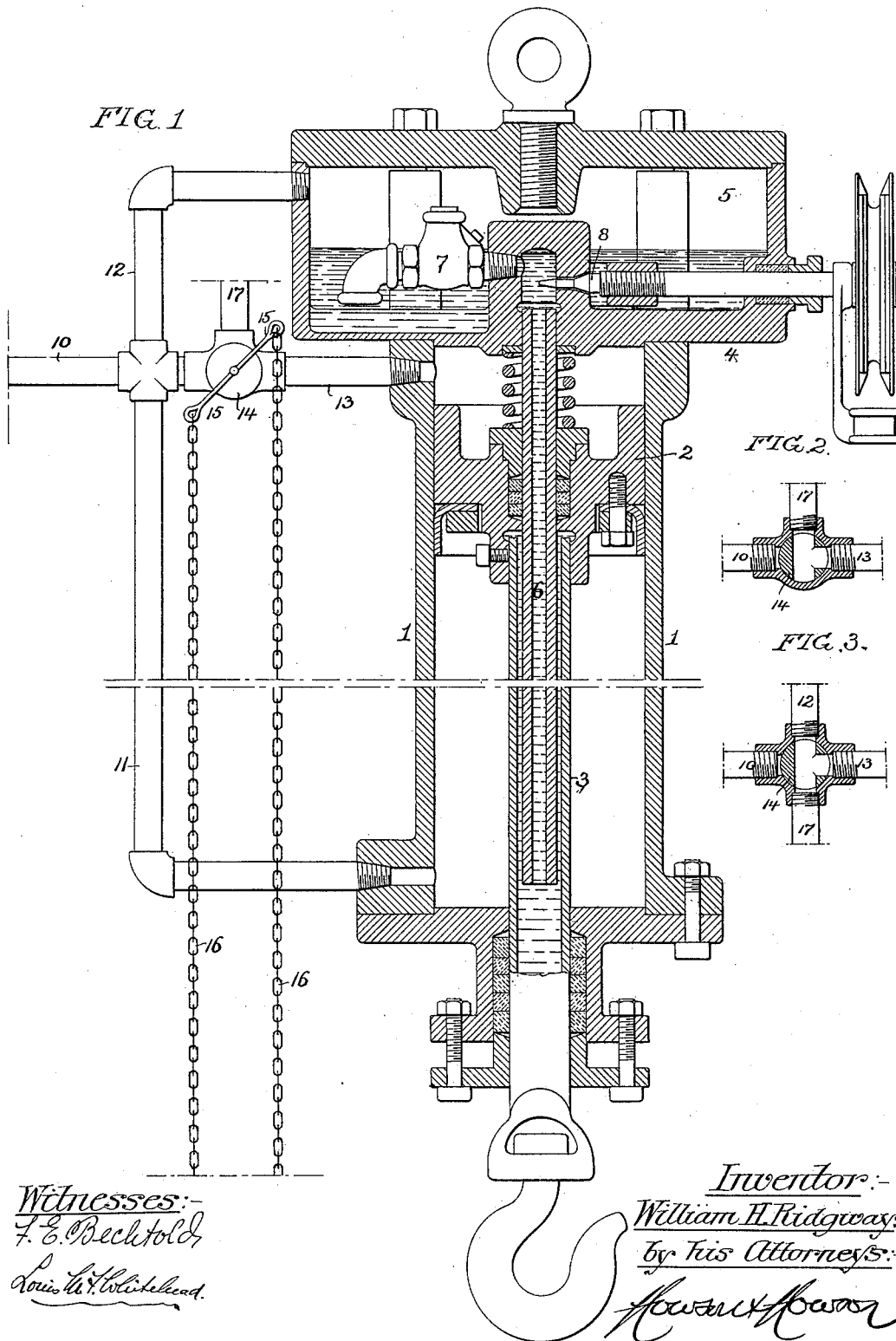


No. 649,357.

Patented May 8, 1900.

W. H. RIDGWAY.
HOISTING APPARATUS.
(Application filed Oct. 30, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

WILLIAM H. RIDGWAY, OF COATESVILLE, PENNSYLVANIA.

HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 649,357, dated May 8, 1900.

Application filed October 30, 1899. Serial No. 735,241. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. RIDGWAY, a citizen of the United States, and a resident of Coatesville, Pennsylvania, have invented certain Improvements in Hoisting Apparatus, of which the following is a specification.

My invention consists of certain improvements in the hoisting device for which I obtained Letters Patent No. 582,092, dated May 4, 1897, the object of my present improvements being to insure a certain and steady movement of the hoist in lowering as well as in raising. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 represents, partly in elevation and partly in section, sufficient of the patented hoisting apparatus to illustrate the application of my improvement thereto. Fig. 2 is an enlarged section of a valve forming part of the device, and Fig. 3 is a similar view illustrating a modification or special embodiment of my invention.

The cylinder 1 of the hoist contains a piston 2, having a hollow rod 3, which passes through a stuffing-box at the bottom of the cylinder and is provided with the hoisting-hook or other attachment. On the top of the cylinder is a hollow head 4, containing a chamber 5, which carries a supply of oil or other liquid, and this chamber communicates through two valved openings with a hollow rod 6, which passes through a stuffing-box carried by the piston 2 and projects down into the hollow piston-rod 3. One of the passages between the chamber 5 and the hollow rod 6 is controlled by a check-valve 7, which should be constructed so as to open inward or toward the rod 6, the other opening being controlled by an adjustable valve 8, which has a stem leading to the outside of the hollow head 4, so that said valve can be readily manipulated.

The parts thus far described formed elements of the patented hoist and were intended for restricting and regulating the upward movement of the piston and piston-rod, the motive fluid, such as compressed air or steam, being admitted beneath the piston and the rise of the latter being restricted by the freedom with which the oil or other fluid contained in the hollow piston-rod could be forced out

through the hollow rod 6 and through the opening controlled by the valve 8.

It has been found in practice that while the combination of parts described was thoroughly effective for the purpose intended the descent of the piston and piston-rod was not always steady and certain, as such descent was dependent upon the weight of the piston and piston-rod, which had to overcome the friction of the two stuffing-boxes, the piston-rod also having to act as a pump for drawing in the oil through the valve 7 from the chamber 5. In carrying out my present invention I supply a positive pressure for forcing the piston downward as well as upward, the pressure for effecting such downward movement being of course much less than that intended to lift the piston and its load.

The main supply-pipe for the motive fluid is represented at 10, and this pipe has three branches 11, 12, and 13, the branch 11 leading to the lower end of the cylinder 1, the branch 12 leading to the chamber 5, and the branch 13 into the upper end of the cylinder. In the branch 13 is an ordinary three-way valve 14, the stem of which has arms 15, with depending chains 16, so that the valve may be readily operated from a point below the hoist, the purpose of this valve being to provide communication through the branch 13 between the motive-fluid-supply pipe 10 and the upper part of the cylinder or to cut off said communication and open the upper end of the cylinder to the exhaust through a pipe 17. It will be noted, therefore, that the full pressure of the motive fluid is always being exerted upon the under side of the piston 2 and upon the oil or other fluid in the chamber 5. Hence the piston is constantly being subjected to upward pressure, and the volume of oil or other fluid in the hollow piston-rod 3 is constantly being subjected to a like downward pressure.

When the valve 14 is adjusted so as to open the upper end of the cylinder to the exhaust, lifting power is imparted to the piston equivalent to the pressure of the motive fluid upon the full area of the piston less the area of the rod 3 and less the downward pressure of the oil or other fluid upon the area represented by the diameter of the hollow

rod 6, such excess of pressure being available for the purpose of raising the weight of the piston-rod and load hung upon the latter. If, however, the valve 14 is adjusted so as to
 5 close the exhaust-pipe 17 and permit flow of motive fluid into the upper end of the cylinder 1, the downward pressure upon the piston 2 will be exerted throughout the full area of the cylinder, while upward pressure will
 10 only be exerted throughout such area, less the area of the rod 3, this excess of downward pressure assisting the weight of the piston and piston-rod in effecting their descent, the result being that a certain and
 15 steady downward movement is always insured.

By the use of a valve and connections such as shown in Fig. 3 the pressure of the motive fluid may be removed from the liquid in the
 20 chamber 5 during the hoisting operation and exerted thereupon only during the lowering operation. In this case the pipe 12 communicates with the chest of the valve 14 and is by the movement of the latter opened either
 25 to pressure or exhaust simultaneously with the like opening of the pipe 13, which leads to the top of the cylinder, the exhaust 17 being in this case directed downwardly instead of upwardly, as in Fig. 1, and the valve being
 30 connected to the pipe 12 in that figure. In other cases the chamber 5 may be permitted to remain open to the atmosphere at all times, the excess of pressure upon the back of the piston due to the difference between
 35 the area of the rod 6 and that of the piston-rod 3 being relied upon to assist the descent of the piston, or, on the other hand, the upper end of the cylinder may be permitted to remain open to the atmosphere, and motive
 40 fluid may be admitted to or exhausted from the lower end of the cylinder, as in the patented hoist, pressure of motive fluid being maintained upon the liquid in the chamber 5 to assist in lowering, or such motive fluid,
 45 controlled by a valve 14, being admitted to the chamber 5 when the hoist is lowering and exhausted from said chamber when the hoist is lifting.

I have shown my present invention as applied to that form of hoist which is illustrated in Fig. 2 of the drawings of my former patent, No. 582,092; but it will be evident that it can be applied with equal advantage to the forms of hoist shown in Figs. 1 and 3 of said
 55 drawings.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A hoist in which are combined a cylinder with piston and a piston-rod and a liquid-regulator for controlling the piston movement, with means for relieving pressure upon the rear side of the piston while maintaining

it upon the forward or piston-rod side when hoisting, and for equalizing pressure in both
 65 ends of the cylinder in order to return the piston and piston-rod after the hoisting has been completed, substantially as specified.

2. A hoist in which are combined a cylinder with a piston and piston-rod, means for
 70 admitting motive fluid to and exhausting it from the cylinder to cause lifting and lowering movement, a liquid-regulator for controlling the piston movement, and means for subjecting said liquid to the pressure of the motive
 75 fluid, substantially as specified.

3. A hoist in which are combined a cylinder with piston and piston-rod, means for admitting motive fluid to and exhausting it from said cylinder to cause lifting and lowering
 80 movement, a liquid-regulator for controlling the piston movement, and means for subjecting such liquid to the pressure of the motive fluid when the hoist is lowering, and for releasing it from such pressure when the
 85 hoist is lifting, substantially as specified.

4. A hoist in which are combined a cylinder with piston and piston-rod, means for exerting pressure of the motive fluid upon the forward or rod side of the piston, both in lifting
 90 and lowering, means for exerting pressure of the motive fluid upon the opposite side of the piston or releasing the same from such pressure, and a liquid-regulator for controlling the piston movement, substantially
 95 as specified.

5. A hoist in which are combined a cylinder with piston and piston-rod, means for exerting pressure of motive fluid upon the forward or rod side of the piston during both lifting
 100 and lowering, means for exerting the pressure of the motive fluid upon the opposite face of the piston or releasing the same from such pressure, a liquid-regulator for controlling the piston movement and means for subjecting
 105 such liquid to the pressure of the motive fluid, substantially as specified.

6. A hoist in which are combined a cylinder with piston and piston-rod, means for exerting pressure of the motive fluid upon the forward or rod side of the piston during both
 110 lifting and lowering, means for exerting the pressure of the motive fluid upon the opposite face of the piston, or releasing the same from such pressure, a liquid-regulator for controlling the piston movement, and means for
 115 subjecting said liquid to and releasing it from the pressure of the motive fluid, substantially as specified.

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

WILLIAM H. RIDGWAY.

Witnesses:

THOS. SPACKMAN,
 H. W. MASTERS.