(No Model.)

2 Sheets—Sheet 1.

E. HUNT.

HYDRAULIC ELEVATOR.

No. 388,683. Patented Aug. 28, 1888.

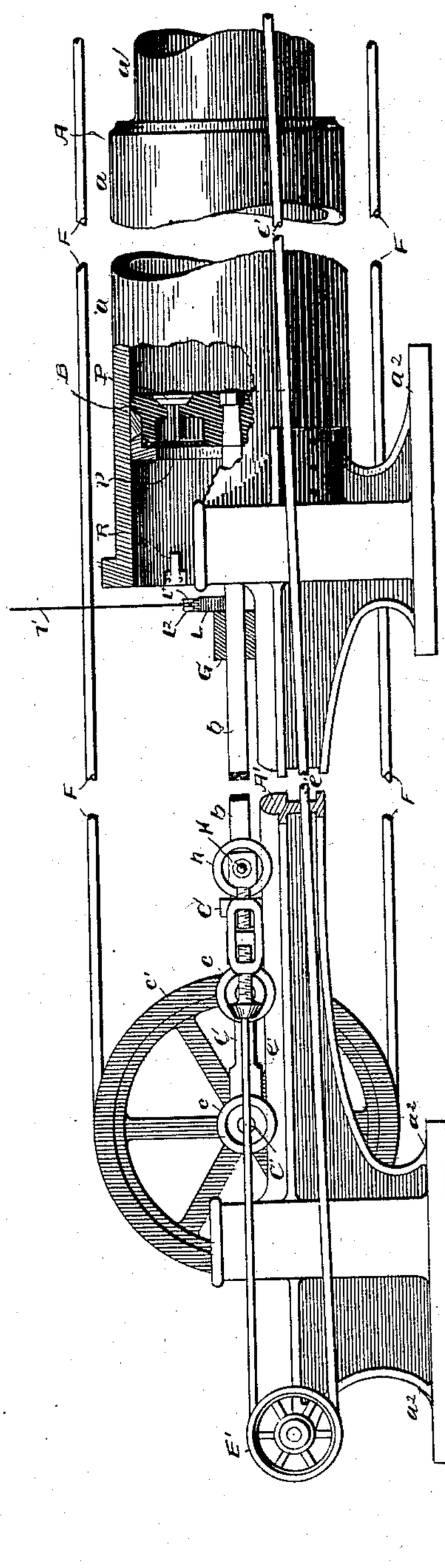

Fig. 1.

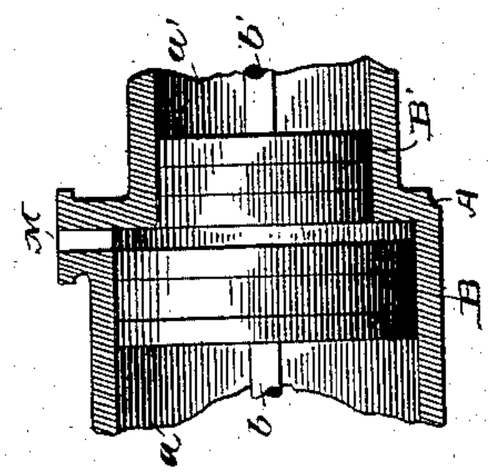

Fig. 3.

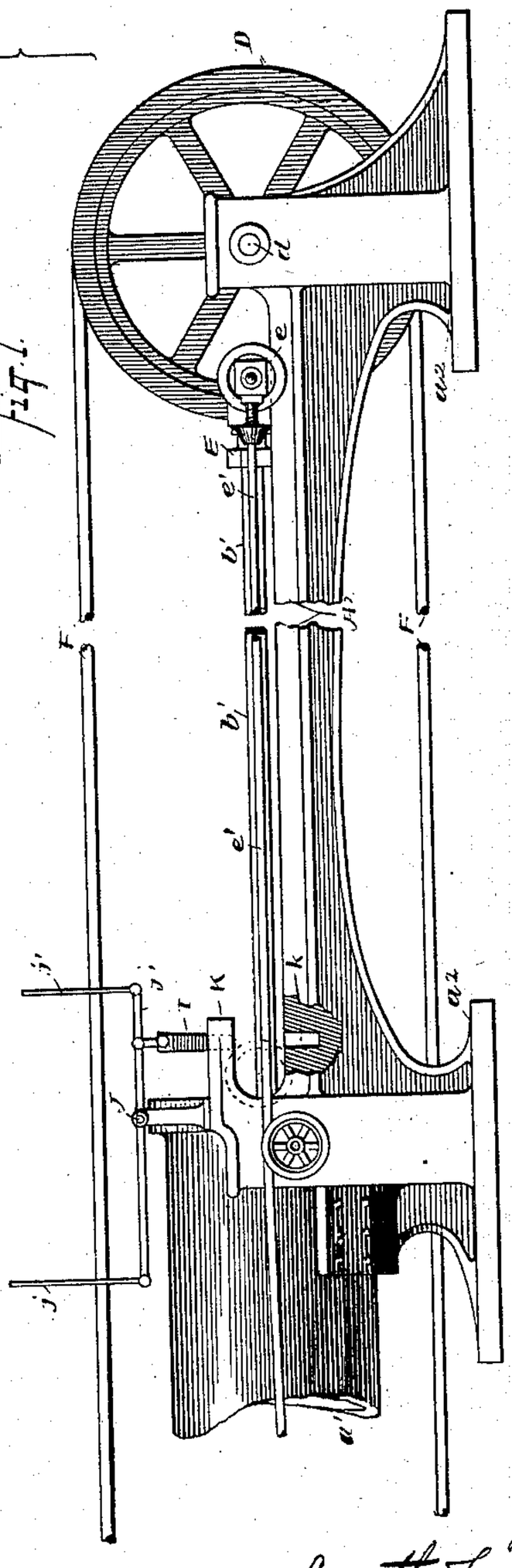

Fig. 2.

WITNESSES.
N. S. Amstutz.
Geo. W. King

INVENTOR.
Edwin Hunt.
By Leggett & Leggett Attorney.

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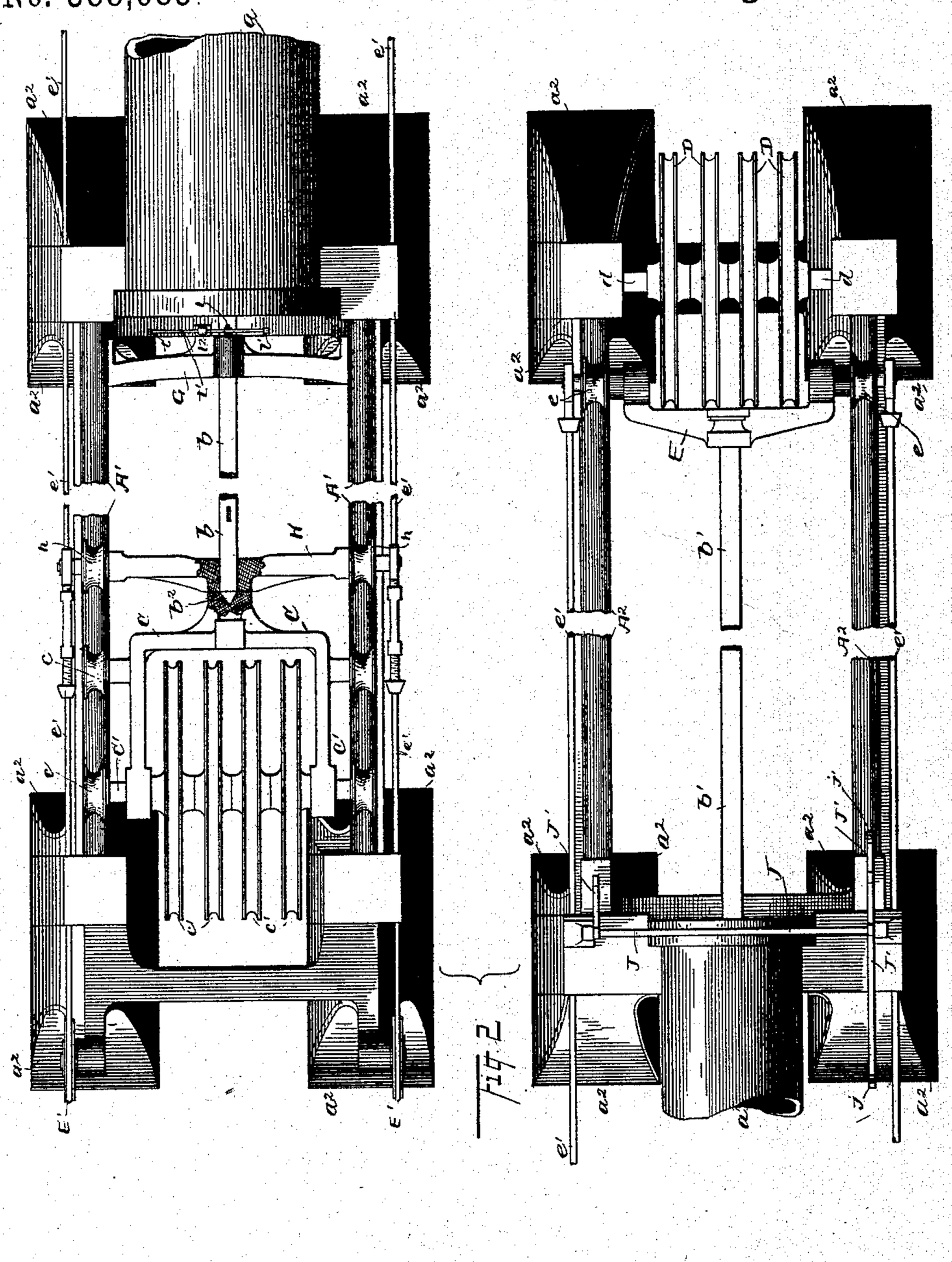

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Edwin Hunt. INVENTOR.
By Leggett & Leggett Attorney.

UNITED STATES PATENT OFFICE.

EDWIN HUNT, OF CLEVELAND, OHIO.

HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 388,683, dated August 28, 1888.

Application filed August 26, 1887. Serial No. 247,920. (No model.)

To all whom it may concern:

Be it known that I, EDWIN HUNT, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hydraulic Elevators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in hydraulic elevators in which is employed a water-cylinder having two bores of unequal diameters in line with each other, with corresponding pistons operating in opposite directions, the one piston-rod acting directly on the yoke to which the reciprocating sheaves are attached, and the other piston-rod, by means of cable and suitable mechanism, also acting on the sheave-yoke, with mechanism had for blocking either piston, so that either or both pistons can be used in elevating the load, according as the load is light or heavy, to the end that with light or medium loads a greater saving of water is effected by using one piston only. As a safety attachment to prevent the piston moving out too far and breaking the hoisting-cable—as, for instance, in case of leakage of the induction-valve overnight—I provide an opening through each piston, each opening being closed by a valve opening inward, such valve having an outwardly-projecting stem that engages a stop and opens the valve whenever the piston shall have exceeded its normal travel outward.

With these objects in view my invention consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in section. Fig. 2 is a plan view, in both these figures the central portion thereof being broken away to reduce the size of the drawings. Fig. 3 is an elevation in longitudinal section showing the central portion of the cylinder with the pistons in juxtaposition at the inner end of their stroke.

A represents the water-cylinder, the same having two bores, *a* and *a'*, of unequal diameter, with corresponding pistons, B and B', the relative areas of the pistons being usually about two to one, although the relative sizes of the pistons may vary according to circumstances. The pistons are provided, respectively, with piston-rods *b* and *b'*, extending in opposite directions, both ends of the cylinder being open. A heavy cross-bar, G, is secured to the front end of the cylinder, the cross-bar having a lateral opening, through which piston-rod *b* passes with an easy fit, the rod and aperture being usually square in cross-section, or of such shape as will hold the piston-rod from turning on its axis. The front end of rod *b* is made conical, as shown at b^2, and fits in a corresponding seat in the rear end of yoke C. This yoke is mounted on grooved wheels *c*, that travel on ways A', the latter forming a part of the frame-work of the machine. A shaft, C', passes laterally through the prongs of the yoke near the forward end of the latter, and on this shaft are journaled a series of reciprocating sheaves, *c'*, around which the hoisting-cable F passes, and leads from thence around sheave D, the latter being journaled on a stationary shaft, *d*, that is rigidly attached to the rear end of the machine. From the sheave the hoisting-cable leads in the usual manner to the elevator, the necessary guiding-wheels being employed. Piston-rod *b'* connects with cross-head E, the latter being mounted on grooved wheels *e*, that travel on ways A^2. Cables *e'* are connected with the ends of the cross-head E, and lead forward around idle-sheaves E', and from thence lead back and connect with cross-bar H, the latter being mounted on wheels *h*, that travel on ways A'. Cross-bar H, when in operation, abuts the rear end of yoke C, the central part of the cross-bar having a lateral opening, through which piston-rod *b* passes with an easy fit, or preferably without contact. The structure is mounted on legs a^2, that elevate the cylinder to allow the lower coils of cable F to pass under the cylinder. The water-pipe M enters the cylinder at the center between the two pistons, this water-pipe being provided with suitable valves such as are in common use for the purpose. Consequently these valves are not shown.

A rock-shaft, J, is journaled in suitable boxes located at the rear end of the cylinder. To this rock-shaft are attached arms J', and from these arms depend wedges I. These wedges pass through vertical openings in

brackets K, and when the wedges are depressed the lower ends thereof enter pockets *k*, had in the frame-work of the machine. When piston B′ is drawn inward to the position shown in Fig. 3, the wheels *e* will have been drawn forward past the line of wedges I, in which case, if the wedges are depressed, the latter will interpose in the path of wheels *e* and block piston B′, in which case this piston will act as a stationary head for the water to press against in moving piston B. The one arm J′ extends some distance forward of the rock-shaft, and at the forward end thereof has attached a small cable, *j*, for depressing the wedges.

To the rear end of one of arms J′ is attached a cable, *j′*, for elevating the wedges. These cables *j j′* extend up along the elevator-shaft, where they are accessible to the operator, so that the latter can block or release piston B′ from its position on the cage of the elevator. A mortise is made through piston-rod *b* to receive wedge L just rearward of cross-bar G when this piston is drawn inward. When, therefore, this wedge is inserted in the mortise of the rod, the projecting ends of the wedge engage cross-bar G and block piston B, so that the latter for the time being remains stationary, serving as a head for the water to act on in operating piston B′. Wedge L is connected with lever L′, the latter being pivoted at L^2, and with cables *l* and *l′*, for operating the lever and wedge, these cables also leading up along the elevator-shaft, where they are accessible from the elevator-cage. Piston B, through the medium of rod *b*, acts direct on yokes C in elevating a load. Piston B′, by means of cross-head E and cables *e′*, draws cross-bar H forward, and thus acts on yoke C in hoisting a load, and when the aforesaid wedges I and L are elevated both pistons co-operate in doing the work.

Suppose the capacity of the elevator be sufficient to elevate twelve persons and the piston B can elevate eight persons, the capacity of piston B′ being four persons. In lifting a full load of course both pistons are used, and the same amount of water is required as with an ordinary cylinder of one piston of the same capacity; but with an ordinary cylinder the same amount of water is used whether twelve persons or one person is elevated. With my improved apparatus, with a load of eight persons or less, by blocking the small piston and using only the large piston, a saving of one-third of the water is effected. With a load of four persons or less, by blocking the large piston and using only the small piston, a saving of two-thirds of the water is effected. Under ordinary circumstances, with an elevator made to carry twelve persons, probably more than nine-tenths of the trips will be made without exceeding four persons to a load. It will be seen, therefore, that a very great saving may be effected by using the piston singly, according to the load.

As a safety attachment I make an opening through each piston and close these openings, respectively, with valves P opening inward. The valve-stems *p* project outward beyond the piston and engage stops R whenever a piston moves out beyond its normal travel. In case the hoisting-cable should break when either piston is moved outward a trifle past the end of its normal stroke, the stem *p* by engaging stop E opens valve P and relieves the pressure in the cylinder, so that no further damage is likely to accrue. Sometimes, by reason of leakage of the induction-valve, for instance, overnight, one or both pistons will be forced out beyond its normal stroke, and in so doing endangering the hoisting-cable. With my improved stops and valves this danger is entirely obviated.

The cylinder is broken away so as to show the one valve P and connected mechanism; but as both valves are alike this is considered sufficient.

What I claim is—

1. In a hydraulic elevator, the combination, with a water-cylinder having communicating bores of unequal diameter and pistons adapted to reciprocate in said bores to hoist or assist in hoisting the load, of blocking mechanism for holding one or both pistons stationary, substantially as set forth.

2. In a hydraulic elevator, the combination, with a water-cylinder having communicating bores of unequal diameters and pistons adapted to reciprocate in said cylinder, of a piston-rod extending from each piston, a flexible cable connecting said rods, and wedge or wedges for holding one or both pistons stationary, substantially as set forth.

3. The combination, with water-cylinder having bores of unequal area and pistons of unequal area operating in opposite directions in the bores of said cylinder, with suitable mechanism, substantially as indicated, for transmitting and utilizing the power of the pistons in elevating the load, of wedges for blocking the respective pistons, and suitable levers and cables for operating the wedges from the cage of the elevator, substantially as set forth.

4. The combination, with water-cylinder and piston, substantially as indicated, of openings through the pistons and valves for closing such openings, said valves opening inward, valve-stems projecting outward beyond the face of the pistons, and stops for engaging such valve-stems to open the valves whenever the pistons shall have exceeded their normal outward movement, substantially as set forth.

5. The combination, with a water-cylinder having communicating bores of unequal diameters and pistons adapted to reciprocate in the bores of said cylinder, of a piston-rod extending from each piston and a cable connecting the piston-rods, substantially as set forth.

6. The combination, with a water-cylinder composed of two communicating bores of unequal diameter and pistons adapted to reciprocate in the bores of said cylinder, of pis-

ton-rods extending from each piston, yokes secured to said piston-rods, and cables connecting said yokes, substantially as set forth.

7. The combination, with a water-cylinder composed of a large and small communicating chamber, and having a water-inlet entering these chambers between the pistons and pistons of different areas in the cylinder, of piston-rods, yokes secured to said rods, and cables connecting said yokes, substantially as set forth.

8. The combination, with a frame having ways thereon, a water-cylinder supported by said frame, said cylinder being composed of a large and small chamber, pistons of different areas in said chambers, and piston-rods extending from the pistons, of a set of reciprocating sheaves connected with one piston, a reciprocating yoke connected with the other, a cable connecting the piston-rods, a set of stationary sheaves, and a cable strung over the stationary and reciprocating sheaves, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 23d day of July, 1887.

EDWIN HUNT.

Witnesses:
WM. B. HOPKINS,
ALBERT E. LYNCH.