(No Model.) 2 Sheets—Sheet 1.

C. A. MACY.

AUTOMATIC STOP MECHANISM FOR ELEVATORS.

No. 553,862. Patented Feb. 4, 1896.

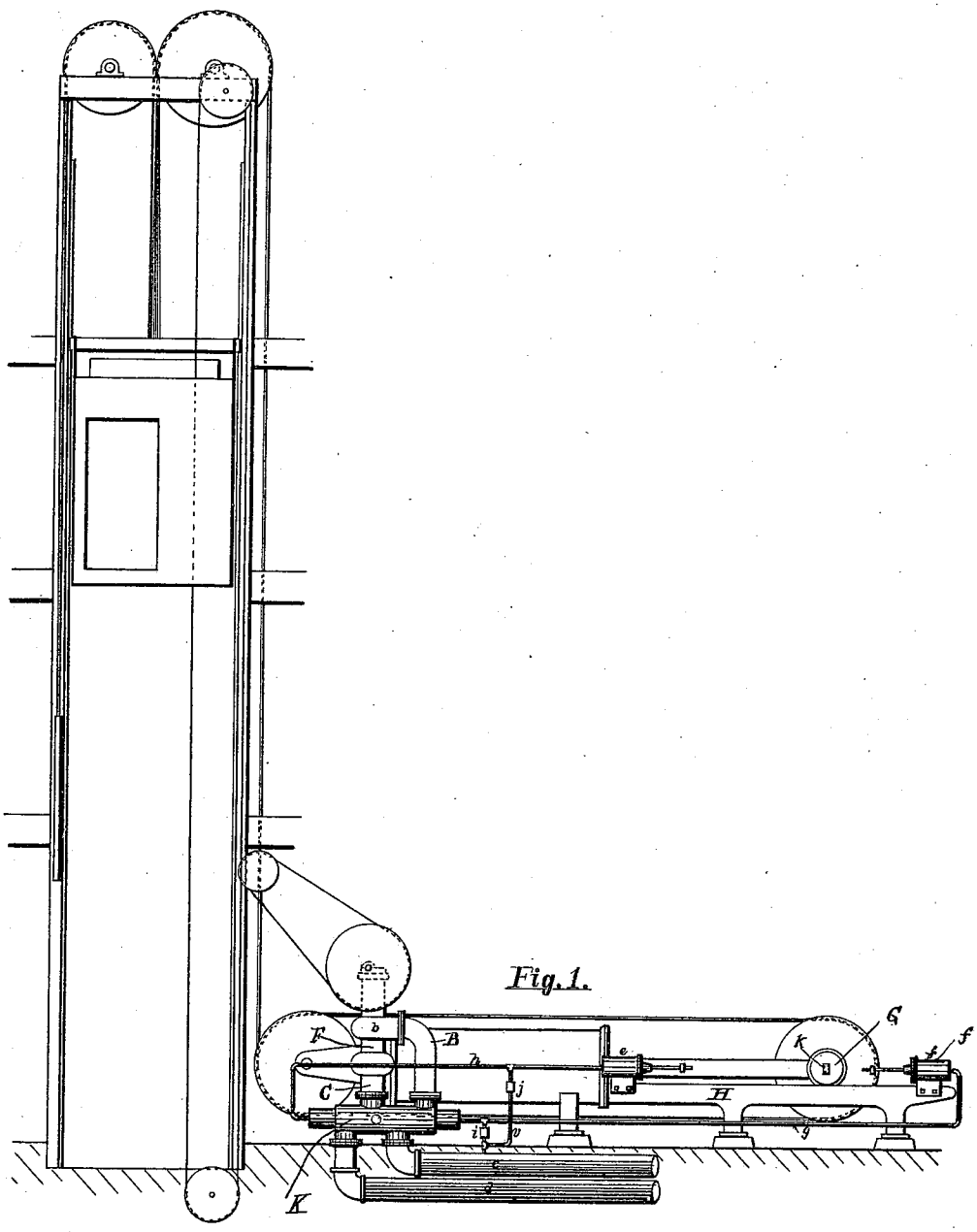

Fig. 1.

Witnesses:
Thomas Durant
Wallace Murdock,

Inventor:
Clarence A. Macy
by Church & Church
his Attys

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

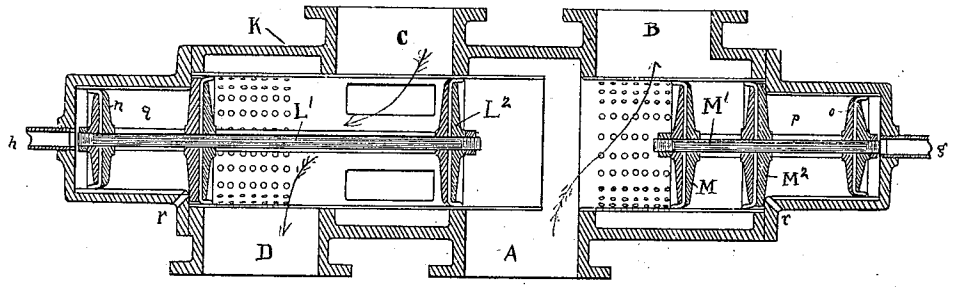


Fig. 3.

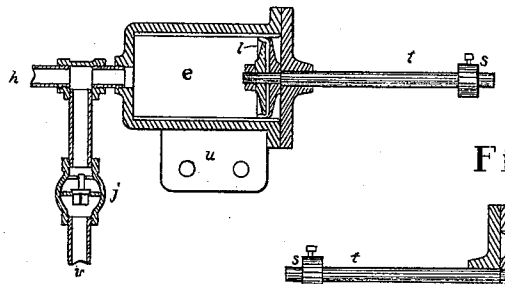
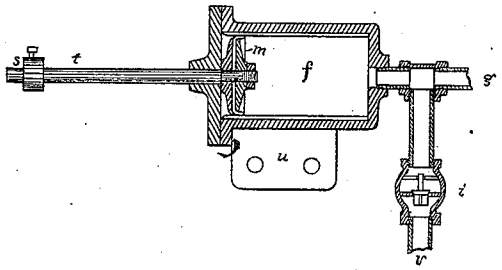


Fig. 4.



Witnesses:
G. Willard Rich.
G. A. Roda.

Inventor;
Clarence A. Macy
by Church & Church
his Atty's.

UNITED STATES PATENT OFFICE.

CLARENCE A. MACY, OF ROCHESTER, NEW YORK.

AUTOMATIC STOP MECHANISM FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 553,862, dated February 4, 1896.

Application filed October 30, 1894. Serial No. 527,464. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE A. MACY, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Automatic Stop Mechanism for Elevators; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-letters marked thereon.

My present invention has for its object to provide a mechanism for automatically arresting the movement of a hydraulic piston, particularly of a hydraulic engine operating an elevator, when the elevator-car has reached the end of the well, or of its excursion in either direction; and it consists in certain improvements in construction and combinations of parts, all as will be hereinafter fully described and the novel features pointed out in the claims at the end of this specification.

In the drawings, Figure 1 is a side elevation of the hydraulic engine and the appropriate connections operating an elevator-car, showing the application of my invention to said engine; Fig. 2, a longitudinal sectional view of the stop or cut-off valve; Fig. 3, a sectional view of one of the valve-operating devices; Fig. 4, a similar view of the other valve-operating device.

Similar letters of reference in the several figures indicate similar parts.

The hydraulic engine, the controlling-valve, the means for operating the latter, and the elevator-car being of the ordinary or any suitable construction they do not require any specific description further than that G indicates the usual cross-head connected to the movable piston for operating the cables, and having a small operating lug or projection *k*, as shown in Fig. 1.

B indicates the water-supply pipe leading to the controlling-valve cylinder F; C, the exit-pipe leading therefrom, and H indicates the frame of the hydraulic engine upon which the cross-head G moves. The pipes B and C are connected to the upper sides of a valve-casing K at the points indicated in Fig. 2, and the water-supply pipe *c* is connected to the port A in said casing, while the exit-pipe *d* leading to the tank or the sewer is connected to the port D in said casing K.

Arranged at one end of the casing K is a valve-piston L secured to a rod or stem L′, to which stem is also connected a balancing-piston L^2, said valve L governing the exit of fluid from the hydraulic cylinder and operating when moved to the right in said Fig. 2 to shut off the exit from said cylinder to the pipe *d*. Beyond this piston L a piston *n* is secured, operating in the cylinder *q*, from which cylinder and between the pistons a small exit-port *r* is provided.

h indicates a small pipe connected with the outer end of cylinder *q* and also with the end of a small cylinder *e*, provided with a securing-bracket *u* and bolted to the frame H of the hydraulic engine, and operating within this cylinder is a small piston *l* secured to a rod *t*, upon which is mounted an adjustable collar or stop *s*, the location of this piston and cylinder being such that the collar *s* is adapted to be struck by the projection *k* on the cross-head when the piston on the latter is at the end of its inner movement—that is, when the elevator-car is at the bottom of the well—and the piston *l* will be moved inward by said cross-head to the opposite end of the cylinder from that shown in Fig. 3. The pipe L is supplied with liquid from the main supply-pipe *c* through a small pipe *v*, in which is interposed a check-valve *j*, admitting liquid to said pipe *h* in sufficient quantity to supply any leakage past the pistons *n* and *l*, thereby keeping the piston *l* in the position shown in Fig. 3. Also mounted in the casing K is a valve-piston M secured to a rod M′, to which latter is also attached a balancing-piston M^2 and at its outer end a piston *o* operating in a cylinder *p*, corresponding to the cylinder *q* at the other end of the casing. This valve M operates to control the passage of liquid from A (the supply) to B, which is the port leading to the supply of the hydraulic engine. The cylinder *p* beyond the piston *o* is connected by a pipe *g* with the end of the cylinder *f*, (see Fig. 4,) within which operates a piston *m* on a rod *t*′, which is provided with an adjustable collar *s*′, as shown in Fig. 4, the construction of this cylinder being the same as the cylinder *e*, and it is attached to the frame H of the

hydraulic engine in such position that the collar s' is adapted to be struck by the lug k on the cross-head G and the piston m moved inward in the cylinder when the said cross-head reaches its outermost position—that is, when the car is at the top of the well—or just before it reaches this position. The pipe g is supplied with liquid under pressure from the supply-pipe A through a small pipe v, a check-valve i, corresponding in position and operation to the check-valve j, being interposed, as shown in Fig. 4.

All of the parts are shown in their normal positions in the drawings, and the pipes h and g are filled with liquid and the cut-off valves L and M are open, as shown, so that the hydraulic engine may be controlled by the usual controlling-valve in the ordinary manner. When, however, through inattention on the part of the operator or otherwise, the car while moving at speed reaches either end of the well—say the top, for instance—the cross-head will operate the piston m through the collar s' and rod t', which movement will be communicated through the liquid column in the pipe g to the piston o, moving the latter and the connected valve M to the left and shutting off the supply of liquid to the engine, thereby arresting the car. As soon as the engine is reversed by the ordinary controlling-valve, the pressure on the piston-rod t' being released, the piston m will be forced out to normal position by the pressure on the valve-piston M, the motion being transmitted through the fluid in the pipe g. In the same manner the piston m and valve-piston L will be operated to shut off the exhaust from the engine-cylinder when the car reaches the bottom of the well and the cross-head engages the piston-rod t.

By employing a liquid column between the main piston and the valves the main valve can be located in any position most convenient.

From the above it will be seen that I have provided independent cut-off valves capable of operation directly from the hydraulic engine, and also devices which are not liable to get out of order and become inoperative by reason of any leakage and in which the operation of said valves is positively and directly caused by the movement of the hydraulic engine. The arrangement is also such that when the elevator-car has reached its highest point the supply to make it move farther in that direction is cut off, though the main-cylinder exhaust may be opened and the car allowed to descend, and when the car has reached its lowest point the fluid-exhaust is closed, while fluid may be admitted to cause the car to ascend.

I claim as my invention—

1. In an elevator, the combination with the main cylinder, the movable piston therein, and the fluid-supply pipe to said cylinder, of the cut-off valve in the supply-pipe normally held open by fluid-pressure, an actuating-piston connected thereto, the movable piston actuated by the main piston when near one extreme of its movement, the liquid column connecting said two pistons, a liquid-supply pipe to said column, and a check-valve in said pipe opening toward said column, substantially as described.

2. In an elevator, the combination with the main cylinder, the movable piston therein, and a fluid-pipe communicating with the cylinder, of the cut-off valve in said pipe normally held open by fluid-pressure, an actuating-piston connected thereto, the piston adapted to be actuated by the main piston when near one extreme of its movement, and the liquid column connecting said two pistons, substantially as described.

3. In an elevator, the combination with the main cylinder, the movable piston therein, and the fluid-exhaust pipe from said cylinder, of the cut-off valve in said exhaust-pipe normally held open by fluid-pressure, an actuating-piston connected thereto, the movable piston actuated by the main piston when near one extreme of its movement, and the liquid column connecting said two pistons, substantially as described.

4. In an elevator, the combination with the main cylinder, the movable piston therein, and the fluid supply and exhaust pipes connected thereto, of the two independent cut-off valves, one in the supply and the other in the exhaust pipe, each of said valves being opened and normally held open by pressure and provided with an actuating-piston, two cylinders and pistons therein arranged to be actuated from the main piston when near the extremes of its movement, a pipe connecting one cylinder with the actuating-piston of the cut-off valve in the supply-pipe and a pipe connecting the other cylinder with the actuating-piston of the cut-off valve in the exhaust-pipe, substantially as described.

5. In an elevator, the combination with the main cylinder, the movable piston therein, the fluid supply and exhaust pipes, and a controlling-valve arranged between them and the main cylinder, of the two independent cut-off valves, one arranged in the supply and the other in the exhaust pipe, each valve being opened and normally held open by pressure and having an actuating-piston, two cylinders, one for each valve connected by pipes with the actuating-piston, and a piston in each cylinder, said pistons being arranged to be actuated from the main piston when near the extreme of its movements in opposite directions, and fluid-supply pipes for the two cylinders having check-valves therein, substantially as described.

6. In an elevator, the combination with the main cylinder, the piston therein, and the supply and exhaust passages, of the cut-off valve in the inlet-pipe, normally held open by fluid under pressure, the cut-off valve in the discharge-pipe, normally held open by fluid un-

der pressure, each of said valves having an actuating-piston, the two independent cylinders, each having a piston therein arranged to be actuated from the main piston when near its extremes of movement, pipes connecting each cylinder with its corresponding actuating-piston, and a liquid supply for each of said pipes having a check-valve therein, substantially as described.

7. The combination with the valve-casing K having the ports A, B, C and D, the connected piston-heads L, L^2, and actuating-head *n*, and the connected piston-heads M, M^2, and actuating-head *o*, of the cylinders *e* and *f*, pistons *l*, *m* therein, the rods *t*, *t'* connected to the last-mentioned pistons, pipes *g* and *h* connecting the cylinders *e* and *f* with the cylinders in the main-valve casing, supply-pipe *v*, check-valves *i*, *j*, between the supply-pipe and pipes *g* and *h*, and the main cylinder and the piston operating therein, substantially as described.

CLARENCE A. MACY.

Witnesses:
F. F. CHURCH,
G. A. RODA.