(No Model.)

J. H. CURRAN.

OPERATING VALVE FOR HYDRAULIC ELEVATORS.

No. 541,993. Patented July 2, 1895.

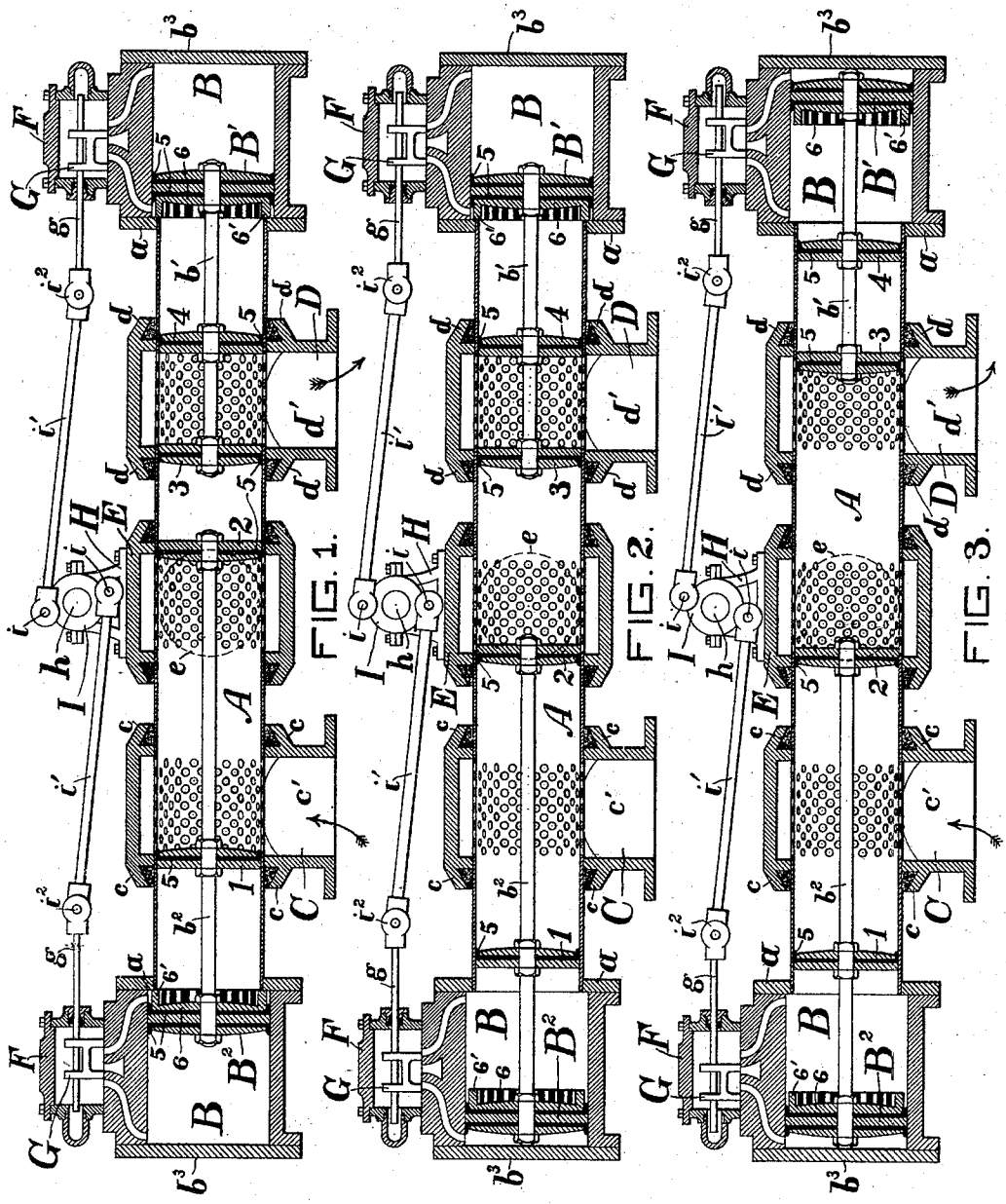

FIG. 1.

FIG. 2.

FIG. 3.

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OPERATING-VALVE FOR HYDRAULIC ELEVATORS.

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To all whom it may concern:

Be it known that I, JAMES H. CURRAN, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Operating-Valves for Hydraulic Elevators, of which the following is a specification.

My invention relates to operating-valves for hydraulic elevators. Its object is to provide a simple, reliable valve which, by a slight movement of the actuating lever, rope, or wheel in the cab, will quickly but gradually turn the supply of water on or off or stop the exhaust from the elevator cylinder so that the cab may be started in either direction and quickly stopped at any point of its travel with certainty and without jarring or jumping. The means by which this object is attained is illustrated in the accompanying drawings, in connection with which the invention will be first fully described and then will be particularly referred to and pointed out in the claims.

Referring to the drawings, in which like parts are indicated by similar reference-letters wherever they occur throughout the various views, Figure 1 is a longitudinal central sectional view of my improved device, the valves being in this view shown in the position they occupy when the supply is turned on to the elevator-cylinder to drive it upward. Fig. 2 is a similar view of the device, the valves being in a position to shut off both the supply and exhaust ports to stop and hold the cab at rest. Fig. 3 is a similar view of the device with the valves in position to shut off the supply to and open the exhaust-port from the cylinder to permit the cab to descend.

Referring to the parts, A is a cylinder, made preferably of brass, the opposite ends of which are secured within annular flanges *a*, which are secured by bolts or in any other suitable manner to cast-iron piston-chambers B. This brass tube passes through the heads of the supply-pipe C and exhaust-pipe D, which have suitable flanges *c* and *d* to receive the packing which makes the joint between the pipe and heads of the supply and exhaust pipes water-tight. The tube also passes through the head E of the pipe leading to the piston-cylinder of the elevator, (not shown,) which has similar flanges to retain the packing. The heads of the pipes C D and E are chambered between the flanges which form the joint of the pipe A, forming jackets around said cylinder A, and the portions of the tube within these jackets are perforated to allow the water to pass to or from the inside of the cylinder A.

The bores of the piston-cylinders B are larger than the interior diameter of the tube A, and upon the top of said cylinders B are fitted slide valve-chambers F, having the exterior ports leading from the chests of the slide-valves to the piston-cylinders B. The slide-valves G are of ordinary construction, except that their sliding surfaces barely cover the supply-ports and that their valve-rods are coupled in such a manner that said ports are never entirely covered. The purpose of this arrangement is to always keep the water-pressure upon both sides of the pistons B′ and B^2 to balance them in whichever position they may be placed and insure their ready starting in either direction when the valve is moved to open one port in each of the valve-chests.

Upon the head E of the supply-pipe leading to the elevator-cylinder is mounted the pillow-block or journal-bearing H, in which is journaled the shaft *h*, which is provided with a wheel or cross-head (not shown) of the usual form, to be connected to the actuating-ropes passing from said wheel or cross-head into the elevator-cab, to be connected there with the customary lever, pilot-wheel, or other actuating device. Upon this shaft *h* is secured a cross-head I, which has wrist-pins *i* projecting from its face, upon which are hinged or journaled the pitmen or connecting-rods *i′*, which connect by swivel-joints at i^2 to the valve-rods *g* of the slide valves G. The rods *b′* and b^2, upon which the pistons B′ and B^2 are secured, extend into the opposite ends of the cylinder A, and have secured on them pistons for covering or uncovering the ports leading to and from the elevator-cylinder. The rod b^2 in the supply end of the device is fitted with two pistons 1 and 2, the said piston 2 being fitted upon the end of the rod b^2 and the piston 1 at a sufficient distance from it to uncover the supply-port *c′*, and the port *e*

leading to the elevator-cylinder when in the position shown in Fig. 1. The piston-rod b' is also fitted with two pistons 3 and 4, the piston 3 being fitted upon the end of the rod b' and the piston 4 at a sufficient distance from it to cover the exhaust-port d', as shown in Figs. 1 and 2. All of the pistons upon the rods b' and b^2 are provided with cup-leather packings 5 of ordinary construction to make water-tight joints between the pistons and cylinders, and have disks or cylinders fitted upon the piston-rods to bear against the back of the cup-leather packings and hold them in place.

The disks 6 within the cylinders B have inwardly-projecting flanges 6′, which project from the perimeter of the disk 6 to abut against the rings a and stop the pistons B′ and B² in their motion toward the center of the tube A. These flanges 6′ are notched from their edges into the body of the pistons so as to permit the water from the valve-chests F to pass through in front of the pistons to drive the pistons B′ and B² toward the end of the cylinders B. The nuts or ends of the piston-rods b' and b^2 stop the pistons B′ and B² by abutting against the cylinder-heads, leaving the ports from the valve-chests F open between the pistons and cylinder ends. The cylinder ends b^3 are secured to the cylinders B by screws or bolts, the joints between the two being suitably packed and the cylinders B and their pistons being larger than the cylinder A. By simply removing the cylinder ends the piston-rods b' and b^2, with their pistons, may be withdrawn for the purpose of supplying new cup-leather packings or other repairs, without disturbing the other part of the mechanism.

I have shown the pistons B′ and B² upon the outer ends of the piston-rods b' and b^2 made double with cup-leather packings on each piston, but a single piston would accomplish the same result but not so satisfactorily.

In the arrangement of my slide-valve mechanism I have coupled the slide-valves to move but a short distance and never to completely cover the ports leading to the cylinders B, so that there is at all times a pressure upon both sides of the pistons B′ and B² in order to thoroughly balance them.

As seen in Fig. 1, when the supply is turned on to the elevator-cylinder, the full pressure is against the outer end of the pistons B′ and B², forcing and holding the pistons upon rod b^2 upon opposite sides of the supply-ports c' and e leading to the elevator-cylinder, while the pistons 3 and 4 cover the exhaust-port d'. When the valves are turned to the position shown in Fig. 2, it will be seen that the pressure is relieved from the outer face of the piston B² and thrown upon its inner face, thus driving the pistons 1 and 2 upon opposite sides of the supply-port c', while the piston B′ is still held in the same position as in Fig. 1, covering the exhaust-port d', the cross-head I is brought to its central position, but leaving all of the ports, exhaust and supply, partially uncovered. When the valves and pistons are brought to the position shown in Fig. 3, the full pressure is thrown against the inner face of the pistons B′ and B², driving the piston B′ to the outer end of the cylinder, uncovering the exhaust-port d', but holding the pistons B² and 1 and 2 in the same position as in Fig. 2. It will thus be seen that the pistons actuating the supply and exhaust ports move independently of each other, while the slide-valves controlling the supply and exhaust from the cylinders B move simultaneously.

In practice, the cylinders B are made larger than the cylinder A, usually about one-third larger. For instance, if the cylinders B are six inches in diameter the cylinder A should be about four inches, the greater area of the actuating-pistons B′ and B² being sufficient to overcome the pressure on the smaller pistons 1, 2, 3, and 4. By reason of the slide-valves having a slight lead, say of about one-sixteenth of an inch, the constant pressure is maintained on the pistons B′ and B², so that a slight movement of the rock-shaft h in either direction instantly starts the desired piston upon its travels. The exhaust-ports in the chests F being gradually uncovered prevents the too sudden starting of the pistons, and, should it be found that the operating-valves are opened too suddenly, the pipe leading from the exhaust-ports of the chests F may be fitted with a regulating-cock to graduate the exhaust from the cylinders B.

By reason of mounting the supply-pistons 1 and 2 and the exhaust-pistons 3 and 4 upon separate rods to be actuated by separate valves, the wear upon the cup-leather packings is reduced one-half over devices in which all the pistons are mounted upon a single rod, and, as the pistons upon each side of the supply move independently of those upon the opposite side, the exhaust-pistons need only be far enough apart to cover the exhaust-port, as seen in Figs. 1 and 2, and their travel is but one-half of that of pistons all mounted upon a single shaft. The device is therefore more compact and subject to less wear than those in common use.

It is obvious that many mere mechanical changes may be made in the device without departing from the spirit or scope of my invention, and

Without limiting myself to the precise details of construction shown, what I claim is—

1. In a valve operating device for hydraulic elevators, the combination of the supply pipe, the pipe leading to the elevator cylinder and the exhaust pipe, the central cylinder passing through the heads of said pipes, large cylinders at each end of said central cylinder, actuating pistons in said larger cylinders having rods extending into the ends of the central cylinder, pistons on one of said rods to cover or uncover a supply port leading to the elevator cylinder, and similar pistons upon the

opposite rod to cover or uncover the exhaust port, slide valves mounted upon the end cylinders to control the movement of the pistons, the rock shaft mounted in bearings between the slide valves, a crosshead supported on said rock shaft, wrist pins projecting from said cross head, and the rods connecting said wrist pins with the slide valves, substantially as and for the purpose set forth.

2. The combination, of the piston cylinder for controlling the supply of water to and its exhaust from the elevator cylinder, larger cylinders at the ends of said cylinder, actuating pistons in each of said larger cylinders, each having a valve rod extending into the ends of the intermediate cylinder, actuating pistons secured upon the outer ends of said rods within the larger cylinders and having inwardly extended notched annular flanges to abut against the end of the inner cylinder and limit the inward motion of said pistons, pistons mounted upon one of said rods to cover or uncover the supply to the elevator cylinder, and upon the opposite rod to cover or uncover the exhaust port, said pistons being provided with cup leather packings, the valve chests, F, mounted upon the larger end cylinders, the slide valves and ports leading from the chests to the larger cylinders, the rock shaft mounted between said slide valves, cross head secured upon said rock shaft and having wrist pins projecting from it, the rods connecting the wrist pins and rods of the slide valves, said valves being connected in such manner that the ports leading to the larger cylinders are not completely covered by their slide valves in either position, substantially as shown and described.

3. The combination of the head, E, of the supply port leading to the elevator cylinder, the heads of the supply and exhaust pipes, C and D, the cylinder, A, passing through said heads, the annular rings, *a*, in which the ends of said cylinder, A, are secured, the larger cylinders, B, secured against the ends of the annular rings, *a*, the slide valves mounted upon said cylinders, B, the actuating pistons, B′ and B^2, fitted to slide within the cylinders, B, the said pistons having inwardly extended notched flanges to bear against the face of the rings, *a*, and limit the inward motion of said pistons, the piston rod, *b*′, secured in the actuating piston, B′, the pistons, 3 and 4, secured upon said rod, the piston rod, b^2, secured centrally in the piston, B^2, and having the pistons 1 and 2 secured upon it, the pillow block or bearing, H, secured upon the head, E, the rock shaft mounted in said bearings, the cross head, I, secured upon said rock shaft, wrist pins, *i*, projecting from the face of said cross head upon opposite sides of the rock shaft, the valve rods, *g*, of the slide valves projecting in the direction of said cross head, and the pitman, *i*′, connecting the wrist pins and valve rods, substantially as shown and described.

4. The combination of the central cylinder, A, the larger cylinders, B, secured at each end of said cylinder, the actuating pistons, B′ and B^2, having independent valve rods, *b*′ and b^2, projecting from the said cylinder, A, the supply and exhaust pistons secured respectively upon said rods, valve chests mounted upon the cylinders of the actuating pistons, slide valves in said chests, and means such as shown for actuating said slide valves simultaneously in opposite directions, substantially as shown and described.

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Witnesses:
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