(No Model.)

H. A. PEDRICK.

HOISTING APPARATUS.

No. 577,779. Patented Feb. 23, 1897.

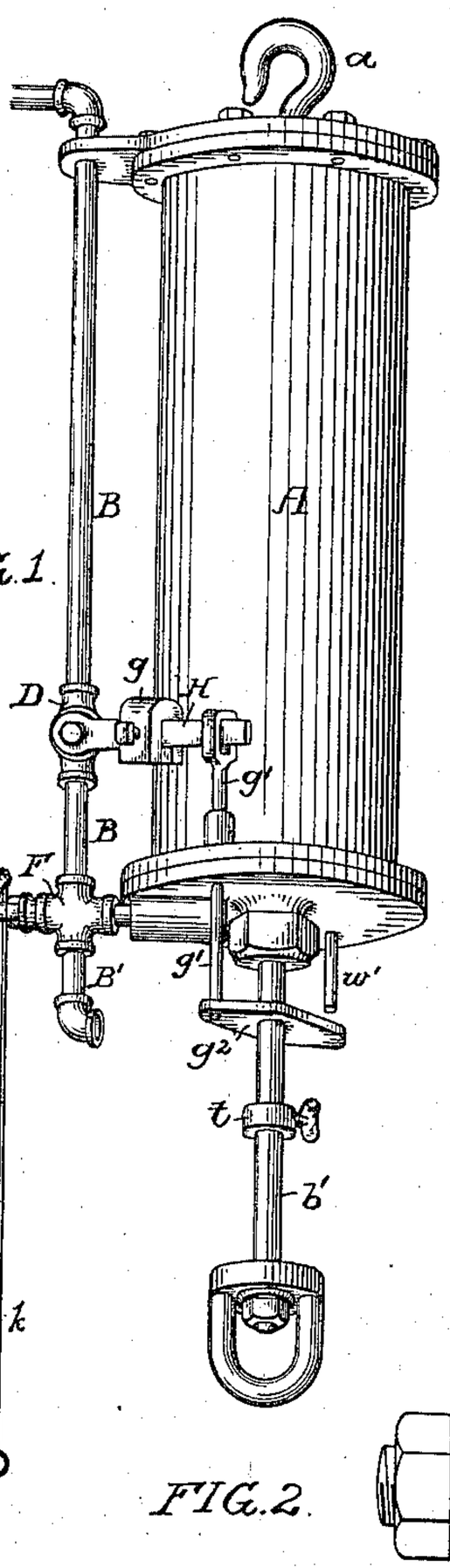


FIG. 1.

FIG. 2.

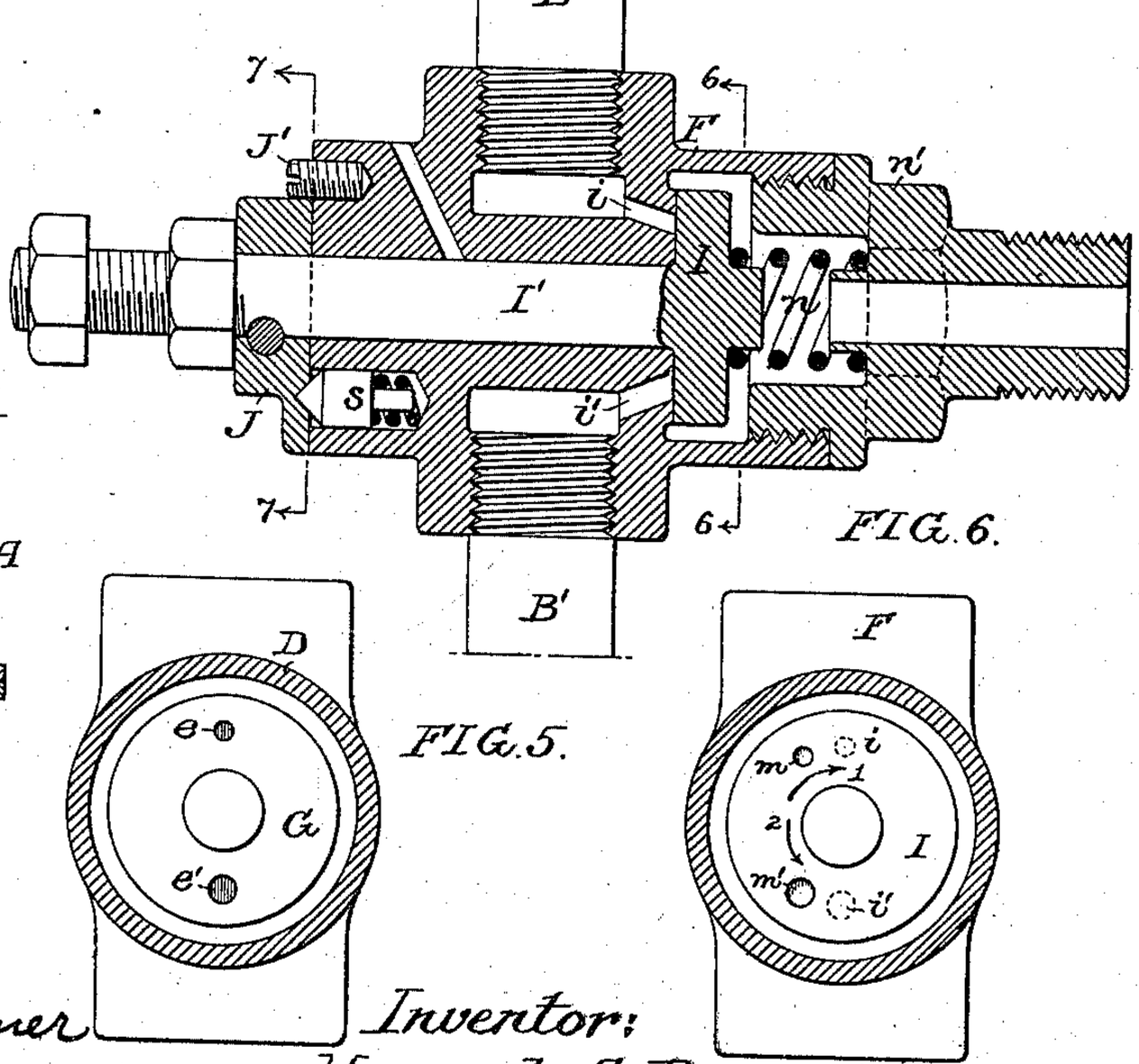


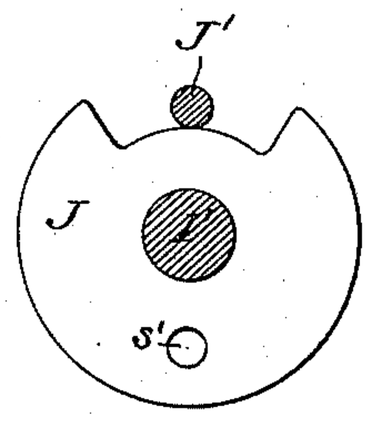
FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 7.



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UNITED STATES PATENT OFFICE.

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HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 577,779, dated February 23, 1897.

Application filed April 17, 1896. Serial No. 587,938. (No model.)

To all whom it may concern:

Be it known that I, HOWARD A. PEDRICK, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Hoisting Apparatus, of which the following is a specification.

My invention relates to that class of hoisting apparatus in which motive fluid admitted to one end of a cylinder acts upon a piston having a projecting piston-rod to which the load is hung, one object of my invention being to so construct such a hoisting apparatus as to automatically prevent excessive lift of the load, and a further object being to prevent such shifting of the load after it has been raised to the proper height as might be caused by the lightening of the load or by expansion of the motive fluid in the cylinder. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a hoisting device constructed in accordance with my invention. Fig. 2 is a sectional view of the lower portion of the cylinder and parts operating in connection therewith. Fig. 3 is an enlarged sectional view of a certain automatic stop-valve employed in connection with the device. Fig. 4 is an enlarged section of a hand-operated valve whereby the flow of motive fluid to and from the cylinder is controlled. Fig. 5 is a transverse section on the line 5 5, Fig. 3. Fig. 6 is a transverse section on the line 6 6, Fig. 4 and; Fig. 7 is a transverse section on the line 7 7, Fig. 4.

A represents the upright cylinder of the hoist, which in the present instance is provided at the upper end with a suspension-hook *a*, although it may be mounted in any available manner. This cylinder contains the usual piston *b* and depending piston-rod *b'*, to which is connected the load to be raised, said piston-rod passing through a suitable stuffing-box on the lower head of the cylinder.

The motive-fluid-supply pipe B is supported at one side of the cylinder and has two valve-casings D and F, the former containing an automatic stop-valve for regulating the flow through the pipe, while the casing F contains the valve which is operated by hand and governs the flow of motive fluid to and from the cylinder in the ordinary working of the apparatus.

The valve-chest D has two ports *d* and *d'*, which communicate with a valve-face, against which bears a disk-valve G, having ports *e* and *e'*, said valve G being held in contact with the valve-face by means of a spring e^2, interposed between the valve and a screw-cap e^3 at one end of the valve-chest D.

The valve G has a stem G', which projects through the valve-chest and has secured to it a recessed stop-collar *f*, which in conjunction with a stop-screw *f'* serves to limit the turning movement of the valve-stem, said stem also having secured to it beyond the collar *f* a lever H, which is in the present instance provided with a weight *g*, tending to depress it, and with a depending rod *g'*, passing through a suitable guide-boss on the cylinder and extending below the lower head of the same for attachment to a bar g^2, which is free to slide on the depending piston-rod *b'*.

When the valve G is turned so that its ports *e e'* register with the ports *d d'* of the valve-chest D, flow of motive fluid through the pipe B is permitted; but when said valve G is turned so as to carry its ports out of line with those of the valve-chest such flow of motive fluid is cut off.

The valve-chest F has ports *i i'* communicating with a valve-face formed in the chest, the port *i* also communicating with the pipe B, while the port *i'* communicates with an exhaust-pipe B', which, if air is used as the motive fluid, may discharge directly into the room or apartment containing the hoisting apparatus, or, if steam or water is used as the motive fluid, may be connected with any availably-located waste-pipe.

The chest F contains a disk-valve I, which is held in contact with the valve-face of the chest by means of a spring *n*, interposed between the back of the valve and screw-cap *n'* at one end of the valve-chest, said screw-cap having a threaded stem for application to a boss on the under side of the lower head of the cylinder, so as to provide communication between the interior of the valve-chest F and the interior of the cylinder below the piston therein.

The valve-disk I has two ports *m* and *m'*,

located in respect to the ports *i i'* of the valve-chest, as shown in Fig. 6, so that when the valve I occupies the intermediate position shown in said figure both ports of the valve will be out of line with the ports of the valve-chest, the movement of the valve in the direction of the arrow 1, Fig. 6, serving to bring the port *m* into line with the port *i* in order to permit flow of motive fluid into the cylinder, while the movement of the valve in the direction of the arrow 2, Fig. 6, will bring the port *m'* into line with the port *i'* and will permit escape of motive fluid from the cylinder.

The valve I has a stem or spindle I' passing through the valve-chest and provided with a recessed stop-disk J, which acts, in conjunction with a stop-screw J', to limit movement of the valve I in either direction, the spindle having beyond this stop-disk a lever K with depending rods *k*, whereby it may be readily operated so as to move the valve I to any position desired.

A spring-actuated plug *s* contained in a recess in the valve-chest F serves by engagement with a recess *s'*, formed in the inner face of the stop-disk J, to arrest said disk when it reaches the intermediate position after having been moved from either of its extreme positions and to hold said disk against accidental displacement from the intermediate position, the spring-plug and recess being conical, however, so that the stop-disk can be moved from the intermediate position to either extreme position when sufficient power is applied to the valve-spindle I'.

On the piston-rod B', beneath the bar g^2, is a collar *t*, which is adjustable vertically on the piston-rod and is provided with a set-screw whereby it may be secured in position on the rod after adjustment. Adjustment of the bar g^2 on the rod *g'*, however, will attain the same result.

Normally the operating-lever H of the stop-valve G occupies the depressed position shown in Fig. 1, and the ports of said valve G are in line with those of the valve-chest D, so as to permit free flow of motive fluid through the pipe B; but when the load has been lifted to the proper height the collar *t* on the piston-rod *b'* will, unless the flow of motive fluid into the cylinder is cut off by the attendant by proper manipulation of the valve I, come into contact with and raise the bar g^2 and with it the rod *g'*, thereby lifting the valve-lever H and moving the valve G, so as to automatically cut off the flow of motive fluid, excessive lift of the load due to carelessness on the part of the attendant being thus effectually prevented. On the descent of the piston-rod the valve-lever H, rod *g'*, and bar g^2 can descend to their normal positions, so as to open the valve G and permit a resumption of flow of motive fluid through the pipe B.

When a hoist of the character described is used in foundries or other establishments where hot castings, ladles of molten metal, or the like have to be handled, it sometimes happens that the heat of the load effects expansion of the motive fluid in the cylinder after the flow of the same into the cylinder has been cut off, and this causes a lift of the load beyond the desired point, or there may be a similar tendency due to the lightening of the load. In order to overcome this defect, I provide the lower head of the cylinder with a relief-valve *w*, opening upward and having a depending stem *w'* of such length that when the load has been raised to the proper height and the flow of motive fluid into the cylinder has been cut off the lower end of the stem will be in contact with the bar g^2, so that any further rise of the piston-rod will effect the opening of the valve *w* and a discharge of motive fluid from the lower portion of the cylinder sufficient to permit the piston and piston-rod therein to descend to the proper point. Hence I not only provide for stopping the lift automatically at any desired point, but also for holding the load there for an indefinite time.

Although I prefer in practice to use the forms of valve and valve-chest which I have described, it will be manifest that other forms of valve or chest may be substituted therefor without departing from my invention. It is also evident that although I have described my invention as applied to a hoist having a vertical cylinder for giving a direct lift my invention is equally applicable to hoists in which the cylinder is horizontal and in which the piston-rod is connected to the load by means well known in the art.

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

1. The combination of the cylinder, piston and piston-rod of a hoisting apparatus, a motive-fluid-supply pipe, a valve therein adapted to be operated by hand and serving to control the flow of motive fluid to the cylinder, and its discharge therefrom, a stop-valve located in said motive-fluid-supply pipe in advance of the hand-operated valve, and connections between said stop-valve and the piston-rod whereby the flow of motive fluid to the cylinder is arrested independently of the hand-actuated valve when the piston reaches a certain predetermined position, substantially as specified.

2. The combination of the cylinder, its piston and piston-rod, the motive-fluid-supply pipe having therein a stop-valve with weighted arm, a rod depending from said arm, a bar connected to said rod and embracing the piston-rod, and a collar on said piston-rod for striking and moving said bar to effect closing of the stop-valve when the piston reaches a predetermined point in its movement, substantially as specified.

3. The combination of a cylinder, piston and piston-rod of hoisting apparatus, an inward-opening relief-valve adapted to a seat in the head at that end of the cylinder in which pressure is maintained, said valve having a

projecting stem, and an attachment on the piston-rod whereby said stem is operated when the piston reaches a predetermined position, substantially as specified.

4. The combination of the cylinder, its piston and piston-rod, a motive-fluid-supply pipe, a stop-valve located therein, an inward-opening valve adapted to a seat in the head at that end of the cylinder in which pressure is maintained, and a valve-operating attachment on the piston-rod constructed as described, whereby when the piston reaches a certain predetermined position the stop-valve will be closed and when the piston moves slightly beyond this position the relief-valve will be opened, substantially as specified.

5. The combination of the cylinder, piston and piston-rod of a hoisting apparatus, a valve-chest having a pressure-chamber and an exhaust-chamber therein, and a valve-face having two ports, one communicating with the pressure-chamber and the other with the exhaust-chamber, and a valve-disk contained in a chamber communicating with the cylinder, said disk having two ports, one of which, by movement of the disk in one direction, is brought into communication with the pressure-port, of the valve-face, the other port of the disk on the movement of the latter in the opposite direction, being brought into communication with the exhaust-port of the valve-face, substantially as specified.

6. The combination of the cylinder, piston and piston-rod of a hoisting apparatus, a valve-chest communicating with the cylinder and having a valve-face with two ports, a disk valve bearing against said valve-face and having ports so disposed that one of the same will be brought into line with one of the ports of the valve-chest by movement of the disk in one direction, and the other will be brought into line with the other port of the valve-chest by movement of the disk in the other direction, and means for moving said disk, stop mechanism for limiting the movement of the disk in either direction, and a spring-actuated and beveled bolt adapted to temporarily arrest the valve when in its intermediate position, substantially as specified.

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

HOWARD A. PEDRICK.

Witnesses:

WILL. A. BARR,

JOS. H. KLEIN.