No. 707,015. Patented Aug. 12, 1902.

E. B. RIDGWAY.

FLUID PRESSURE ACTUATED HOIST, &c.

(Application filed Oct. 22, 1901.)

(No Model.)

Fig. 1.

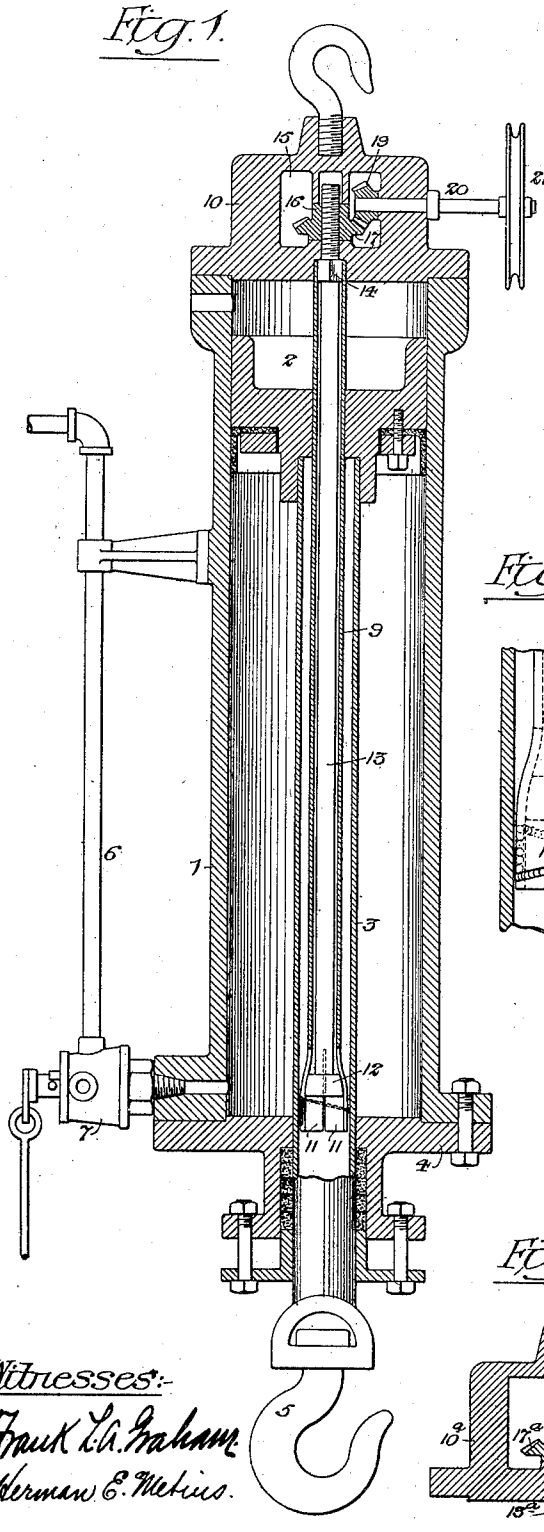


Fig. 2.

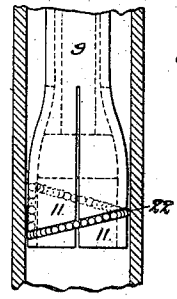


Fig. 3.

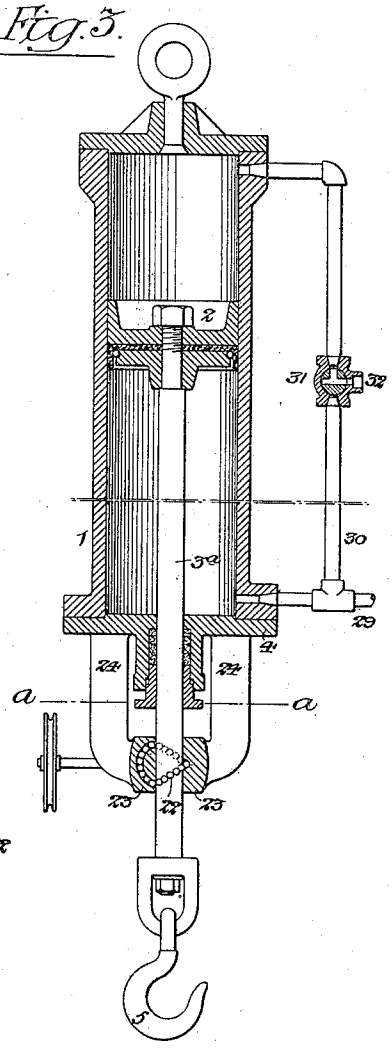


Fig. 4.

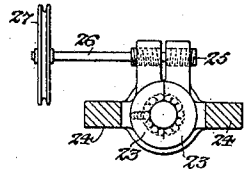
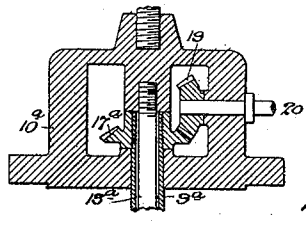


Fig. 5.



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ELLIS B. RIDGWAY, OF COATESVILLE, PENNSYLVANIA.

FLUID-PRESSURE-ACTUATED HOIST, &c.

SPECIFICATION forming part of Letters Patent No. 707,015, dated August 12, 1902.

Application filed October 22, 1901. Serial No. 79,598. (No model.)

To all whom it may concern:

Be it known that I, ELLIS B. RIDGWAY, a citizen of the United States, and a resident of Coatesville, Pennsylvania, have invented certain Improvements in Fluid-Pressure-Actuated Hoists, &c., of which the following is a specification.

The object of my invention is to provide a fluid-pressure-actuated hoisting or other device with means whereby jerkiness or irregularity of either lifting or lowering movement may be prevented and the descent of the load may be controlled or arrested at pleasure, an object which 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 a fluid-pressure-actuated hoist provided with means in accordance with my invention for rendering uniform the movements of the movable member of said hoist and controlling or arresting the descent of the same. Fig. 2 is an enlarged side elevation of a portion of said device. Fig. 3 is a view similar to Fig. 1, but illustrating another and in some cases a preferable method of carrying out my invention. Fig. 4 is a sectional plan view of the same on the line *a a*, Fig. 3; and Fig. 5 is a view of part of the hoist shown in Fig. 1, showing a modification thereof.

In Fig. 1 the cylinder of the hoist is represented at 1, this cylinder containing a piston 2, which is provided with a rod 3, passing through a stuffing-box on the lower head 4 of the cylinder and having at its lower end a hook 5 or other attachment whereby the load may be suspended from it. A pipe 6, provided with a valve 7, serves to admit fluid under pressure to and to exhaust it from the lower end of the cylinder 1, the admission of said fluid under pressure serving to raise the piston, its rod, and the load suspended therefrom and the exhaust of the fluid serving to permit of the descent of the piston, piston-rod, and load. This is a common form of fluid-actuated hoist, and my invention consists of an attachment thereto whereby jerkiness or irregularity of movement of the movable member of the hoist will be prevented and the ascent or descent of the load may be controlled or arrested, as desired. In that form of my invention illustrated in Fig. 1 this controlling device consists of a tube 9, secured to and depending from the upper head 10 of the cylinder, said tube 9 passing through a central opening in the piston 2 and extending down into the hollow piston-rod 3 to a point therein close to the bottom of the cylinder, the lower end of said tube 9 being split, as shown in Fig. 1, and flared outwardly, so as to form a series of clutch-fingers 11, which can be expanded by means of a wedge-block 12, inserted in the flared lower end of the tube 9 and connected to a rod 13, which passes up through said tube and is squared or otherwise formed at its upper end, as shown at 14 in Fig. 1, to engage with a corresponding portion of the tube, so that any turning movement of the rod within the tube is prevented. Within an opening 15 in the upper head 10 of the cylinder is a nut 16, engaging with the threaded upper end of the rod 13, this nut being vertically confined between bearings in said upper head 10 and forming part of a bevel-wheel 17, which meshes with a bevel-pinion 19 on a shaft 20, the latter being mounted in suitable bearings in the upper head 10 of the cylinder and being provided at its outer end with a chain-wheel 21 or other suitable device, whereby rotating movement may be readily imparted to the shaft. When, therefore, the shaft 20 is turned in one direction, the wedge-block 12 will be lowered and the clutch-fingers 11 will be permitted to contract, so as to exercise but little, if any control over the movement of the hollow piston-rod 3; but by turning the shaft 20 in the opposite direction the wedge 12 will be raised and the clutch-fingers 11 will be expanded, so as to exert any desired degree of friction upon the inner side of the hollow piston-rod, and thus retard or even, if desired, entirely arrest the movement of said rod. By this means the movement of the piston-rod either in raising or lowering can be steadied and the jerkiness and irregularity of movement which sometimes attends the operation of fluid-actuated hoists can be prevented. Moreover, the descent of the movable element of the hoist can be governed as desired, or it can be held in the raised position for as long a time as necessary by proper manipulation

of the shaft 20. This is of importance in many cases, especially in foundry-work, where it is frequently desirable to carry loads for considerable distances. This can be readily done with my improved hoist by simply disconnecting the fluid-pressure-supply device and after the hoist has reached its destination controlling the descent of the load by the friction-brake.

If desired, the relation of the fixed and moving parts of the clutch may be reversed—that is to say, the rod may be fixed and the tube may be movable—such modifications being shown in Fig. 5, where the tube 9^a is represented as being threaded at the upper end for adaptation to the nut of the bevel-wheel 17^a, the threaded upper end of the rod 13^a engaging with a threaded opening in the head 10^a of the cylinder.

In order to render the friction-brake smooth in action, I prefer to provide the expanded lower portion of the tube 9 with a series of balls 22, which are interposed between the inner side of the piston-rod 3 and a spiral ball-race formed in the expanded lower portion of said tube 9, the upper and lower terminations of this spiral ball-race being connected by a vertical passage, through which the balls can rise from the bottom of the race to the top of the same. (See Fig. 2.)

In that form of my invention shown in Figs. 3 and 4 a solid piston-rod 3^a is used and the brake is applied to the outside of said rod below the lower head of the cylinder, said brake consisting of a pair of jaws 23, embracing the piston-rod and suspended from the lower head of the cylinder by means of suitable posts 24, depending therefrom, the free ends of the jaws 23 having threaded openings, one right-handed and the other left-handed, for the reception of the right and left threaded portions 25 of a shaft 26, which has a chain-wheel 27 or other means whereby it can be readily rotated in one direction or the other, so as to close the clamp upon the piston-rod or slacken its hold thereon. In this case the race for the balls 22 is formed in the inner faces of the clamping-jaws 23. In this form of hoist the fluid-supply pipe is represented at 29, this pipe communicating directly with the lower end of the cylinder and also communicating with the upper end of the cylinder through a vertical branch 30, which has a three-way valve 31, whereby fluid under pressure may be permitted to flow through the pipe 30 into the upper end of the cylinder or may be exhausted from said upper end of the cylinder through a lateral branch 32 of the valve-chest.

Although I have shown my invention as applied to a hoist, it can be used with like good results in other forms of fluid-actuated machines in which it is desired to regulate or control the movement of the piston-rod independently of the pressure upon the piston. In fact, the ball-bearing friction-clutch which I have devised is of even broader availability.

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

1. The combination of the longitudinally-movable piston-rod of a fluid-pressure-actuated machine with a friction-clamp having a ball-race with balls constituting a contact-face of the clamp, substantially as specified.

2. The combination of the longitudinally-movable piston-rod of a fluid-pressure-actuated machine, with a friction-clamp therefor having a spiral ball-race with connection between the upper and lower ends thereof, a series of balls interposed between said race and the rod, and means for tightening and loosening the clamp, substantially as specified.

3. The combination of the hollow piston-rod of a fluid-pressure-actuated machine, with a friction-clamp located on the inside of said hollow rod, and means for expanding and contracting said clamp, substantially as specified.

4. The combination of the hollow piston-rod of a fluid-pressure-actuated machine, with a tube contained within said hollow piston-rod, and split at the lower end of the same so as to form a clutch, a wedge for expanding said clutch, a rod connected to said wedge, and passing through the clutch-tube, and means for projecting and retracting one of said clutch members, substantially as specified.

5. The combination of the hollow piston-rod of a fluid-pressure-actuated machine, with a tube contained within said hollow piston-rod, and split at the lower end of the same so as to form a clutch, a wedge for expanding said clutch, a rod connected to said wedge and passing through the clutch-tube but prevented from rotating therein, and means for projecting and retracting one of said clutch members, substantially as specified.

6. The combination of the hollow piston-rod of a fluid-pressure-actuated machine, with a tube contained within said hollow piston-rod, and split at the lower end of the same so as to form a clutch, a wedge for expanding said clutch, a rod connected to said wedge, and passing through the clutch-tube, but prevented from rotating therein, and gearing for projecting and retracting one of said clutch members, one of the wheels of said gearing forming a nut which is adapted to a threaded portion of the movable clutch member, substantially as specified.

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

ELLIS B. RIDGWAY.

Witnesses:
HARRY S. WOODWARD,
A. TUCK.