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M. C. MERKER.

VALVE MECHANISM FOR HYDRAULIC ELEVATORS.

(Application filed Feb. 21, 1901.)

(No Model.)

Fig. 1.

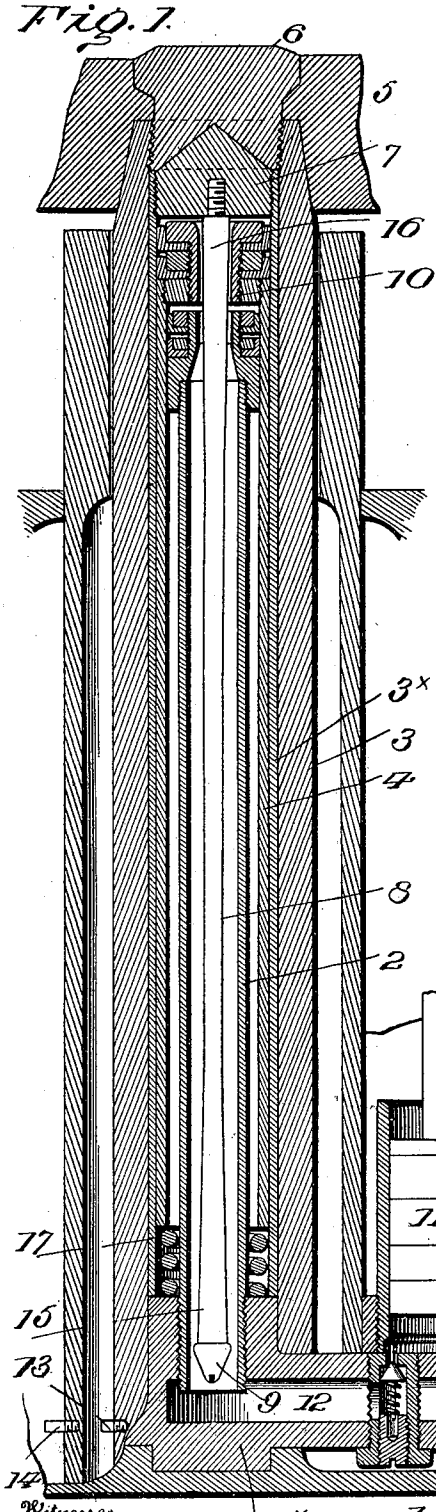


Fig. 2.

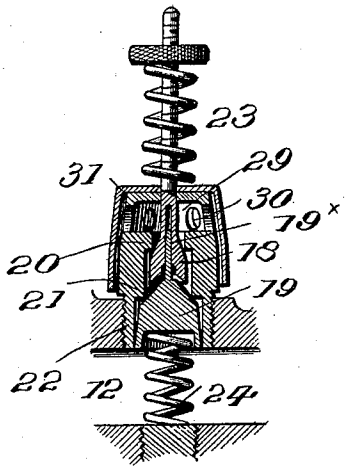
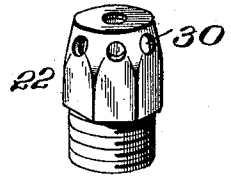
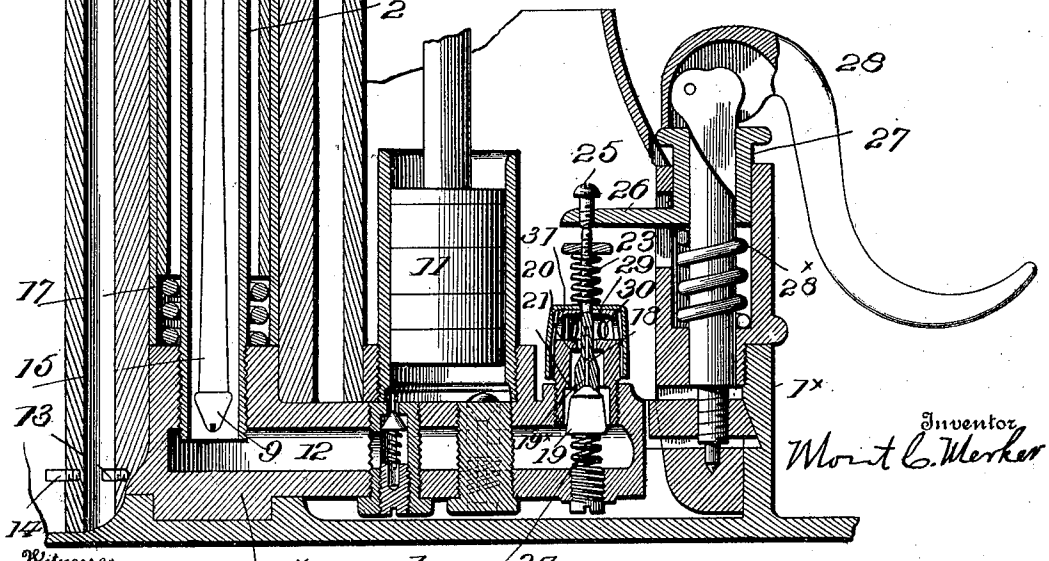


Fig. 3.





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VALVE MECHANISM FOR HYDRAULIC ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 684,843, dated October 22, 1901.

Application filed February 21, 1901. Serial No. 48,372. (No model.)

To all whom it may concern:

Be it known that I, MONT C. MERKER, a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Valve Mechanism for Hydraulic Elevators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to valve mechanism for hydraulic elevators, and has for its object to increase the efficiency and utility of such devices.

The invention consists in the construction herein described and pointed out.

In the accompanying drawings, Figure 1 is a broken vertical section of a chair-base provided with seat elevating and lowering devices embodying the invention. Fig. 2 is an enlarged vertical section of relief-valves. Fig. 3 is a perspective of a cap for the valve-case.

The invention is illustrated in the present instance as applied to a chair and in connection with telescoping seat-supporting tubes.

Numeral 1 denotes a base having a vertical flange $1^{\times}$ to constitute an oil-holder, in which base is rotatably supported a casting $2^{\times}$, in which is screwed a tube 2, that coacts with telescoping tubes 3 and 4.

The cross-bar of a chair-seat frame is denoted by 5, and 6 is a screw plug or bolt securing a telescoping tube 3 to said cross-bar. Said tube 3 has a lining $3^{\times}$, in which is secured a screw-plug 7, from which plug depends a fluid-displacing and tube-raising rod 8, having an enlarged foot 9, whereby it is adapted when suitably elevated to engage the contracted upper part of the inner telescoping tube 4.

The upper ends of tubes 2 and 4 are suitably packed to prevent leakage, and the packings are provided with interior spaces about the rod 8, so that oil or other fluid can pass up or down. The opening in the packing of the fixed tube 2 is sufficiently large to permit the free passage of the foot of rod 8; but that in the packing of tube 4 is smaller. The packing devices comprise a housing-thimble 10, adapted to engage the foot 9 of the rod 8.

11 denotes a pump-piston, and 12 a conduit, whereby the fluid may be forced into the fixed tube 2 and upwardly about the rod 8 and through passages in the packings about said rod and against the plug 7, which closes the upper end of the lined tube 3.

In operation the tube 3 is pushed up by the action of the pump and the seat and its occupant raised. The rod 8 is also pushed and drawn up until its foot engages a shoulder, ring, or thimble 10 of the inner tube 4. Tube 3 will be moved first by fluid-pressure because of the comparatively large area of the plug 7, against which the pressure acts. The tube 3 can be provided with a projection or pin 13 to engage another telescoping tube having a tube-engaging or stop-engaging pin 14, which latter tube may engage still another tube or may be stopped in any usual way. Adjacent the foot 9 of the rod 8 is a part 15, of frusto-conical form.

16 denotes a similarly-shaped part reversely disposed at the upper end of the rod.

When a fluid, such as oil, is pumped into the tube 2, the parts being situated at their lowest position, as represented, the oil first fills the tube about the body of the rod and then passes up through the space about the part 16. Said part 16 nearly fills the circumjacent space and limits the quantity of ascending oil. When, however, the rod has been moved up, as before described, and said part 16 has been elevated above tube 4, the smaller part of the rod is brought adjacent the upper end of the tube, and the oil-exit space is thereby enlarged. This has the effect to start gradually the upward movement of the seat or other load, avoiding concussion. After a smooth and gradual start the movement is accelerated by the greater flow of oil provided by the enlarged oil-passage. The tube 3, because of its greater transverse area, will be first moved up, together with the rod 8, and the foot of the latter will engage the packing 10; but before such engagement occurs with the packing 10 the enlarged part 15 of the said rod 8 enters the contracted opening in the upper end of the tube 4 and diminishes the flow of oil and decreases the pressure, thereby gradually checking the upward movement and avoiding jar of the head 9 coming in contact with the tube 4. In lowering the parts from their highest to their lowest situations by withdrawal of oil from the tubes the operation of the parts 15 and 16 is reversed. The

former, being situated in the packing 10, temporarily diminishes the escape of oil from the tube 3 in descending and the latter diminishes it at the end of the descent, as indicated at the upper part of Fig. 1. Obviously if fixed stops are provided for any of the parts, as usual in dental chairs, lifting-jacks, and like structures having telescoping elevating-tubes, they should be so arranged as to come into action after the parts 15 and 16 have performed their office. Obviously the relative time and speed of the movements of the telescoping tubes depend upon their relative area of pressure. The precise order of the movements of the parts is not essential to the invention herein claimed.

To further guard against a concussion of the descending tube 4, a spring 17 is provided between the tubes 2 and 3, as shown. The devices thus far described are operative to gradually start the parts from their lowest position and also to modify their descent. To provide for a gradual and smooth descending start from any elevation, a novel form of a pressure-relief device has been provided, the general purpose of which is to permit oil to escape from the tubes as required to lower the elevating-tubes and their load. This device consists of two coacting valves 18 and 19, having seats 20 and 21 in a valve-case 22, which in the present instance has the form of a thimble screwed into the casting $2^{\times}$. The valve 18 is normally held to its seat by a spring 23 and valve 19 by a spring 24. As represented in Fig. 2, the valves are seated.

$19^{\times}$ denotes a guide-stem fixed to valve 19 and movable in a socket in valve 18. This stem prevents the tilting and consequent binding of valve 19. As indicated, the valve 18 can be opened by downward pressure, overcoming spring 23, without affecting valve 19 until valve 18 is pushed down into contact therewith. As represented in Fig. 1, valve 18 has been opened and is in position when farther depressed to push open valve 19. The valve-springs are compressed and the valves successively opened by a pin 25, carried by an arm 26 of a sliding sleeve 27, operated by a lever 28. A returning-spring is denoted by $28^{\times}$. These valve-operating devices constitute no part of the invention, and any suitable devices may be substituted in practice.

The body of the valve 19 has a frusto-conical form arranged, as shown, so that when the valve is opened the circumferential outlet between it and the casing will be gradually enlarged. This provides for a slow escaping flow of oil at the beginning and a gradually-increased flow, whereby when the valve is opened the descent of the seat or other load is gradually started from whatever point the start be made. When the valves are relieved from the pressure of the pin 25 and closed by their respective springs, the valve 18 moves away from valve 19, as indicated in Fig. 2.

In practice it has been found that a single relief-valve, such as valve 18, is liable to be held open by foreign particles lodged between it and its seat. Particles of metal from the interior of the castings, portions of fibrous waste used in cleaning the parts, and foreign matter carried by the oil are liable to obstruct the closing of the valve, which is thereby prevented from fulfilling its office. The valve 19 in such cases effects a suitable closure, and the oil admitted on the next opening of the valves flushes the seat of valve 18 and carries away any obstruction temporarily lodged thereon. The lower surface of the valve 19 when closed is flush with the lower surface of the valve-casing, and both are preferably in the same plane as the adjacent wall of the outlet. The passage between the valve 19 and the adjacent wall of the casing is transversely narrower than that between valve 18 and the part of the casing adjacent thereto. The former is made narrow to arrest foreign particles and prevent their reaching the valve-seats as far as practicable. Particles arrested by the adjacent lower surfaces of the valve 19 and the casing will be pushed down and away from the casing when the valve is opened and will in large part be carried by pressure up into the spring-holding recess in the bottom of the valve and will remain there until the parts are cleaned. Particles which are not thus diverted, but which enter the circumferential passage about valve 19, even if they temporarily hold said valve from its seat, will not prevent the proper seating of the independently-movable valve 18, and when they escape upwardly from about valve 19 they have a free escape because of the comparatively larger space between valve 18 and its adjacent part of the casing.

To obviate the hissing sound that accompanies the passage of oil past a valve, such as 18, and to prevent the throwing of oil out of the reservoir, a chamber 29, with outlets 30, is provided above the valve-seat, and this is covered by a cap 31, that surrounds the valve-case 22. By the apertured chamber the unpleasant sound of escaping oil is obviated, while the cap prevents the ejection of oil from the reservoir. Said chamber is wider than the valve-casing and unobstructed, except by a contracted portion of the valve-stem. Its capacity is much larger than that of the interior of the casing for valve 18, and it is provided with outlets of relatively large size, which communicate with a circumferentially large and backwardly-directed outlet. As a consequence of the comparative size of the chamber 29 and its outlets hissing and other noises such as caused by small exits in constructions having no similar chamber are obviated.

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

1. In combination with the tubes, a liquid-outlet provided with a valve-casing, a valve

in said casing pressed toward its seat by liquid in the tubes and normally closed, a second valve seated in said casing and normally free from said liquid-pressure, and mechanism for opening the latter valve, said mechanism being operative to subsequently open the first-named valve.

2. In combination with the tubes, a liquid-outlet, a valve-casing communicating with said outlet and attached to its wall, a valve 19 having a face exposed to the liquid in the outlet and normally held adjacent the end of the casing fixed in said outlet-wall, mechanism for moving the exposed face of the valve away from the valve-casing face to dislodge foreign particles in opening the valve, and a second independently-movable valve seated in said casing and normally free from said liquid-pressure, the transverse distance of the latter valve from the wall of the casing being greater than that of the former, whereby foreign particles that may pass the first-named valve may more freely pass the second.

3. In combination with the tubes, a liquid-outlet, a valve-casing, an outlet-valve normally exposed to liquid-pressure in the outlet, a second valve beyond the valve first named, both valves being seated in the casing and independently movable, and means to hold the second valve closed in case the first-named valve is temporarily held open by solid particles.

4. In combination with the tubes, a liquid-outlet, a valve-casing communicating with said outlet and attached to its wall, a valve 19 having a face exposed to the liquid in the outlet and normally held adjacent the end of the casing fixed in said outlet-wall, mechanism for moving the exposed face of the valve away from the valve-casing face to dislodge foreign particles in opening the valve, and a second independently-movable valve seated in said casing and normally free from said liquid-pressure.

5. In combination with the tubes, a liquid-outlet, a valve-casing communicating with said outlet and attached to its wall, a valve 19 having a face exposed to the liquid in the outlet and normally held adjacent the end of the casing fixed in said outlet-wall, mechanism for moving the exposed face of the valve away from the valve-casing face to dislodge foreign particles in opening the valve, a second independently-movable valve seated in said casing and normally free from said liquid-pressure, and a recess in the first-mentioned valve to receive the dislodged particles.

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

MONT C. MERKER.

Witnesses:
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G. W. BALLOCH.