(No Model.)

2 Sheets—Sheet 1.

W. H. RIDGWAY.

AIR HOIST.

No. 582,092. Patented May 4, 1897.

FIG. 1.

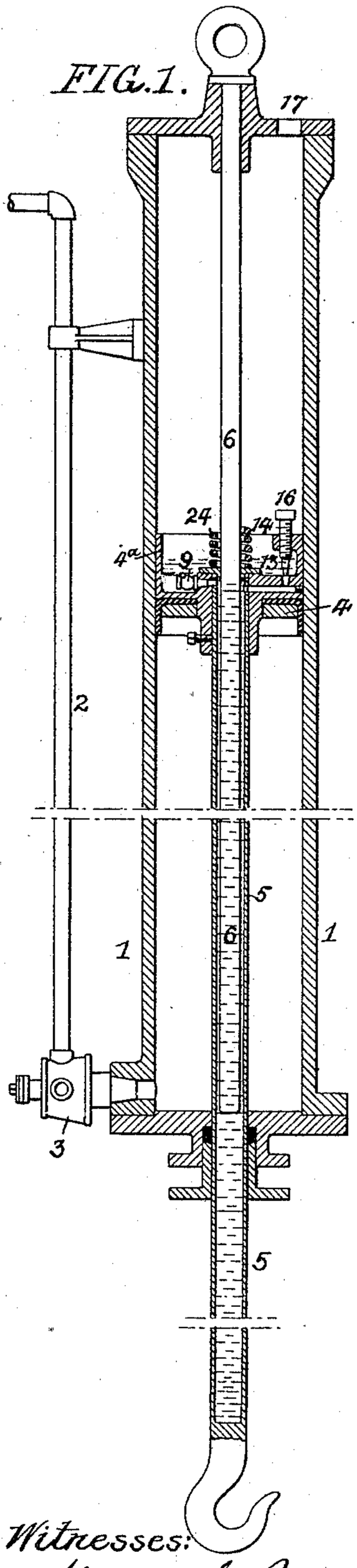


FIG. 2.

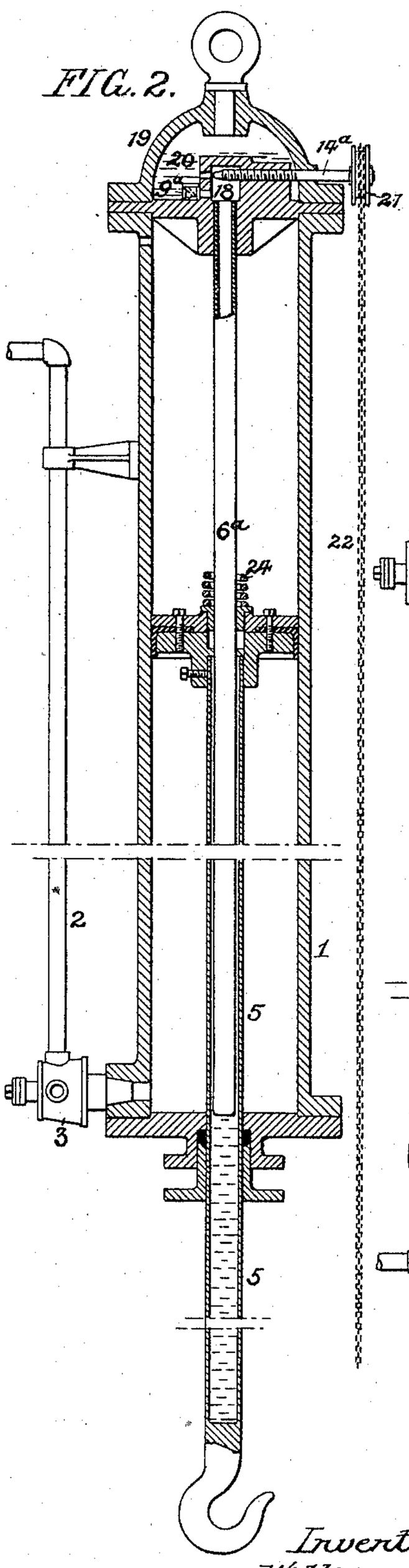
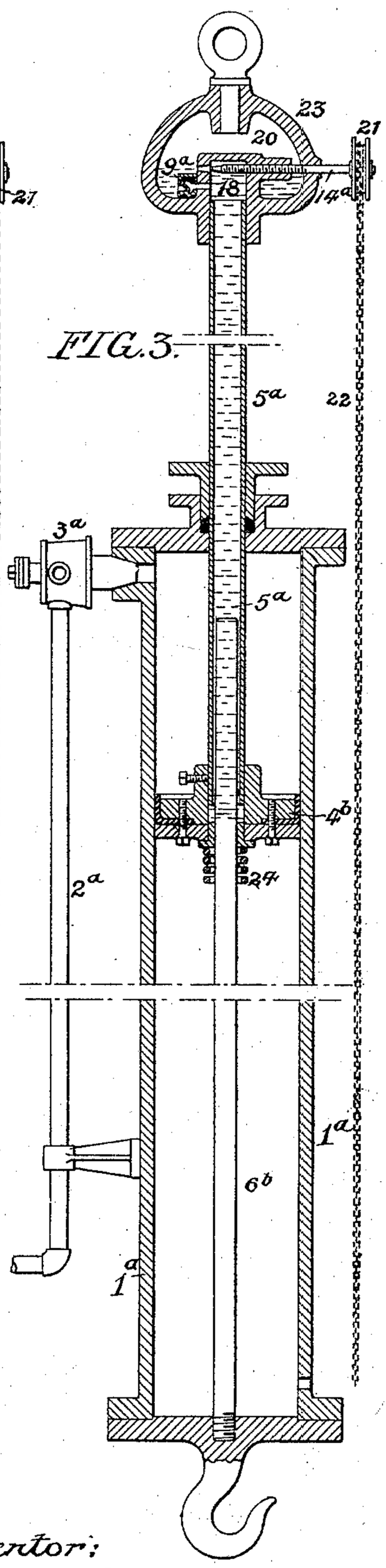


FIG. 3.



Witnesses:
Murray C. Boyer
Charles DeLow.

Inventor:
William H. Ridgway
by his Attorneys
Howson & Howson

(No Model.)

2 Sheets—Sheet 2.

W. H. RIDGWAY.

AIR HOIST.

No. 582,092. Patented May 4, 1897.

FIG. 4.

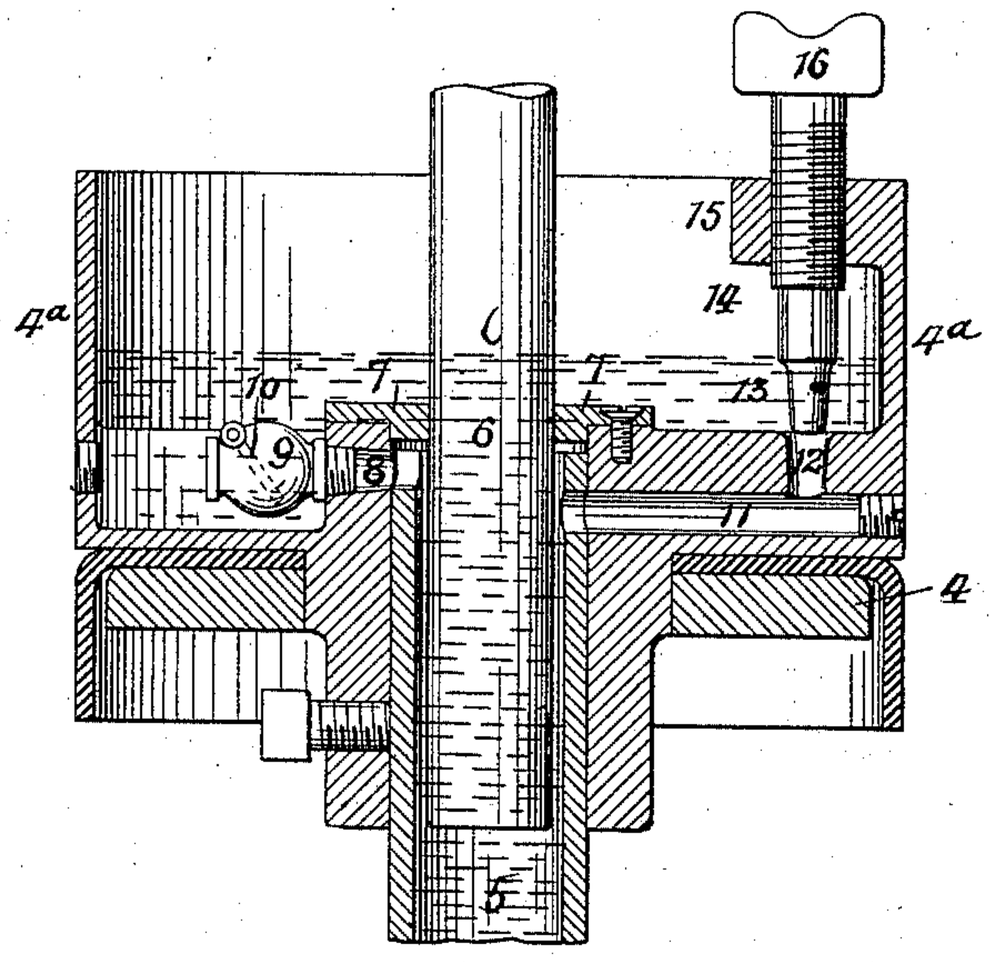
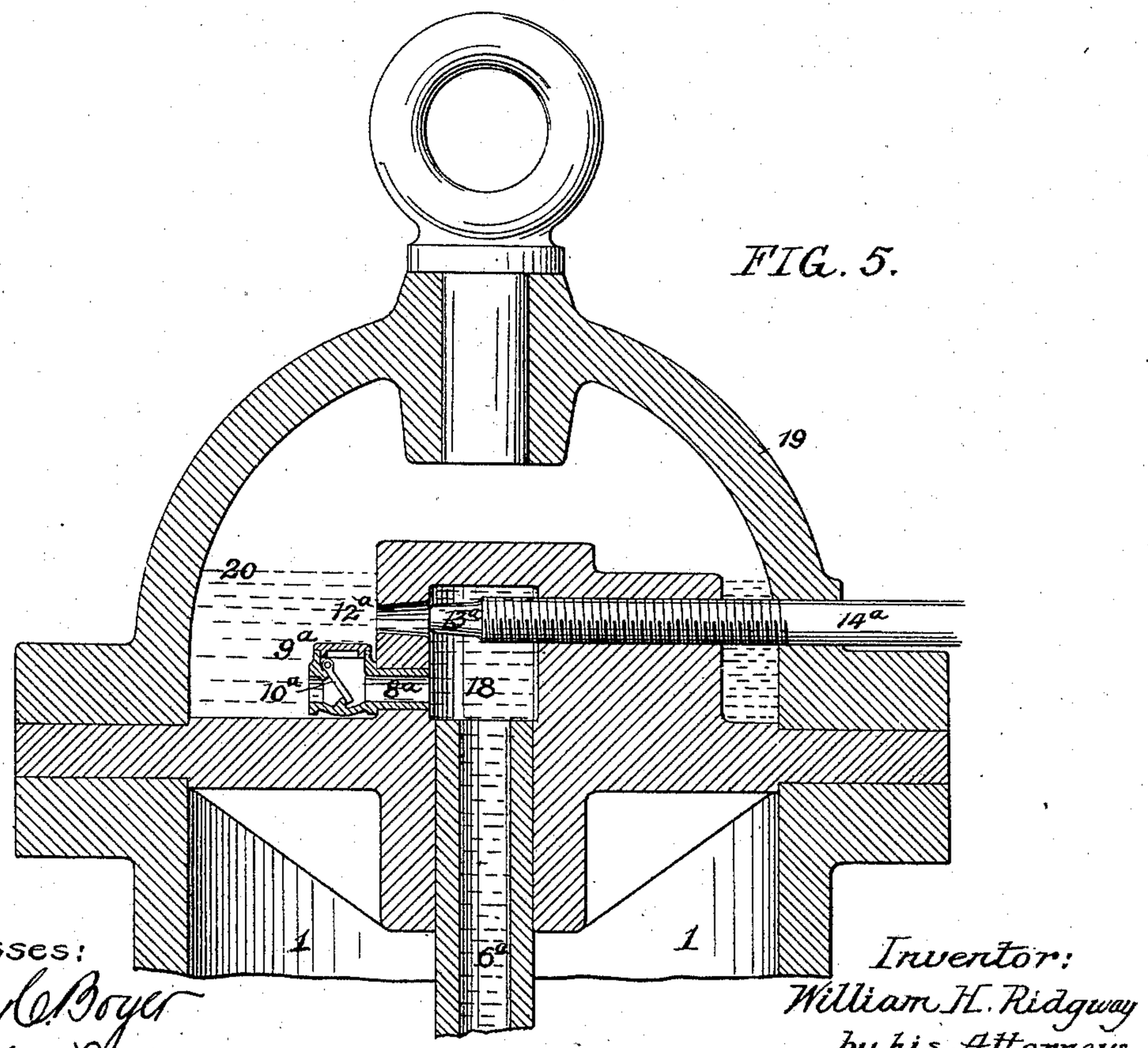


FIG. 5.



Witnesses:
Murray C. Boyer
Charles De-Cow.

Inventor:
William H. Ridgway
by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

WILLIAM H. RIDGWAY, OF COATESVILLE, PENNSYLVANIA.

AIR-HOIST.

SPECIFICATION forming part of Letters Patent No. 582,092, dated May 4, 1897.

Application filed August 28, 1896. Serial No. 604,246. (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, Chester county, Pennsylvania, have invented certain Improvements in Air-Hoists, of which the following is a specification.

The object of my invention is to combine a fluid-actuated hoist with means whereby the speed of movement of said hoist can be regulated and prevented from exceeding a predetermined limit; and this object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of one form of fluid-actuated hoist embodying my invention. Fig. 2 is a similar sectional view illustrating another, and in some respects a preferable, embodiment of the invention. Fig. 3 is a similar sectional view of a hoist, showing still another embodiment of the invention. Fig. 4 is an enlarged sectional view of part of the hoist shown in Fig. 1, and Fig. 5 is an enlarged sectional view of part of the hoist shown in Fig. 2.

In operating hoists actuated by fluid under pressure, such as compressed air or steam, it frequently happens that a load is lifted too rapidly or is started with a sudden jerk, owing to improper manipulation by the attendant of the valve which governs the flow of motive fluid into and from the cylinder of the hoist, or in some instances when the load falls from the hook as it is being lifted the elastic fluid will force the piston toward the cylinder-head and will damage the apparatus; and the object of my invention is to provide such a hoist with means whereby the speed of the lifting movement may be regulated and restricted as desired and breakage or accident prevented, an object which I attain by causing the rise of the movable element of the hoist to force a body of liquid through a contracted opening, the size of which is by preference readily governable in order to permit of any desired restriction in the speed of such rising movement.

In that embodiment of my invention shown in Fig. 1 the cylinder of the hoist is represented at 1, said cylinder being provided with means whereby is mounted upon it the pipe 2, which supplies the motive fluid for operating the hoist, the flow of motive fluid into and from the cylinder being regulated by means of a valve contained in the chest 3 at the base of the cylinder.

The piston 4 has a depending rod 5 passing through a suitable stuffing-box at the bottom of the cylinder and provided at its lower end with a hook or other suitable means for supporting the load. The piston-rod 5 is hollow and is adapted for the reception of a rod 6, which is secured to the upper end of the cylinder and passes through an opening in a plate 7, Fig. 4, secured to the piston, in which opening the rod 6 fits snugly, but not so tightly as to prevent free movement of the piston thereon.

The piston 4 has in the present instance an upwardly-projecting flange 4^a, forming a chamber or reservoir which is in communication with the interior of the hollow piston-rod through two independent passages, one of these passages 8, Fig. 4, having a valve-chest 9, with valve 10 opening inwardly or toward the passage, and the other passage 11 having a branch 12, the effective area of which can be varied by the adjustment of a tapering plug 13, carried by a threaded stem 14, which is adapted to an internal threaded opening in a lug 15, projecting inwardly from the flange 5 of the piston at one side of the same, said threaded stem 14 having a head 16, whereby it may be conveniently turned. The chamber on the top of the piston carries a supply of oil or other liquid in sufficient volume to fill the hollow piston-rod and the various passages when said piston-rod is at the limit of its downward movement. As soon as the piston commences to rise, therefore, this liquid is displaced by the action of the rod 6 and is forced through the passage 11 and branch 12 into the chamber above the piston, any escape of liquid through the passage 8 being prevented by the outwardly-closing valve 10 in the chest 9. The speed at which the piston is permitted to rise is therefore dependent upon the area of the passage through the opening 12, which area can be regulated as desired by projecting or retracting the valve-plug 13. The descent of the piston, however, is unrestricted, owing to the fact that as the piston descends the oil or other liquid can flow freely into the hollow

piston-rod through the valve-chest 9 and passage 8.

The flange 4^a on the piston 4 may be dispensed with, if desired, the oil in this case simply entering the cylinder above the piston and lying upon the top of the latter and in contact with the inner wall of the cylinder, so as to serve the additional purpose of lubrication.

In the top of the cylinder 1 is an opening 17, and when the piston is at the limit of its upward movement the head 16 of the screw-stem 14 can be made to project through this opening, and is therefore accessible, so as to permit of the adjustment of the valve-plug 13. Such construction only provides for adjustment of the valve-plug when the piston is at the top of its stroke, and then only by gaining access to the top of the cylinder, whereas it may be advisable in some cases to provide for adjustment of the regulating-valve when the piston is at some other point than the top of the stroke and to effect such adjustment by means accessible from some point more convenient than the top of the cylinder. In order to provide for this, I have devised the construction shown in Figs. 2 and 5, on reference to which it will be observed that instead of the sliding rod 6 I employ a hollow rod 6^a, which communicates at its lower end with the chamber within the hollow piston-rod 5 and at its upper end with a chamber 18 in the top of the cylinder, the latter in this case having a head 19, which forms a chamber or reservoir 20 on the top of the cylinder. With this chamber 20 the chamber 18 communicates through a passage 12^a and also through a passage 8^a and valve-chest 9^a, having an inwardly-opening valve 10^a, as shown in Fig. 5.

The valve-plug 13^a, which regulates the area of the passage 12^a, forms part of a screw-stem 14^a, passing through the hood 19 and provided at its outer end with a sprocket-wheel or sheave 21, to which is adapted an endless chain 22, depending to a point where it is convenient of access. As the piston rises, therefore, the liquid is forced from the hollow piston-rod through the hollow rod 6^a, chamber 18, and passage 12^a into the chamber 20, and on the descent of the piston the liquid is drawn from the chamber 20 through the valve-chest 9^a and passage 8^a into the chamber 18, hollow rod 6^a, and hollow piston-rod 5.

In the construction shown in Fig. 3 the cylinder 1^a is the moving element, the piston 4^b being secured to the lower end of a hollow piston-rod 5^a, which passes through a stuffing-box at the top of the cylinder 1^a and has secured to its upper end a structure 23, which contains the regulating mechanism and is substantially similar to the structure carried by the upper end of the cylinder 1 in Fig. 2. A rod 6^b projects from the lower end of the cylinder 1^a upwardly into the hollow piston-rod 5^a, so as to force the liquid from said hollow piston-rod as the cylinder rises and draw the liquid back into said hollow piston-rod as the cylinder falls. In this structure the motive-fluid supply-pipe 2^a communicates with the upper end of the cylinder through a valve-chest 3^a instead of communicating with the lower end of the cylinder, as in the structure shown in Figs. 1 and 2.

In all of the hoists shown the piston carries a buffer-spring 24, which prevents contact of the piston with the end of the cylinder.

I have shown three different embodiments of my invention, and other embodiments of the same involving no departure from the main features of my invention will suggest themselves to those skilled in the art. Hence I wish it to be understood that my invention in its broadest form is not limited to either of the three specific structures shown and described, but will cover analogous structures having the same function.

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

1. A fluid-actuated hoist having a cylinder with piston and piston-rod, a liquid-chamber with contracted outlet through which the liquid is forced as the moving element of the hoist rises, and a chamber which receives the liquid from said contracted outlet and retains it until it is returned, substantially as specified.

2. A fluid-actuated hoist having a cylinder with piston and piston-rod, and a liquid-chamber with contracted outlet through which the liquid is forced as the moving element of the hoist rises, and a valved inlet through which the liquid flows into the chamber as the moving element of the hoist descends, substantially as specified.

3. A fluid-actuated hoist having a piston and piston-rod, a liquid-chamber with contracted outlet through which the liquid is forced as the moving element of the hoist rises, said outlet being combined with an adjustable valve whereby its effective area may be regulated, and a chamber which receives the liquid from said contracted outlet and retains it until it is returned, substantially as specified.

4. A fluid-actuated hoist having a cylinder with piston and hollow piston-rod, the latter communicating through a contracted opening with a liquid chamber or reservoir, in combination with a rod carried by the cylinder and projecting into said hollow piston-rod, substantially as specified.

5. A fluid-actuated hoist in which are combined a cylinder with piston and hollow piston-rod, a liquid-chamber carried by the fixed element of the hoist, and communicating through a contracted opening with said hollow piston-rod, whereby as the moving element of the hoist rises, liquid will be forced from the hollow piston-rod through said contracted opening, substantially as specified.

6. A fluid-actuated hoist having a cylinder

with piston and hollow piston-rod, a liquid-chamber carried by the fixed element of the hoist and communicating through a contracted opening with said hollow piston-rod, and a valve adapted to regulate the effective area of said contracted passage, said valve having a stem projecting through the casing of the liquid-chamber so as to be operated from the outside of the same, substantially as specified.

7. A fluid-actuated hoist having a cylinder with piston and hollow piston-rod, a hollow rod depending from the top of the cylinder and projecting into said hollow piston-rod, and a liquid-chamber in the top of the cylinder communicating through a contracted opening with said hollow rod, substantially as specified.

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

WILLIAM H. RIDGWAY.

Witnesses:
J. W. WINGARD,
C. RIDGWAY.