(No Model.)

# W. H. HULTGREN.

## ELEVATOR VALVE.

No. 566,982. Patented Sept. 1, 1896.

Fig 1.

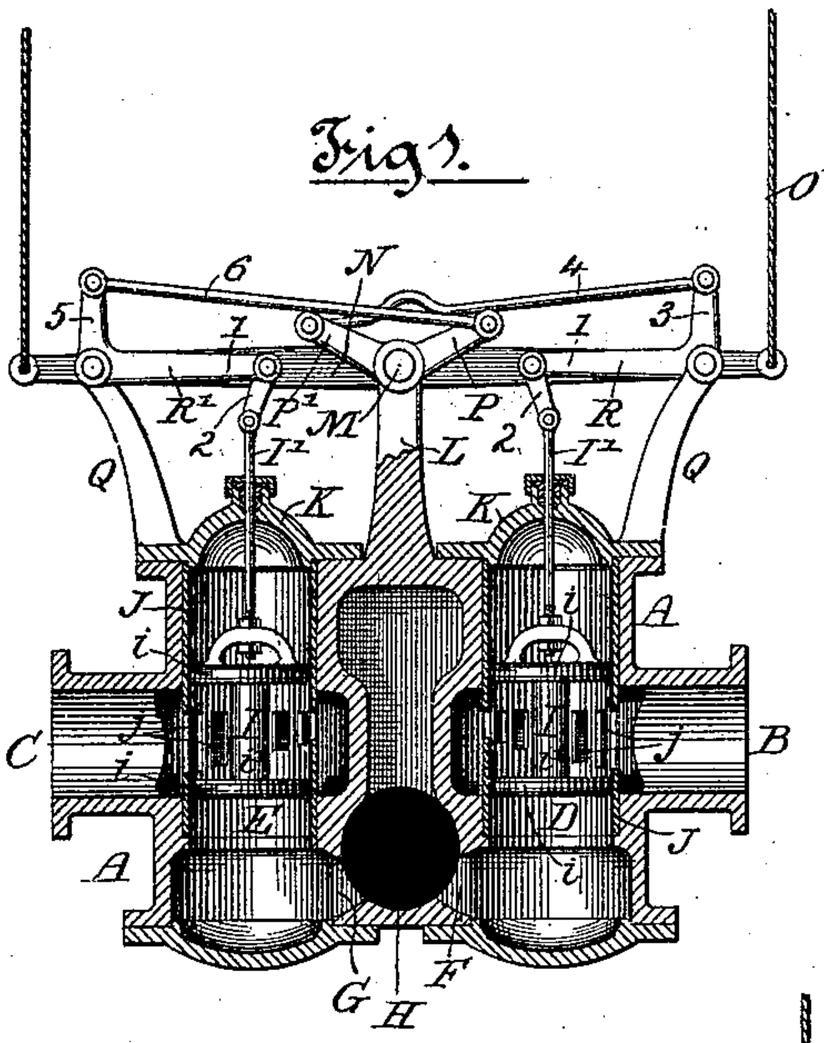



Fig 2.

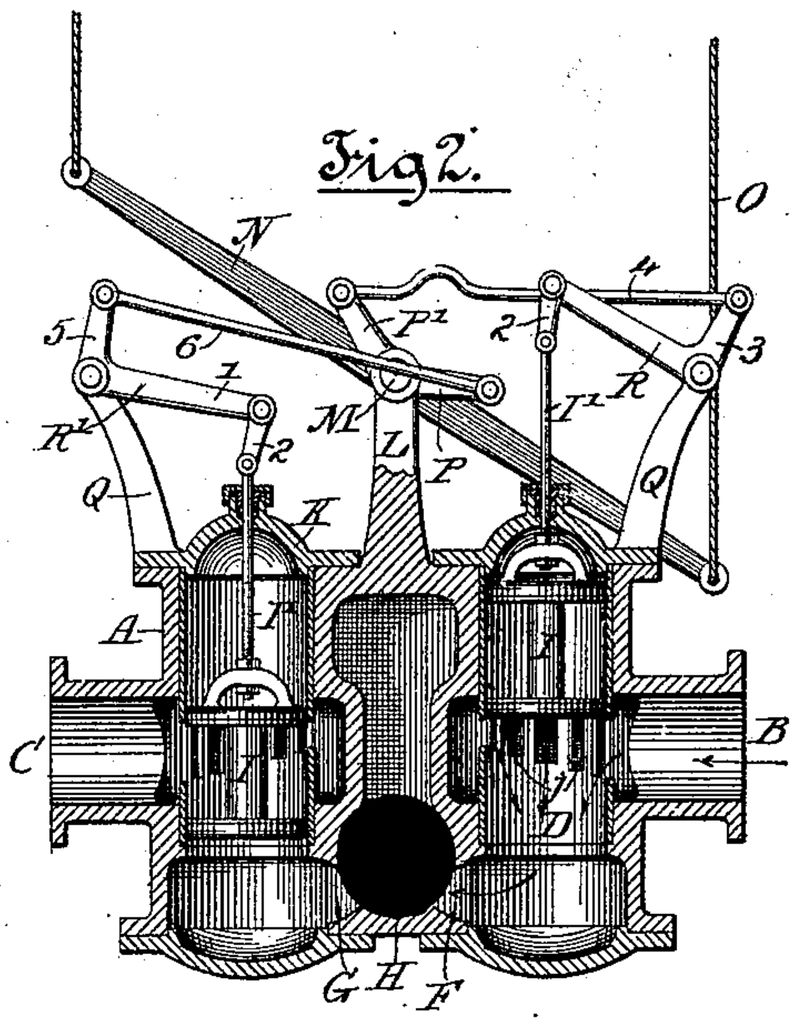



Fig 3.

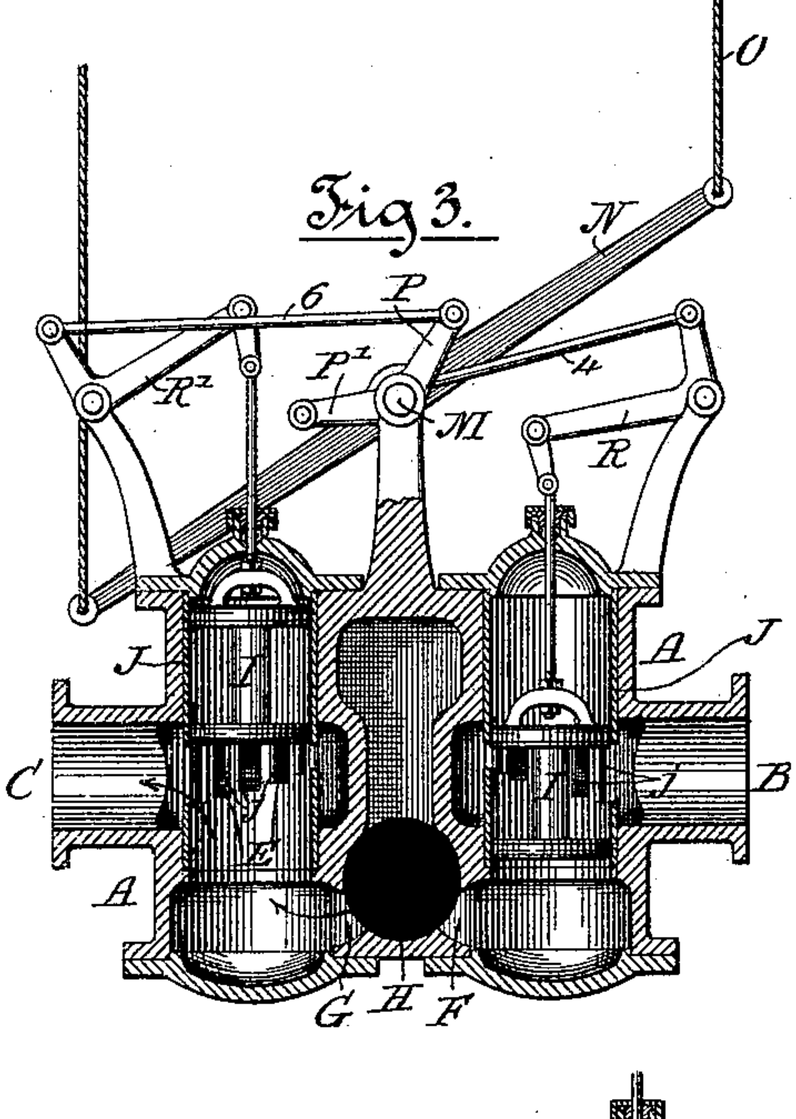



Fig 4.

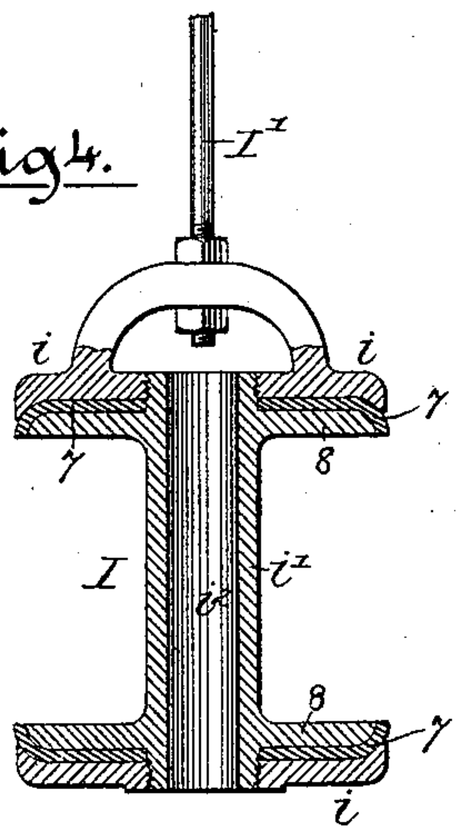
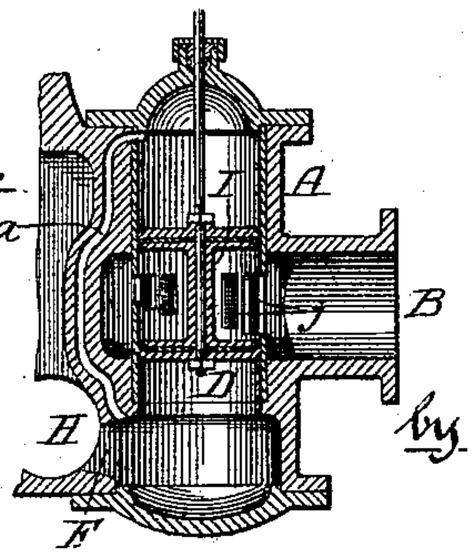



Fig 5.

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# UNITED STATES PATENT OFFICE.

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## ELEVATOR-VALVE.

SPECIFICATION forming part of Letters Patent No. 566,982, dated September 1, 1896.

Application filed December 29, 1890. Serial No. 376,068. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. HULTGREN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevator-Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to the main controlling-valves of hydraulic elevators; and it consists in certain novel features of construction and arrangement, as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a central longitudinal section of the valve-casing of a valve mechanism embodying my invention, the valves and their operative connections being in side elevation and set to stop the elevator-car. Fig. 2 is a view similar to Fig. 1, but showing the valves and connections set to carry the elevator-car upward. Fig. 3 is a similar view showing the valves and connections set to bring the elevator-car down. Fig. 4 is a central longitudinal section, on an enlarged scale, of one of the controlling-valves detached. Fig. 5 is a fragmentary sectional view of a modified construction of means for balancing the controlling-valves.

As shown in the accompanying drawings, A designates the casing of the controlling-valves, which casing is preferably of the elongated form shown. At one end of the casing A is formed an inlet-port B, adapted to be coupled to the service or supply pipe from the roof-tank or any other suitable source or means of supplying water under pressure, and at the opposite end of said casing is formed an outlet-port C, adapted to be coupled to the pump-reservoir or other place of discharge. The inner end of the inlet-port B communicates with one side of the inlet-valve chamber D, while the inner end of the outlet-port C communicates similarly with one side of the outlet-valve chamber E. These valve-chambers are arranged in the casing A with their central axes vertical, as shown, and communicate, respectively, through horizontal channels F G in the bottom of said casing with the port H, leading to the water-cylinder of the elevator.

I I designate the controlling-valves, which are each double piston-valves, their upper and lower parts *i i* being of disk shape and rigidly connected by a stem *i'*, as shown. Each of these controlling-valves works within a cylindrical bushing J, which is removably secured one in the valve-chamber D and the other in the valve-chamber E and each of which is provided with longitudinal slots or ports *j j j*. These ports are disposed in progressively-shortened series, as shown in the drawings, so that as the valves move into their seats the volume of the water passing through the ports is gradually diminished and the shock or jar which is liable to arise from suddenly cutting off the water is avoided.

In order to provide access to the interior of the valve-chambers D E for inserting and removing the bushings J and valves I, caps K are bolted or otherwise removably secured upon the casing A in such position as to cover the upper ends of said chambers D E, as shown. The upper and lower disks *i i* of the valves I are of equal area or diameter, and water is constantly admitted both above and below the valves, so as to perfectly balance them. This balancing is shown in the drawings as accomplished in two ways. In the construction shown in Fig. 4 a channel $i^2$ extends longitudinally through the stem *i'* of the valve, thus insuring the presence at all times of water under equal pressure above and below the valve. In Fig. 5 this result is accomplished by forming passages *a* in the valve-casing A, the upper and lower ends of which communicate, respectively, with the upper and lower ends of the chambers D E above and below the valves I, thus constantly maintaining the balanced condition of said valves. In order that the valves I shall work tightly in their valve-chambers, as required, the upper and lower ends *i* of the valves are preferably packed with leather or other similar

packing-disks 7, which are interposed between the two parts *i* and 8 of the valve ends, as shown, and which work tightly against the inner sides of the bushings J.

The connections for operating the valves I are arranged as follows: Upon the upper side of the casing A, about midway of its length, is formed or suitably secured an upright arm or standard L, in the upper end of which is journaled a short horizontal rock-shaft M. Upon one end of this shaft is mounted a rocking lever N, which is connected rigidly, about midway of its length, to said shaft, and to the ends of which are connected the ends of the pull cord or rope which runs upward through the elevator-car. Upon the opposite end of said rock-shaft M are mounted two rock-arms P P′, arranged at an obtuse angle with each other. Upon the caps or covers K are mounted two standards Q, and upon the upper ends of these standards are pivoted two bell-crank levers R R′, as shown. The ends of the arms 1 of these bell-cranks are connected by rods or links 2 and piston-rods I′ I′ with the upper ends of the valves I, said piston-rods passing through stuffing-boxes in the caps or covers K. The upper end of arm 3 of the bell-crank R is connected by a link 4 with the upper end of the rock-arm P′, while the upper end of arm 5 of bell-crank R′ is connected by a similar link 6 with the upper end of rock-arm P, the inner ends of said links 4 and 6 thus passing each other and each link being connected with the rock-arm farthest away from its bell-crank.

Assuming now that the parts occupy the relative positions shown in Fig. 1, in which the elevator-car is at rest, and it is desired to elevate the car, the attendant in the car will pull downward on the right-hand strand of the rope O in order to cause the car to ascend. This movement of rope O will cause the right-hand end of rock-lever N to descend and will throw the rock-arms P P′ and bell-cranks R R′ to the right, and thus to the position shown in Fig. 2, consequently raising the right-hand valve I out of its seat in the chamber D and depressing the left-hand valve I into its seat in the chamber E. This allows the water to flow from the inlet B, through the chamber D and channel H, into the water-cylinder, thus carrying the elevator-car upward. When the attendant desires the car to descend, he pulls upward on the rope O and brings the left-hand end of the rocking lever N upward, thus throwing the rock-arms P P′ and bell-cranks R R′ to the left and into the reversed position shown in Fig. 3. The right-hand valve I will now be lowered into its seat in the chamber D and the left-hand valve will be raised up out of its seat in the chamber E, allowing the water to flow out of the water-cylinder through the port H, channel G, and chamber E, and escape through the outlet C, thus allowing the elevator-car to descend.

The double piston-valves I I are made of such length that the disks or valve-pistons *i i* stand at a distance apart considerably greater than the length of the valve-ports *j j j*, so that when the valves are in their intermediate position, as seen in Fig. 1, the said disks stand at some distance from the adjacent ends of the ports. It follows that the valves may be moved a considerable distance in either direction before the ports are uncovered by one of the disks. It will be observed, furthermore, that when the rock-shaft M is turned sufficiently to open one of the valves the arm P′, through which the opened valve is actuated, will extend upwardly from the rock-shaft and will therefore be in position to give a considerable horizontal movement to the end of the link connected therewith, while the other arm, P, which actuates the closed valve, will stand horizontally, or nearly so, so that its movement will produce a practically vertical movement of the end of the link connected therewith. It follows that when the lever N is inclined, as seen, for instance, in Fig. 2, a movement of said lever sufficient to open and close one valve may take place without producing sufficient movement in the other valve to open the same. Thus in Fig. 2 the valve I at the right is open and may be entirely closed or placed at any intermediate point between its open or closed position without moving the valve at the left sufficiently to uncover the ports, the arm P′, which is connected with the bell-crank lever R by the link 4, being in position to give a considerable horizontal but little vertical movement to the end of said link attached thereto, while the arm P, which is connected by the link 6 with the bell-crank lever R′, is in position to give little horizontal but considerable vertical movement to the adjacent end of said link 6. Similarly in the reversed position of the parts the valve at the left will be moved to the greatest extent, while the valve at the right will be moved only slightly and not sufficiently to uncover the ports. It follows from the construction described that both of the controlling-valves are operated directly from the elevator-car without the intervention of any sliding joints or parts having lost motion, but, on the contrary, by means of positively-connected parts.

It will of course be understood that the particular details of construction illustrated are not essential and that the same main features of construction and operation above set forth may be embodied in a mechanism differing materially in form and details from that illustrated—as, for instance, the rocking and bell-crank levers may be otherwise constructed or disposed to produce the same result of a slight movement of one valve with a considerable movement of the other valve, and the valve-chambers may be made without bushings, or otherwise modified in structure. Furthermore, valves other than piston-valves may be actuated by substantially the same mechanism illustrated to produce the same re-

sult, provided the valves employed are capable of some movement relatively to the valve-ports without opening or closing the said ports.

I claim as my invention—

1. The combination with the valve-chambers and valves, of a rock-shaft provided with rigid arms arranged at an angle with each other, and bell-crank levers connected with said arms and with the valves, substantially as described.

2. The combination with a pair of valve-chambers each provided with a piston-valve, of a rock-shaft provided with rigid arms arranged at an angle with each other, and bell-crank levers connected with said arms and with the valves, substantially as described.

3. The combination with a pair of valve-chambers and the valves thereof, of a rock-shaft mounted between said chambers provided with rigid arms arranged at an angle with each other, bell-crank levers each having one arm connected with one of the valves and its other with one of the arms of the rock-shaft by means of a link, the connecting-links of the several bell-crank levers being each engaged with the arm of the rock-shaft remote from the bell-crank lever so as to bring said links into overlapped relation to each other, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM H. HULTGREN.

Witnesses:
C. CLARENCE POOLE,
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