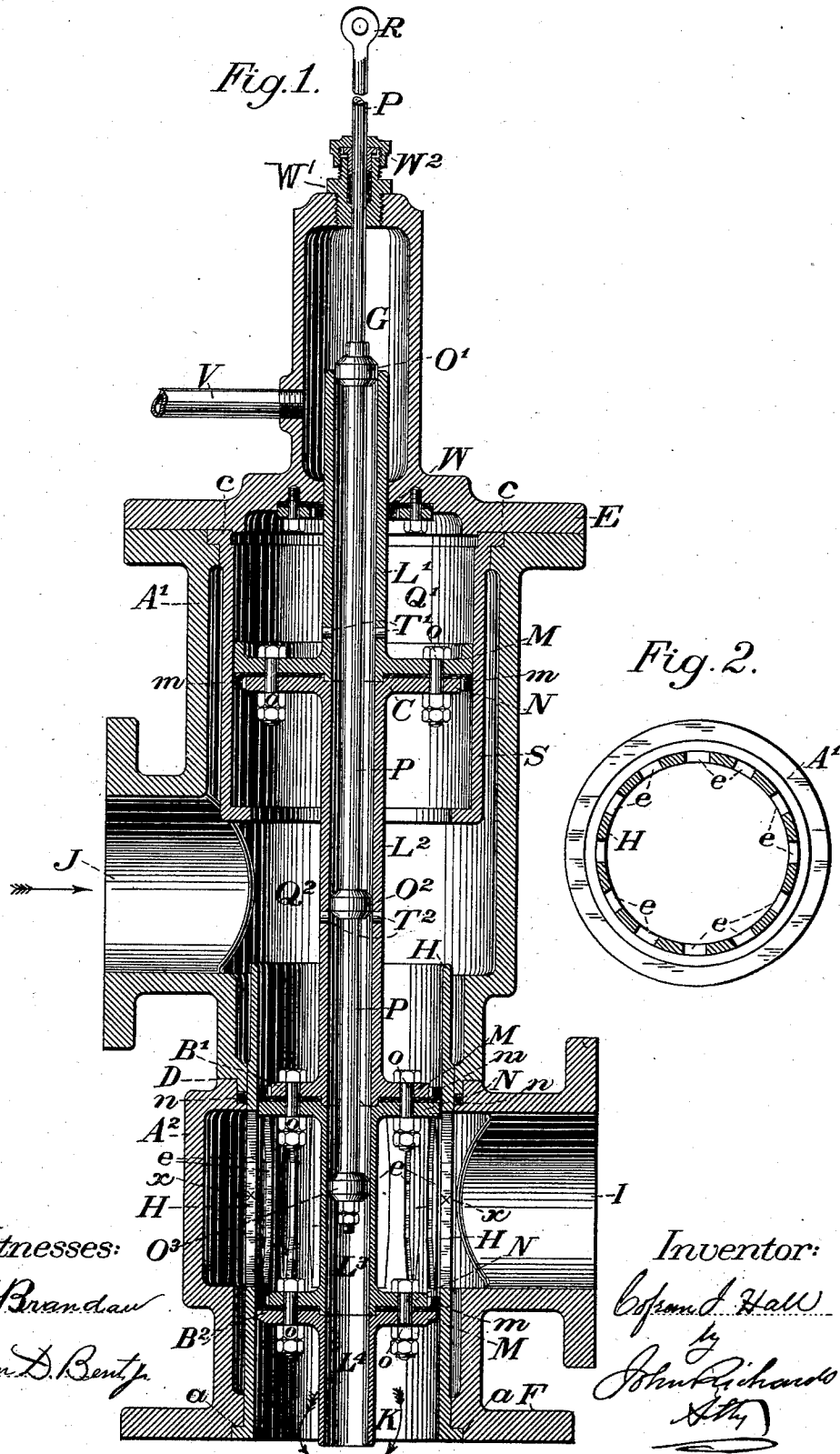


(No Model.)

C. I. HALL.
VALVE FOR HYDRAULIC ELEVATORS, &c.

No. 509,847.

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UNITED STATES PATENT OFFICE.

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CAHILL & HALL ELEVATOR COMPANY, OF SAME PLACE.

VALVE FOR HYDRAULIC ELEVATORS, &c.

SPECIFICATION forming part of Letters Patent No. 509,847, dated November 28, 1893.

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To all whom it may concern:

Be it known that I, COFRAN I. HALL, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Valves for Hydraulic Elevators and Similar Uses; and I hereby declare the following specification, with the drawings attached thereto and forming a part of the same, to be a full, true, and exact description of my invention.

My improvements relate to a class of valves for controlling the action or movements of hydraulic apparatus, especially elevators for raising and lowering passengers and goods, operated by hydraulic power, and to that class of valves wherein their movement is performed by water pressure regulated or controlled by supplementary valves, the latter operated by hand, or automatically by stops on cages or platforms, in the usual manner.

My invention consists essentially in the construction, arrangement and combination of parts and in numerous details thereof, substantially as will be hereinafter described and then more particularly pointed out in the appended claims.

In the accompanying drawings illustrating my invention: Figure 1 is a central longitudinal section through one of my improved valves; and Fig. 2 is a cross section on line *x x* showing the perforations in the cylinder or barrel, on which the main valve moves.

The method of constructing and the manner of operating my improved valves are as follows:

A¹ and A² are sections of different diameter constituting a main casing for the valve, formed by the pistons B¹ and B², and operating piston C. These two sections A¹ and A², are joined at D, and are held together by bolts, or rods extending from the flange E at the top, to the flange F at the bottom, or by means of bolts at the different joints as may be preferred. The upper chamber G is made integrally with the flange E forming a cover for the chamber A¹. The valve proper consists of the two packed pistons B¹ B², sliding in an inserted tube or barrel H set in from the bottom, resting on a ledge *a*, and held by the flange of a waste pipe attached to the

flange F. This shell H is packed water tight at its inner bearing by the grommet ring *n*, which also serves to pack the joint between sections A¹ and A² of the main chamber. In this way it will be seen that the grommet ring *n* serves a double purpose, and simplifies the construction, and permits the easy removal of the shell H by releasing the pressure on the packing ring *n*. This lining tube or cylinder H is perforated with oblong apertures *eee*, as shown in the section Fig. 2, and for a distance equal to the diameter of the pipe, or passage I, so that if the valve or pistons B¹ B² are depressed or moved below these perforations *eee* then there will be free communication between the passage J and the passage I, and if the valve or pistons B¹ B² are raised above these perforations *eee* then there will be free communication between the passage I and the discharge outlet K, at the bottom.

The main valve, consisting of the pistons B¹ B², and the piston C, are rigidly connected by the tubes L² L³ forming a part of a continuous tube extended by L¹ and L⁴ above and below the pistons, as shown in Fig. 1. These tubes are made integrally with, or attached to, plates M and N composing the piston heads; between which are placed cup leather packings as shown at *m m m*, the parts being joined by bolts *ooo* in the usual manner. The tube L¹ is provided with a packing gland W to prevent the escape of water from the chamber Q¹ into the chamber G. The stem P is also provided with a gland W² formed in the plug or seat W¹, the latter made large enough in diameter, so that when it is removed the stem P, with the valves O¹ O² and O³, can be drawn out for inspection or repairs without disturbing other parts of the apparatus. The pistons B¹ B², constituting the main valve, and the operating piston C, with their tubular connections and extensions L¹ L² L³ and L⁴, and plates M and N, consist only of four principal pieces, joined and connected as shown. In the center bore thus formed by the connecting tubes L¹ L² L³ and L⁴ are placed the small piston valves O¹ O² and O³, all mounted rigidly on a stem P, the latter passing out through the gland W² in the top of the chamber G, and terminating in an eye R,

or other suitable means of attachment to a lever or other suitable operating apparatus.

The main or operating piston C slides in a sleeve or barrel S, inserted from the top and held by a ledge c under the main cap E. This barrel S is made long enough to accommodate the stroke of the piston C, and is open continually to the chamber Q² the same as the upper end of the other barrel or shell H, so that the whole space between the main piston C and the piston B' forming one end of the valve, can be considered as one chamber, subject all the time to the static head of the operating water pressure entering at the passage or inlet-nozzle J.

The operation of my improved valve is as follows: The passage or inlet J is connected with the water supply under pressure. The passage or outlet I is connected with the elevator cylinder, or other apparatus to be operated intermittently, and the discharge outlet K, from where the waste water is carried off in the usual manner, is connected to a waste pipe, attached to the flange F. To open communication between the inlet nozzle J and the nozzle I, the main valve, composed of pistons B' B², is depressed below the apertures e e e e. To permit spent water to pass from the nozzle I to the exhaust passage at K, the main valve is raised above the orifices e e e e. I will now proceed to explain how these two movements are performed by means of the stem P, and the supplementary valves O' O² and O³. Fig. 1 shows the pistons B' B², forming the valve, in their neutral or central position covering the perforations e e e e, and closing communication every way between the main passages I, J and K. To depress or lower the main valve and piston C the stem P is moved downward until the valve O² passes below the ports or apertures T². This opens communication between the chamber Q² and Q' by means of the ports or apertures T² and T', permitting an equal pressure on each side of the piston C. This piston being then in equilibrium, the main valve is at once forced down by the pressure on the piston B', and continues to move until the ports T² overtake the valve O², and are covered or closed, the main valve following and moving the same distance as the stem P. To raise the main valve, the operation is the same in effect, but a little different in nature; the stem P is moved upward until the valve O' passes out of the tube L' at the top. This permits the water in the chamber Q' to flow through the ports T' and tube L' into the chamber G, and escape at the waste pipe V, relieving the top of the piston C from pressure. The chamber Q² remaining under static pressure of the supply water, and the piston C being larger in area than B', there is an upward force equal to this difference of area, and the main valve rises following the stem P, until the pipe L overtakes the valve O', and closes the escape of water from the chamber Q'. Thus it will be seen that the main valve

B' B², follows both ways, all movements of the stem P assuming the same relative position thereto, when the latter is moved upward or downward, and stopped. The speed at which the main valve follows the movement of the stem P is governed by the number and area of the holes or ports T' T², and consequent length of time required to fill or discharge the chamber Q', above the piston C. These two movements, which I have described as raising and lowering the main valve, are, as before explained, to send the supply water from the nozzle J to the one I, and from I to K, causing corresponding action of an elevator, or other apparatus, connected at the nozzle I. The lower valve O³, on the stem P, is to balance the upward pressure on the valve O² when the latter is above the apertures T², the same as the valves O' and O² are balanced when the latter is below the apertures T²; so that in all positions the stem P and its valves are in equilibrium in so far as water pressure, and it requires no force to move it except to overcome friction. In this manner, it will be seen, there are gained certain desirable operating conditions, namely: The main valve is moved and controlled by means of water pressure, distributed by the small rod P and its valves, requiring an inconsiderable amount of force in handling. The main valve follows or moves over the same distance as the supplementary or auxiliary ones on the stem P, stopping coincidentally therewith each way, and when stopped in either direction the main valve is locked and firmly held by maintained pressure under the piston C, and its abutment on the water contained in the chamber Q'. It may also be seen that by constructing the three pistons C, B' and B² with tubular connections and placing the auxiliary valves in their axes, great simplicity of construction and short channels of flow for the water are attained, and that by removing the cap E at the top, all of the moving parts of the valve can be drawn out for inspection or repairs; also the barrel or shell H, in which the main valve moves, can be similarly removed and replaced at the bottom, and any leak through or past the auxiliary valves O' O² O³, escapes free, without interfering with the practical working of the apparatus. These qualities, with a certainty of action, as great as can be attained by hydraulic apparatus of the kind, are accomplished by what may be called concentric parts, equally disposed around a common axis, all water ducts being direct, and all movements in one line.

Although I have, for the purpose of convenience, described my improved valve in a vertical position, it is obvious that it will operate the same however placed or arranged.

Having thus explained the nature and objects of my invention and the manner of constructing the same, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hydraulic valve, the combination of

two chambers of different diameters, sleeves or barrels situated in said chambers, an upper or main piston in the upper barrel and a main valve in the lower barrel, consisting of the two pistons, each composed of flanges M N secured together by means of bolts and having an intermediate packing between them, the tubular connection L³ between the said pistons of the main valve, the tubular extension L² above the upper piston and connecting with the piston in the upper barrel, and the tubular extension L⁴ below the lower piston, and the auxiliary valves O' O² O³ located within the central tubular passage, all arranged to operate substantially as described.

2. In a hydraulic valve, two main containing chambers A' A² connected, as shown, and containing removable barrels or linings S and H, the latter perforated in its central part to permit a flow through its sides, a retaining ledge or flange a, and a packing grommet ring n, so the barrel can be easily removed or replaced without disturbing the main casing or the main valve, in the manner substantially and for the purposes described.

3. In a hydraulic valve, the main piston C, pistons B' and B² forming the main valve, a central tube or pipe connecting these pistons and forming a central bore throughout; a supplementary valve O' opening and closing the upper end of this tube and permitting a flow of water from the chamber Q' to the chamber G, thus permitting the piston C to rise by pressure on its bottom, raising the main valve and permitting spent or waste water to pass out and beneath the main valve, in the manner substantially and for the purposes described.

4. In a hydraulic valve, the main valve consisting of the packed pistons B' and B², the central tubular passage L² L³ L⁴, formed integral with the said pistons and extending above and below the same, a second piston of larger area to which the central tubular passage is likewise connected, substantially as described, and the auxiliary valves O' O² and O³, located and operating within the cen-

tral cylindrical passage, substantially as and for the purposes specified.

5. In a hydraulic valve, the combination of the main piston C, having a constant pressure on one side and a variable pressure on the other side, a central tube or pipe formed therewith or connected thereto, an upper waste chamber G into which the upper end of said central tube extends said tube having ports or apertures T' and T² formed therein and a supplementary valve O' operating in conjunction with the upper end of said tube for the purpose of permitting and preventing the flow of water from above the piston causing it to rise or be held in a fixed position in the manner substantially and for the purposes specified.

6. In a hydraulic valve, the combination of main chambers of different diameters, sleeves or barrels removably situated in said chambers, one of said barrels being perforated to permit a flow through its sides, a double piston valve in the lower barrel, a main piston in the upper barrel, a central tubular connection between the valves, consisting of the sections L' L² L³ and L⁴, said connection having perforations T' and T², and the auxiliary valves O' O² O³ in said tubular connection carried on stem P, substantially as described.

7. In a hydraulic valve, a main piston C, lower pistons B' B², a central tube or pipe connecting these pistons and forming a central passage, said pipe consisting of sections L' L², integral with piston C, said section L² being likewise integral with piston B', section L³ integral with pistons B' and B² and section L⁴ integral with piston B² and the auxiliary valves O' O² and O³ located within the central pipe, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

COFRAN I. HALL.

Witnesses:

ALFRED A. ENQUIST,
WILSON D. BENT, Jr.