HYDRAULIC-ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 327,074, dated September 29, 1885.

Application filed February 2, 1885. (No model.)

To all whom it may concern:

Be it known that I, QUIMBY N. EVANS, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Regulators for Hydraulic Elevators, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 In elevators of that class in which the elevator-car is actuated or controlled in its movements by the pressure of a liquid on a piston the speed of movement of the car varies widely when the load or weight carried by the car is varied, the car descending much more rapidly when heavily weighted than when empty, its descent being in either case produced by the action of gravity and controlled or resisted by the friction of water passing around through passages from one to the other side of the plunger connected with the elevator-car and working in a long cylinder.

My invention consists, essentially, in the combination, with the apparatus, of a hydraulic elevator with a valve or regulator controlled by the flow of water and operating to diminish the area of the passage for the water in proportion as its velocity is increased, so that substantially uniform velocity is imparted to the car under all circumstances.

Figure 1 is a side elevation of a portion of a hydraulic elevator provided with a valve or regulator embodying this invention; Fig. 2, a longitudinal section of the valve or regulator for the elevator on a larger scale; Fig. 3, a plan view thereof, the fixed plate being partly broken away to show the movable plate of the valve or regulator beneath it; and Fig. 4, a transverse section on line *yy*, Fig. 2.

The main portion of the elevator apparatus may be of any suitable or usual construction, being herein shown as consisting of a cylinder, *a*, containing a piston or plunger connected with a cross-head, *b*, provided with a pulley, *c*, which in its upward and downward movement acts on the bight of a rope, *d*, passing over suitable pulleys and connected with the elevator-car, so as to lower and raise

the latter. The ends of the cylinder *a* are in communication by short passages *e e'* with a connecting pipe or passage, *f*, joined at its upper end with the inlet-passage *g*, through which the water or liquid enters the upper end of the cylinder *a* to force the plunger downward, an outlet or exhaust passage then being provided from the lower end of the said cylinder.

The lower end of the connecting-passage *f* is in communication with a valve apparatus, *h*, of usual construction, by which, when in one position, communication is established between the passage *e'* and an exhaust-passage, *i*, and at the same time the lower end of the connecting-passage *f* is closed, so that the water will enter from the pipe *g* into the upper end of the cylinder *a*, and will escape from the lower end of the said cylinder, and by its pressure will force the plunger down in the said cylinder and thus raise the elevator-car.

As the load in the elevator-car may vary widely, while the pressure in the pipe *g* remains substantially constant, the speed of the car will vary unless means are provided for preventing such variation, as will be hereinafter described.

When the valve apparatus *h* is in an intermediate position, it closes the passages *i* and *f*, and the elevator-car is thus stopped and held stationary, and when the valve is moved to its other position the passages *f* and *e'* are connected and the exhaust-passage *i* closed, in which condition the liquid may be forced around from the upper part of the cylinder through the passages *e*, *f*, and *e'* into the lower part thereof as the plunger moves, permitting the elevator-car to move downward by the action of gravity, resisted only by the friction of the liquid passing through the connecting-passage *f*, the empty car being of sufficient weight to overbalance the plunger and connected parts and any additional counterbalance that may be used in connection with the car. It follows that when the load in the car is increased its downward speed will also increase, and the water will be forced more rapidly through the connecting-pipe *f*, and in order to regulate the speed of the car in its

downward movement the passage f is provided with a regulating apparatus, h , consisting, essentially, of a valve acted upon by the water flowing through the passage, which tends to close the said valve as the velocity of the flow is increased, and by such closing of the valve to produce increased resistance to the flow of the water, thus checking its velocity, which is thus maintained nearly constant.

To prevent the increase of speed during the downward movement of the car, which is the chief object of my invention, I have devised a valve or regulator which, placed in a passage in communication with the cylinder, is actuated solely by the pressure of the water—the greater the pressure the greater the movement of the valve—to check the flow of the water through the passage in which it is placed, the employment of the valve or regulator enabling the speed of the descent of the car to be kept substantially uniform.

For closing the water-passages as the speed of the descending car tends to increase, I have herein placed, between the passages g and f , a valve or regulator composed of a short section of pipe, h , best shown in the enlarged Figs. 2, 3, and 4, containing a plate, m , having a series of openings, m' , for the passage of the water, the said plate constituting a valve-seat, and having co-operating with it the movable plate n , provided with attached spiral blades o , the said plate and blades being carried by an arbor or shaft, n^2 . The plate n has a series of passages, n' , which may be caused to register with the passages m' of the stationary plate, permitting the full flow of water through the said passages, or may be moved around out of coincidence with the passages m' , thus partly or wholly closing the latter and reducing the area for the passage of water therethrough. The stream or current of water flowing through the pipe f is made to turn or operate the movable plate n of the valve or regulator to reduce the effective area of the passages m' in the plate m , and thus control the quantity of water that may flow through them, and to accomplish this, as herein shown, the plate n is provided with spiral blades, on which the water acts, causing the said plate to rotate in the direction to close the passages m' as the velocity of water or its propelling force on the said blades increases.

In order to resist the action of the water on the blades and to open the valve when the flow of water through the pipe f ceases, or in proportion as its velocity diminishes, so that the water may have a free passage when the car is lightly loaded, the arbor n^2 of the valve-plate and actuating-blades o is connected with a retractor, shown as a weight, p , in this instance placed outside of the pipe f upon an arm, p' , of a rock-shaft, p^2 , extending through a stuffing-box to the interior of the valve-cas-

ing, and provided with another arm, p^3 , connected with a crank, p^4 , on the said arbor n^2 in such manner that the rotation of the said shaft by which the valve is closed also operates to raise the said weight. Thus, when the car is heavily loaded and tends to descend with great rapidity, forcing the water with great velocity through the connecting-pipe f , the stream of water passing through the said pipe presses on the blades o and turns plate n , thus partially closing the passage m' , which so impedes the flow of water that its velocity will be scarcely greater in the pipe f than when the empty car is descending with the said valve fully opened. The tendency of the flow of water to close the valve and of the retractor or weight p to open it thus regulates the flow of water through the pipe f and retains it nearly uniform.

When found necessary to regulate the speed of the car in rising, a similar valve or regulator may be used in the exhaust-passage i , so that by closing or throttling the said passage at any point as the velocity of the water increases the said velocity may be retained substantially constant in the said passage.

It is obvious that a valve or regulator of this kind may be applied to elevators of different construction or arrangement of the water-passages from that herein shown, and in such cases the regulator might be applied in connection with other passages than a connecting-passage between the ends of the cylinder—as, for instance, in the inlet or outlet passages for the water—the gist of the invention consisting in the application within the water-passages of the elevator of a valve or regulator actuated solely by the flow of the water.

I claim—

1. The cylinder and connected passages of a hydraulic elevator combined with the valve or regulator, substantially as described, composed essentially of a case, a plate, m , provided with holes, and a movable plate and blades, the pressure of the water on the latter effecting the closing of the holes in the plate m in proportion as the pressure of the water increases, substantially as described.

2. The combination of the cylinder of a hydraulic elevator with a regulating device consisting of a valve and spiral actuating-blades therefor operated by the flow of water through the said valve, and a retractor opposing the movement of the said blades, substantially as described.

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

QUIMBY N. EVANS.

Witnesses:

G. W. GREGORY,
B. J. NOYES.