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HYDRAULIC FLUID MOTOR LIFT MECHANISM

Original Filed March 31, 1949.

2 SHEETS—SHEET 1

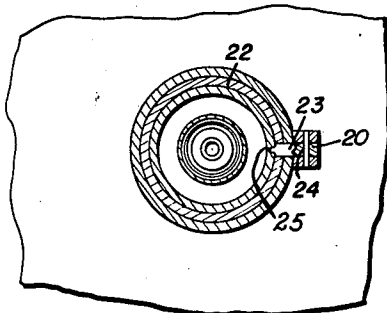
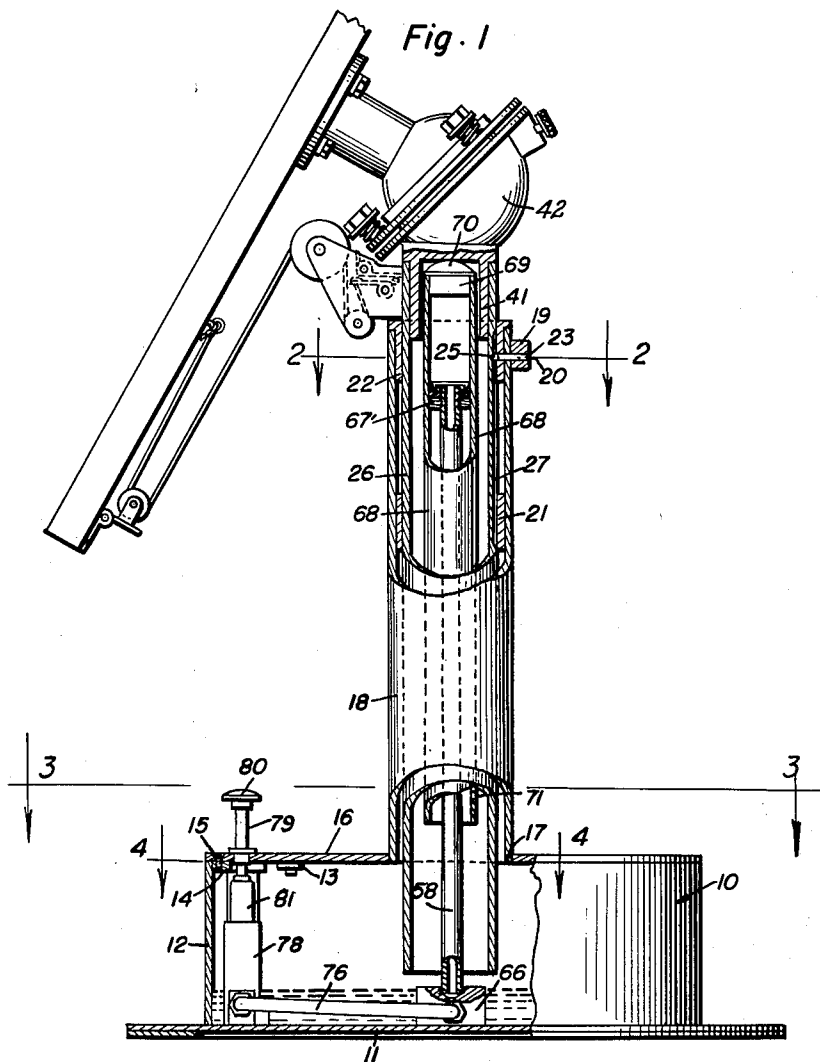


Fig. 2

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2 SHEETS—SHEET 2

Fig. 3

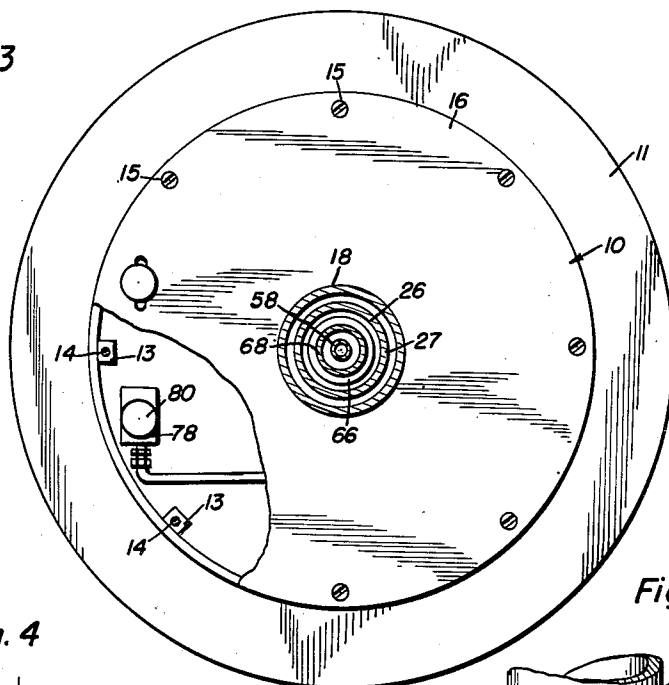


Fig. 5

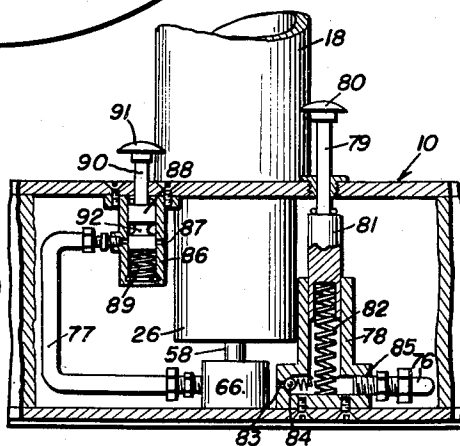


Fig. 4

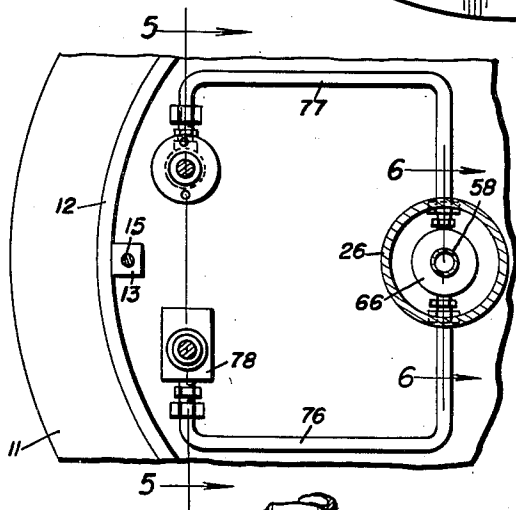
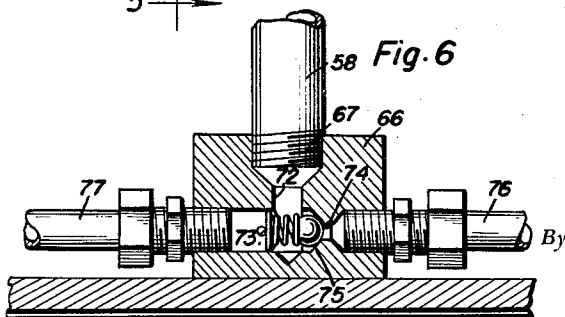


Fig. 6



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UNITED STATES PATENT OFFICE

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HYDRAULIC FLUID MOTOR LIFT
MECHANISM

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Original application March 31, 1949, Serial No. 84,582, now Patent No. 2,601,998, dated July 1, 1952. Divided and this application August 15, 1950, Serial No. 179,514

7 Claims. (Cl. 60—52)

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The present invention relates to improvements in hydraulic fluid motor lift mechanisms and is a divisional application of my co-pending application, Serial No. 84,582, filed March 31, 1949, now Patent No. 2,601,998, issued July 1, 1952. My invention relates more particularly to the type of mechanism which is well adapted to be employed with drafting tables and the like for elevating the same.

The primary object of the present invention is to provide a novel hydraulic fluid motor lift mechanism whereby adjustment in a vertical direction of various devices may be accomplished.

A further object of the present invention resides in the provision of means for raising and lowering objects which is highly efficient in operation, of durable construction and wherein simple means are provided for actuating the lift mechanism.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description.

The means by which the above objects of the invention may be accomplished includes a hollow base adapted to contain an incompressible liquid such as that employed in the conventional braking system of a motor vehicle, a tubular standard rising from the base and communicating with the interior thereof, a tubular column mounted to slide vertically in the standard, means carried by the upper end of the tubular column such as a table or similar object to be lifted, and lift means within the tubular column and engaging the underside of the object to be elevated along with the tubular column when fluid is forced from the base into the elevating means.

Other features include a pump mounted within the base and actuated from the exterior thereof for introducing fluid from the base into the elevating means, a valve connected with the elevating means and communicating with the interior of the base for returning the liquid pumped into the elevating means to the base when it is desired to lower the object supported thereby, and means operable through the hollow base for controlling the valve.

The best form in which I have contemplated applying my invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a side view of a table embodying the features of the present invention, certain portions being broken away to more clearly illustrate details of construction;

Figure 2 is a horizontal sectional view taken substantially along the line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view taken substantially along the line 3—3 of Figure 1;

Figure 4 is a horizontal sectional view taken

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substantially along the plane of line 4—4 of Figure 1;

Figure 5 is a vertical transverse sectional view taken substantially along the plane of line 5—5 of Figure 4; and

Figure 6 is a vertical transverse sectional view taken substantially along the plane of line 6—6 of Figure 4.

Referring more particularly to the drawings, wherein like numerals designate like parts throughout, the base is designated generally by the numeral 10 and comprises a bottom 11 which is preferably circular in shape and has welded or otherwise secured thereto an upwardly extending cylindrical wall 12 which lies concentric with relation to the outer edge of the bottom 11. This wall is provided adjacent its upper end with inwardly extending brackets 13 which are provided with internally screw threaded openings 14 for the reception of suitable attaching screws 15 by means of which a cover 16 of circular form is detachably connected to the upper edge of the cylindrical side wall 12. This cover 16 is provided with a centrally located concentric circular opening 17 which lies concentric with relation to the wall 12, and welded or otherwise fixed to the cover 16 in concentric relation in the opening 17 is a tubular standard 18 carrying adjacent its upper end an outwardly extending boss 19 having an opening 20 extending therethrough which also extends through the standard 18 as will be readily understood upon reference to Figure 1. Secured in any suitable manner within the standard 18 intermediate its ends is a guide sleeve 21, and fitted in the upper end of the standard 18 is a guide bushing 22 which is held in place by a radial pin 23, which as illustrated in Figures 1 and 2 projects through the opening 20, and is held therein by a cross pin 24. The inner end of the guide pin 23 projects beyond the inner wall of the bushing 22 and is flattened to form a rectangular guide member 25 by means of which the column to be more fully hereinafter described is held against turning within the standard 18.

Mounted for vertical sliding movement in the guide ring 21 and guide bushing 22 is a tubular column 26 which is provided with an elongated longitudinal groove 27 in which the guide member 25, previously referred to, is received. It will thus be seen that the tubular column 26 is mounted for vertical sliding movement within the tubular standard 18 and will form an effective guide for various means to be received thereon for lifting by the hydraulic fluid motor lift mechanism of the present invention. As here shown, and described in my said copending application, Serial No. 84,582, now Patent No. 2,601,998, a pedestal drafting table having a carrying socket and head are mounted on the tubular column 26 and within the tubular standard

18 which provides a lifting guide therefor. Inasmuch as the pedestal drafting table and universal ball socket joint therefor have been completely described in my copending application, above identified, further description thereof in this application is deemed unnecessary. It should be noted that there are other means that may be mounted on the upper end of the tubular column 26 for lifting thereby.

Welded or otherwise fixed to the bottom 11 of the base 10, and in axial alignment with the column 26, is a fitting 66 which is provided in its upper face with a vertically extending internally screw threaded bore 67 in which a vertical pipe 58 is threaded. This pipe extends upwardly within the column 26 to a point near the upper end thereof and supported on the pipe adjacent its upper end is a piston 67' of a conventional form. As illustrated in Figure 1, the upper end of the pipe opens through the upper end of the piston, and slidably fitted over the piston is an elevating cylinder 68, into the upper end of which is fitted an end closing plug 69 having a dome-shaped upper surface 70. The dome-shaped upper surface 70 engages the inner end of the axial bore in the neck 41 of the spherical socket 42. The plug 69 is secured in the upper end of the elevating cylinder 68 in such a manner as to form a fluid-tight joint so that fluid entering the cylinder through the pipe 58 and confined by the piston 67' will cause the cylinder 68 to rise upwardly, carrying with it any means supported on the tubular column 26.

A suitable by-pass port 71 is formed in the cylinder 68 adjacent its end remote from the plug 69 and serves to permit fluid entering the cylinder through the pipe 58 to escape and fall downwardly through the column 26 into the reservoir formed by the hollow base 10 (Figure 6). The inner end of the bore 67 communicates with a reduced bore 72 which opens into a transverse bore 73 formed in the fitting 66 which is interrupted intermediate its ends, and to one side of the bore 72, by an inwardly extending annular rib 74 forming a seat for a ball valve 75. A feed pipe 76 is coupled to the bore 73 to feed liquid into the bore on the side of the rib or seat 74 remote from the bore 72, and a discharge pipe 77 is coupled to the opposite end of the bore 73.

A suitable pump 78 is mounted on the bottom 11 within the base 10 and is provided with an actuating plunger 79 which projects upwardly through the top 16 of the base 10 and terminates in a head 80. The plunger 81 of the pump 78 is normally urged upwardly under the effort of a compression coil spring 82 contained within the pump and one port 83 of the pump 78 opens into the interior of the hollow base 10. A suitable ball valve 84 is mounted within the pump 78 near the port 83 to prevent fluid which has entered the pump with the up-stroke of the piston 81 from falling back into the base 10 when the plunger 81 is moved downwardly against the effort of the spring 82. The opposite port 85 of the pump 78 is connected to the feed pipe 76 so that by reciprocating the plunger 81 in the pump 78, liquid contained within the hollow base 10 will be expelled by the pump through the pipe 76 and into the pipe 58 past the ball valve 75.

It will thus be seen that by manipulating the pump, liquid pressure may be developed within the cylinder 68 above the piston 67', to cause the cylinder to move upwardly and carry therewith the means supported on the column 26, the latter serving as a guide within the guide ring

21 and guide bushing 22 of the standard 18 to hold the parts in vertical position.

Fitted to the inner surface of the top 16 of the hollow base 10 and near the pump 78, is a valve cylinder 86 (Figure 5) having opening therein a pair of diametrically opposed ports 87, one of which is coupled through the medium of a discharge pipe 77 with the pipe 58. A plunger 88 is mounted to slide within the cylinder 87 and is yieldingly held upwardly under the influence of a compression spring 89. The upper end of the plunger is provided with a shank 90 which projects upwardly through the top 16 of the base 10 and is equipped with a suitable head 91 by which the plunger 88 may be moved downwardly against the effort of the spring 89. Formed in the plunger 88 intermediate its ends is an annular groove 92 which, when the plunger is depressed, aligns with the ports 87 to establish communication between the pipe 58 and the interior of the hollow base 10.

It will thus be seen that liquid which has been pumped into the cylinder 68 may be discharged therefrom through the pipe 58, passages 72 and 73, pipe 77 and ports 87 into the interior of the hollow base 10, for re-use in elevating the cylinder 68 and its attendant mechanism.

When the hydraulic fluid lifting mechanism of the present invention is employed in conjunction with a pedestal drafting table as shown, the device may be transported with the liquid in a container separate from the base 10, and upon arriving at the place of use, one of the screws 15 may be removed and the liquid may then be introduced into the hollow base through the screw hole 14 after which the screw is replaced. Upon introducing the desired quantity of liquid in the hollow base 10, the top 16 is replaced and upon reciprocating the pump plunger 81, it will be evident that fluid will be extracted from the hollow base 10 and forced upwardly through the pipe 58 into the cylinder 68 above the piston 67'. Upon attaining the desired height, further pumping is ceased and the fluid will be held in the cylinder until such time as the valve plunger 88 is depressed to align the groove 92 with the ports 87. Upon so aligning the groove, the fluid which has been pumped into the cylinder 68 will flow backwardly through the pipe 58 and into the hollow base 10.

Inasmuch as the hollow base 10 serves as the reservoir for the elevating fluid for lifting table tops and other similar means, it will be evident that the fluid serves as a ballast in weighting the base and thereby steadying the table or the like when such is in use.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure by use of mechanical equivalents which may be reasonably included within their scope without sacrificing any of the advantages thereof.

Having described the invention, what is claimed as new is:

1. A fluid motor lift mechanism comprising a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member engaged in and closing the upper end of said column, a pipe 75 mounted on the base and extending upwardly

therefrom within the column, a piston carried by the pipe within the column, a cylinder slidably mounted on the piston and disposed within the column to move vertically on said piston, a head closing the cylinder, said member being removably seated on said head, and manually controlled means within the base and connected to the pipe to force liquid into the cylinder above the piston and elevate the cylinder.

2. A fluid motor lift mechanism comprising a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member received in and closing the upper end of said standard, a pipe mounted in the base and extending upwardly therefrom within the column, a piston carried by the pipe within the column, a cylinder slidably mounted on the piston and disposed axially of and within the column to move vertically on said piston, a head closing the cylinder and engaging said member, manually controlled means within the base and connected to the pipe to force liquid into the cylinder above the piston and elevate the cylinder, and said cylinder having a by-pass opening therein in vertically spaced relation to the head to return liquid to the base when a predetermined height above the base has been attained.

3. A fluid motor lift mechanism comprising a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member supported by and closing the upper end of said column, a pipe mounted in the base and extending upwardly therefrom within the column, a piston carried by the pipe within the column, a cylinder mounted on the piston within the column to move vertically on said piston, a head closing the cylinder, said member being seated on said head, manually controlled means within the base and connected to the pipe to force liquid into the cylinder above the piston and elevate the cylinder, and a manually controlled valve within the base and connected to the pipe to drain liquid from the cylinder and return it to the base.

4. A fluid motor lift mechanism comprising a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member supported by and closing the upper end of said column, a pipe mounted in the base and extending upwardly therefrom within the column, a piston carried by the pipe within the column, a cylinder mounted on the piston within the column to move vertically on said piston, a head closing the cylinder, said member being removably seated on said head, manually controlled means within the base and connected to the pipe to force liquid into the cylinder above the piston and elevate the cylinder, said cylinder having a by-pass opening therein in vertically spaced relation to the head to return liquid to the base when a predetermined height above the base has been attained, and a

manually controlled valve within the base and connected to the pipe to drain liquid from the cylinder and return it to the base.

5. A fluid motor lift mechanism comprising a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member supported by and closing the upper end of said column, a pipe mounted in the base and extending upwardly therefrom within the column, a piston carried by the pipe within the column, a cylinder mounted on the piston within the column to move vertically on said piston, a head closing the cylinder, said member being removably seated on said head, a manually actuated pump within the base and connected to the pipe to force liquid from the base and through the pipe into the cylinder to elevate the cylinder.

6. A fluid motor lift mechanism comprising a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member supported by and closing the upper end of said column, a pipe mounted in the base and extending upwardly therefrom within the column, a piston carried by the pipe within the column, a cylinder mounted on the piston within the column to move vertically on said piston, a head closing the cylinder, said member being removably seated on said head, a manually actuated pump within the base and connected to the pipe to force liquid from the base and through the pipe into the cylinder to elevate the cylinder, and manually controlled valve within the base and connected to the pipe to drain liquid from the cylinder.

7. In a device of the type described, a hollow base forming a reservoir for a substantially incompressible liquid, said base having an aperture opening through its top, a tubular standard carried by the base and rising vertically therefrom in axial alignment with the aperture, a tubular column mounted in the standard to slide vertically therein, a member supported by and closing the upper end of said column, a pipe mounted in the base and extending upwardly therefrom within the column, a piston carried by the pipe within the column, a cylinder mounted on the piston within the column to move vertically on said piston, a head closing the cylinder, said member being removably seated on said head, a manually actuated pump within the base and connected to the pipe to force liquid from the base and through the pipe into the cylinder to elevate the cylinder, and said cylinder having a by-pass opening remote from the head to drain liquid from the cylinder and return it to the base when a predetermined height above the base has been attained.

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