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HYDRAULIC RAISING AND LOWERING MECHANISM FOR CHAIR SEATS

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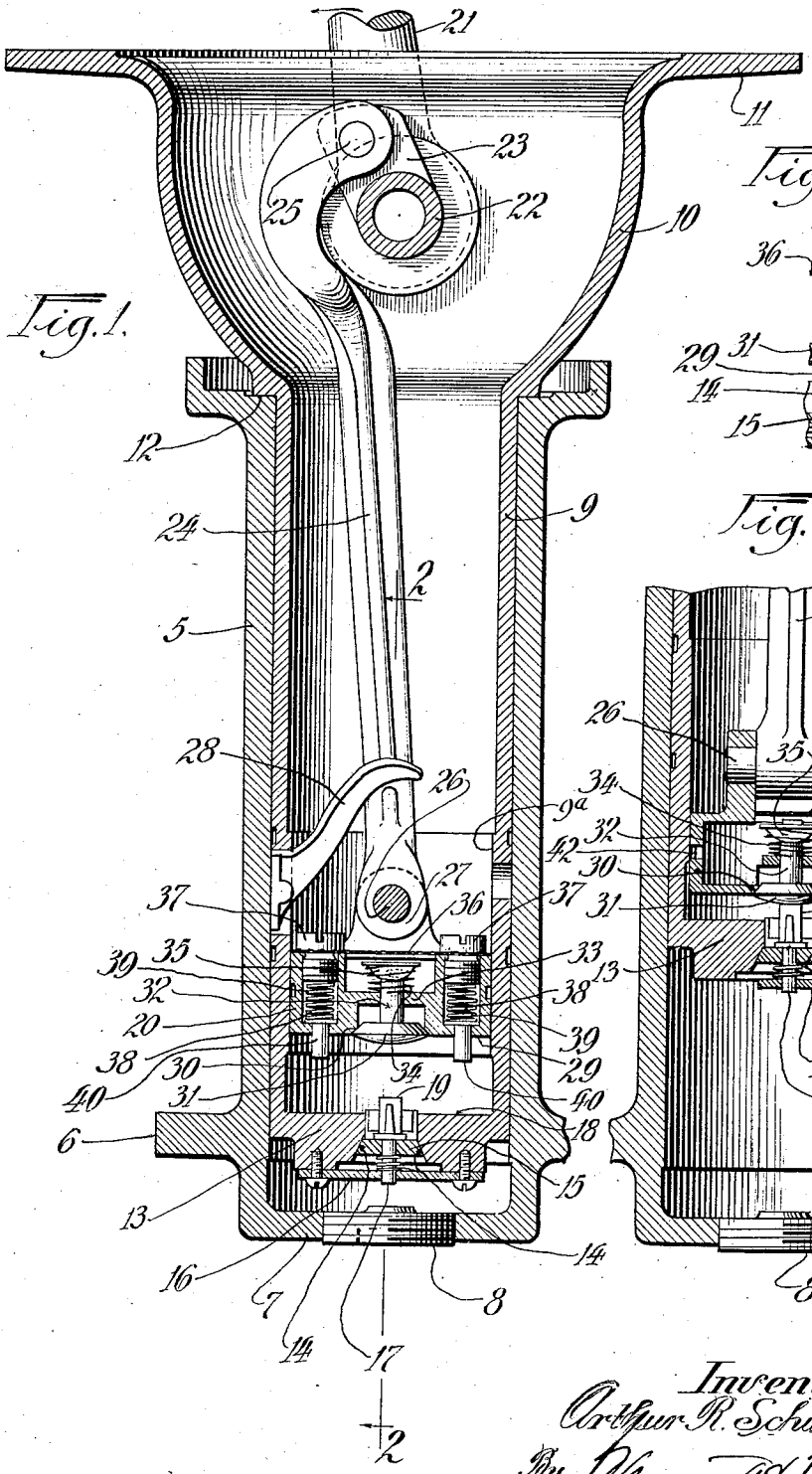


Fig. 1.

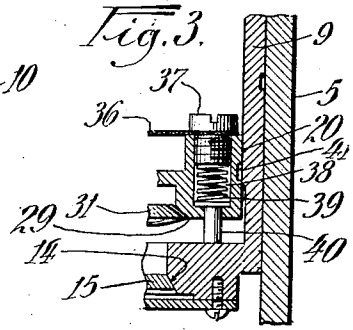


Fig. 3.

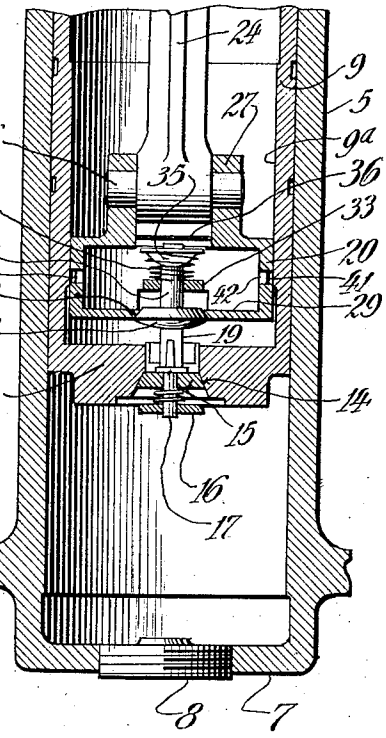


Fig. 2.

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UNITED STATES PATENT OFFICE

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HYDRAULIC RAISING AND LOWERING MECHANISM FOR CHAIR SEATS

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This invention relates to hydraulic raising and lowering mechanism for chair seats, and has reference more particularly to that type of chairs known as barbers' chairs and dentists' chairs, although the particular construction herein described is capable of use in other situations where it is desired to raise and lower a seat or other support.

The principal object of this invention is to provide novel means in the pump bucket of the device for cushioning the same when the hand lever is moved into the extreme down postion for lowering the chair seat. Another object is to provide a novel pump bucket having a check valve adapted to unseat the valve which controls the passage of liquid from the main supporting cylinder to the seat supporting stem when lowering the latter. Another object is to provide cushioned stops for absorbing the jar usually occasioned when the pump bucket is moved to the lower limit of its down stroke for the purpose of releasing the liquid and permitting the chair seat to lower.

Other objects and advantages will appear in the course of this specification, and with all of said objects and advantages in view, this invention consists in the several novel features of construction, arrangement and combination of parts hereinafter fully set forth and claimed.

The invention is clearly illustrated in the drawings accompanying this specification in which—

Figure 1 is a central vertical longitudinal section taken through hydraulic raising and lowering means for chair seats embodying a simple form of the present invention;

Fig. 2 is a vertical cross section taken on the line 2—2 of Fig. 1, but showing the stem raised above the position illustrated in Fig. 1; and

Fig. 3 is a fragmental vertical longitudinal section showing the parts in the position occupied in Fig. 2, the plane of the section being transverse thereto.

Referring to said drawings, which illustrate one embodiment of the present invention, the reference character 5 designates a cylinder which is supported and contained in the base of a chair (not shown) in the customary manner. It is here shown as provided with a flange 6 whereby it may be attached to the base. The cylinder is open at its upper end and is closed at its lower end by an end wall 7 in which is a drain opening closed by a plug 8 threadedly secured therein.

Rotatably and slidably mounted in the cylinder 5 is a hollow cylindrical seat suporting stem 9, formed at its upper end with an enlarged or swelled portion 10, at the upper edge of which is a flange 11 to which the chair seat (not shown) is bolted or otherwise secured. An annular shoulder 12 is formed between the stem 9 and enlarged portion 10, which shoulder may seat upon the upper end of the cylinder 5 whenever the stem is lowered to the lower limit of its movement.

The lower end of the stem 9 is closed by a head 13 in which is a discharge port 14 through which liquid may pass from the interior of the stem 9 to the interior of the cylinder 5 below the head 13. The port 14 is controlled by a valve 15, here shown in the form of a tapered check valve, arranged to seat upon the tapered seat of the port 14. The valve 15 is held upon its seat by a spring confined between the valve and a bridge 16 secured to the underside of the head 13 by screws or the like. The valve 15 is provided with a valve stem 17, one end of which is guided in the bridge 16 and the other end of which projects above the valve and above the upper face 18 of the head 13, and preferably is in the form of a winged stem 19, whereby it is guided by the vertical wall of the port 14.

Within the cylindrical stem 9 is the pump bucket 20 which is fitted close to the machined portion 9^a of the internal wall of the stem 9 and reciprocates in the hollow of the stem. Below the machined portion 9^a, the internal bore of the cylinder is slightly greater than that of the machined part 9^a. A hand lever 21 is provided for reciprocating the pump bucket, and in accordance with the usual practice, said hand lever has a sleeve 22 thereon which is rotatably mounted in the enlarged portion 10 of the stem 9 and formed with a crank arm 23 connected to the pump

rod 24 by a wrist pin 25. The lower end of the pump rod is connected to the pump bucket by a pin 26 passing through upstanding ears 27 on the pump bucket and through the lower end of the pump rod. The upper end of the pump rod is preferably formed with a laterally bent or U-portion to enable the hand lever to be swung back far enough to carry the wrist pin 25 beyond a vertical line passing through the axis of the sleeve 22. The usual brake shoe 28 may be provided as is customary.

The pump bucket may be made hollow to provide a chamber, as is seen in Fig. 2, and in its lower wall 29 is a port 30 normally closed by a valve 31, preferably in the form of a tapered check valve seating upon a tapered seat around the port 30. The stem 32 of the valve extends up through a bridge portion 33 which extends transversely through the hollow of the pump bucket, and above said bridge is a coiled compression spring 34 which engages with a sleeve or other shoulder 35 upon the valve stem 32 and acts to yieldingly hold said valve 31 upon its seat, thereby normally closing the port through the pump bucket.

The chamber of the pump bucket opens upwardly into the interior of the cylindrical stem 9 through an opening located between the ears 27 and, as a preference, a screen or other strainer 36 is provided above said opening to prevent any foreign matter from entering the chamber of the pump bucket. As shown, the screen or strainer 36 is secured to the upper face of the pump bucket by cap screws 37 threadedly secured in diametrically opposed sockets 38 cast in the wall of the pump bucket.

Cushioning means are provided for absorbing any jar that may be occasioned when the pump bucket is moved to the lower limit of its down stroke, and, as shown, said cushioning means comprise coiled compression springs 39, one contained in each socket 38 and confined under compression between the lower ends of the cap screws 37 and short stems or pins 40, which protrude from the bottoms of the sockets and are adapted to engage with the upper face 18 of the head 13 of the cylindrical stem whenever the pump bucket is moved to the lower limit of its down stroke. The upper ends of the stems or pins 40 are formed with enlargements or heads against which the coiled compression springs bear. The heads of the stems 40 are adapted to rest upon the bottoms of the sockets to prevent the stems from falling through the sockets.

In the outer face of the pump bucket is formed a circumferential groove 41 and leading from said groove into the interior of the pump bucket are ports 42 which form by-passes through which liquid may pass from the lower side of the pump bucket into the interior thereof whenever the circumferential groove 41 is brought down below the machined portion 9^a of the cylindrical internal wall of the stem. The ports 42 are rather restricted in diameter whereby the flow of liquid therethrough is retarded in order that the cylindrical stem and the chair seat, which is mounted thereon, may move slowly downward when the liquid flows through the by-passes.

A body of liquid, usually an oil, is contained in the device and serves as a medium for raising and lowering the cylindrical stem 9 as well as supporting it in any adjusted position. The liquid contained in that portion of the cylinder 5 below the cylindrical stem 9 serves to support the stem and parts carried thereby, and the liquid contained within the cylindrical stem may be forced into that portion of the cylinder below the stem to raise the latter.

In the operation of the device, and assuming the parts to be in the position seen in Fig. 1, with the shoulder 12 of the stem 9 resting upon the upper end of the cylinder 5, to raise the stem and parts carried thereby, the hand lever 21 is oscillated back and forth with short strokes thereby reciprocating the pump bucket, and as the pump bucket moves downward it forces the liquid contained between the pump bucket and head 13 of the stem past the check valve 15 into that part of the cylinder 5 below the head, thereby forcing the stem upward. As the pump bucket moves upward, the liquid contained in the stem above the pump bucket flows past the check valve 31 into the enlarging space between the pump bucket and head 13, and is thereafter discharged through the port 14 into the space below the stem 9 on the succeeding down stroke of the pump bucket.

To lower the stem 9, the hand lever 21 is swung down in the direction of the arrow thereon in Fig. 1 to the full limit of its stroke, thereby bringing the lower face of the check valve 31 into engagement with the winged stem 19 of the check valve 15 and unseating said check valve 16, thereby permitting the liquid contained in that part of the cylinder 5 below the stem 9 to return through the port 14 into the space between the pump bucket and head 13 of the stem, from which it passes through the ports or by-passes 42 and through the chamber of the pump bucket, finally discharging out through the opening in the top wall thereof and into the upper portion of the stem.

It will be observed that in order to bring the check valve 31 into effective engagement with the stem of the valve 15, sufficient force must be applied to the hand lever to compress the springs 39 when the pins 40 impinge upon the upper face of the head 13. Said compression springs, therefore, not only cushion the shock which would otherwise be

caused by the check valve 31 impinging upon the valve stem 19, but also serves as a cushion stop for the hand lever.

I claim:

1. In hydraulic raising and lowering mechanism, the combination of a cylinder closed at its lower end, a cylindrical stem therein closed at its lower end and formed with a valve controlled port in said lower end, a reciprocatory valved pump bucket in said cylindrical stem having cushioned limiting means disposed laterally of the valve of the pump bucket and adapted to impinge against the head of the stem during the final portion of the down stroke of the pump bucket to retard movement of said bucket toward said head and valve controlled port, and means for reciprocating the pump bucket.

2. In hydraulic raising and lowering mechanism, the combination of a cylinder closed at its lower end, a cylindrical stem therein having a head at its lower end formed with a valve controlled port, a valved pump bucket in said stem, spring pressed members disposed laterally of the valve of the pump bucket and protruding from the lower face of said bucket and adapted to impinge against the head of the stem to retard movement of said bucket toward said head and valve controlled port when the pump bucket is moved beyond the lower limit of its pumping stroke, and means for reciprocating the pump bucket.

3. In hydraulic raising and lowering mechanism, the combination of a cylinder closed at its lower end, a cylindrical stem therein having a head at its lower end formed with a valve controlled port, a pump bucket having a port therein closed by a downwardly opening check valve, said check valve being arranged to impinge against and thereby unseat the first mentioned check valve whenever the pump bucket is moved to the lower limit of its down stroke, said pump bucket having also a normally closed by-pass therethrough, cushioned limiting means arranged to retard movement of the bucket during the final portion of its down stroke and to absorb shock on the pump bucket whenever the latter is moved to the lower limit of its down stroke in unseating the check valve of the port in the stem, and means for reciprocating the pump bucket.

4. In hydraulic raising and lowering mechanism, the combination of a hydraulic cylinder closed at its lower end, a cylindrical stem therein having a head at its lower end formed with a check valve controlled port, a pump bucket in said stem and having a port therethrough closed by a downwardly opening check valve, the latter being arranged to unseat the first mentioned check valve whenever the pump bucket is moved to the lower limit of its down stroke, said pump bucket having also a normally closed by-pass therethrough, spring actuated cushion stop members protruding from said pump bucket and arranged to impinge against the head of the stem during the final portion of the down stroke of the bucket to retard movement thereof, and means for reciprocating said pump bucket.

5. In hydraulic raising and lowering mechanism, a chambered pump bucket having a centrally located port leading from the chamber and a normally closed by-pass leading through the cylindrical wall of the pump bucket to the chamber thereof, a check valve for closing said port, a plurality of sockets formed in the wall of the bucket, at places disposed laterally of the port and check valve headed pins contained in and protruding from said sockets, and coiled compression springs in said sockets and adapted to bear against said pins.

6. In hydraulic raising and lowering mechanism, a chambered pump bucket having an opening leading upwardly from the chamber, and a valve controlled port leading downwardly from said chamber, a screen over said upper opening of the chamber, sockets formed in the wall of the bucket for receiving cushioning members, and means securing said screen to the pump bucket and extending into said sockets and forming abutments for said cushioning members.

In testimony whereof, I have hereunto set my hand this 28th day of September, 1928.

ARTHUR R. SCHWARZKOPF.