

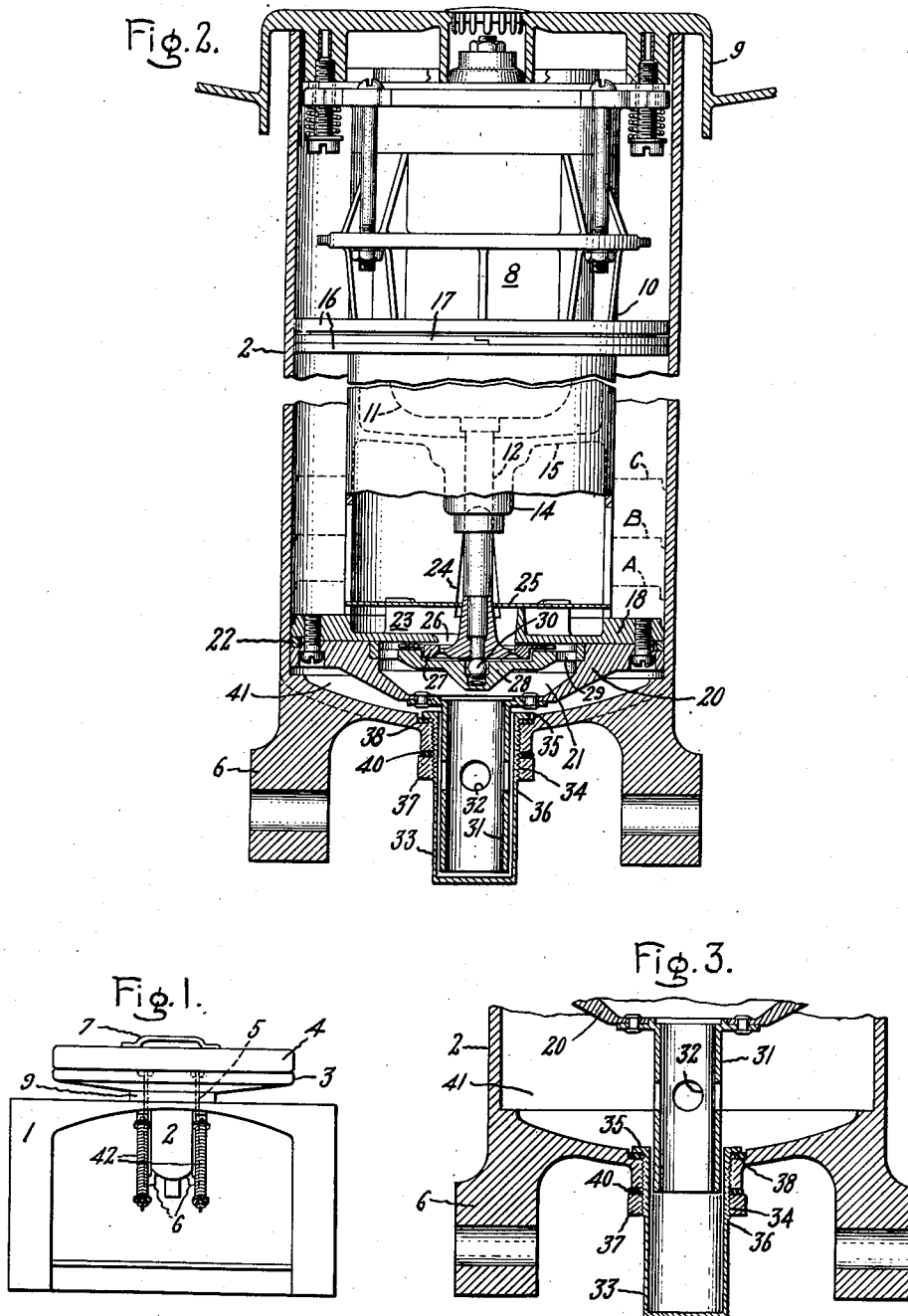
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HYDRAULIC POWER UNIT FOR DOMESTIC IRONING MACHINES

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HYDRAULIC POWER UNIT FOR DOMESTIC IRONING MACHINES

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This invention relates to improvements in hydraulic power units for domestic ironing machines of the type described and claimed in the Wardwell, Jr. Patent No. 2,135,266 granted November 1, 1938, for "Ironing Press."

A commercially well-known ironing press of the domestic type disclosed therein has a padded buck on which the clothes are placed, and a heated shoe to be brought into ironing position by the operator. By means including a cylinder fixed relative to the ironing table and containing a piston and therewith combined motor-driven impeller to generate fluid pressure within the cylinder, the buck is automatically driven upwardly to press the article against the shoe. In practice, the buck is fixed to an end of the piston to be directly propelled thereby, but such arrangement is discretionary; any means whereby movement of the piston is translated into movement of the buck, or conjoint movement of the buck and shoe, may be employed.

It is desirable to have the buck move into and out of operating position relatively rapidly; but an immediate fast upward movement of the buck gives rise to structural problems concerned with the inertia of the heavy buck, among others, and the possibility that an inexperienced or careless operator may get her fingers caught between the buck and shoe. Accordingly, I propose to provide means effective to elevate the buck relatively slowly during the first part of its movement and then automatically to accelerate it to close rapidly against the shoe. In a presently preferred form of the invention I provide the cylinder with a well extending concentrically from an end wall thereof, and affixed to the end of the piston, in communication with the discharge of the impeller, a sleeve member which telescopes into said well, there being sufficient clearance between the walls of the sleeve and the well to provide a restricted flow passage. The sleeve has one or more relatively large ports through its wall near the distal end. During the initial operation of the impeller the fluid discharges from the sleeve into the well and passes along the clearance therebetween to enter the cylinder for propulsion of the piston. Because of the restricted flow, the piston movement will be slow until the sleeve ports emerge from the well, whereupon the greatly increased liquid flow into the cylinder accelerates the rise of the piston. The ports may be disposed along the sleeve according to the proportion of the total piston movement which is to be at increased speed.

Further features and advantages of the inven-

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tion will be apparent from the following detailed description read in conjunction with the accompanying drawing, in which Fig. 1 is a front elevation of a typical ironing machine; Fig. 2 is a sectional elevation taken through the power unit and showing the combined piston and impeller means therein in home position, and Fig. 3 is a view of the lower portion of Fig. 2 on an enlarged scale and showing the upper extreme of movement of the piston.

Referring now to Fig. 1, an ironing machine of the general type shown in said Wardwell Patent No. 2,135,266 includes a table 1 having affixed thereto by any suitable means (not shown) a power cylinder 2. Carried by piston means within said power cylinder is a buck 3 for cooperation with a heated shoe 4 carried by arm means 5 pivotally mounted on lugs 6 formed integral with the cylinder to be drawn from a retracted position clear of the buck surface to the illustrated operating position above the buck. Accordingly, the shoe is provided with any suitable handle 7 which the operator may grasp to draw the shoe forwardly to the said operating position.

As shown in Fig. 2, the cylinder 2 contains a combined piston and impeller 8 to the upper end of which is affixed a collar 9 forming a part of means for carrying the buck 3. The weight of the buck, supplemented if necessary by springs or equivalent (not shown), returns the piston after each operation to the home position of Fig. 2, in which the buck is at its lowest point relative to the surface of the table 1.

The piston comprises a sealed upper compartment 10 within which is an electric motor 11 having a shaft 12 which passes through the bearing 14 extending from a web 15 defining the lower wall of said compartment. Motor leads (not shown) are brought out through the cylinder wall as desired. Suitable flange means 16 provide for the reception of a piston ring 17. The lower end of casing 10 suitably secures to a flange 18 to which is affixed a dished cover plate 20 which provides the piston head and affords a chamber 21 into which the impeller discharges as later described. Between said flange and the piston head 20 is disposed a second piston ring 22.

The cylinder is filled with liquid, preferably a light oil, to a level immediately below flange 16. The cylinder thus affords a reservoir of liquid to be fed to an impeller 23 through side wall slots 24, a suitably apertured screen plate 25 and an inflow port 26. The impeller rotor 27 is affixed to the end of the motor shaft 12 to be driven thereby. The cover plate 28 completes

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the pump chamber; and oil under pressure is discharged therefrom into the chamber 21 through the plurality of openings 29. The rotor 27 may advantageously be supported relative to the cover 28 by a spring pressed, ball thrust bearing 30.

The above construction, except for the piston head 20, is substantially as disclosed in detail in the said Wardwell patent. According to the present invention I affix to the piston head 20 a tubular sleeve 31 provided with a plurality of ports 32. Circular ports are merely by way of illustration; they may be of any desired shape. There may be four such ports arranged relative to the distal end of the sleeve 31 according to the desired acceleration of the piston as later described. For cooperation with said sleeve I employ a well 33 which may be affixed in any suitable fashion to the bottom of the cylinder 2 for telescoping relation with the sleeve 31. For example, I may provide said well with a threaded portion 34 extending from beneath a flanged end 35; the unthreaded remainder 36 has an outside diameter suitably less than the root diameter of the threading to permit the well to be passed through the cylinder 2 from the interior thereof and to permit the use of a lock nut 37 firmly to secure the well structure in leak-tight relation with respect to the cylinder. I may use suitable gaskets 38, 40 as desired.

As is more fully explained in said Wardwell patent the motor 11 is operated by the closing of a switch in a suitable circuit; for example, a switch associated with the shoe to be closed as the shoe comes into operating position. The motor driven impeller thus pumps liquid from the cylinder and discharges it through the openings 29 into the chamber 21 whence it flows into the sleeve 31, passing from the bottom of said sleeve and the ports thereof into the small clearance space between the sleeve and the well 33. Initially, therefore, the resistance to the flow of oil along the clearance space and into the cylinder space 41 slows the oil flow and causes the piston to rise slowly. However, as the piston rises and the ports 32 commence to emerge from the well, the rate of oil flow increases nonlinearly until at Fig. 3, where the ports have cleared the well, substantially unrestricted flow of liquid into the chamber 41 occurs and the piston is rapidly propelled. Piston movement is therefore characterized by slow initial movement and then increasing acceleration to final maximum speed. To illustrate a typical rate of movement, I have shown in Fig. 2 dotted line outlines of the upper surface of the flange 18. The piston rises at one rate from home position to level A, then faster to B, and finally, to the upper limit C, the spacing between said levels representing identical time intervals. Thus, piston movement is with a minimum of structural shock, and although the total elapsed time of piston travel is relatively short, the operator is not conscious of a sharp rise.

At the end of the pressing operation the operator returns the shoe 4 to its retracted position, said operation being assisted by suitable counterbalance springs 42. By any appropriate means, such as the shoe-controlled switch of Wardwell, the motor is stopped and the piston returns to its home position, dropping through the liquid

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beneath it. Here, also, the ports 32 provide an immediate free path of return of the liquid from the chamber 41 through chamber 21 and ports 29 to the impeller housing whence it returns to the reservoir. As the ports 32 drop below the surface of the well 33, however, the passage restriction becomes effective and the final movement of the piston and back to home position is cushioned against shock by reason of the resistance to liquid flow.

It will be immediately apparent to those skilled in the art that substantially the same effect may be obtained by shortening the sleeve 31 so that it leaves the well at the selected intermediate stage of piston travel. However, the desideratum of rather close spacing between the sleeve and the well introduces alignment problems which would complicate such an arrangement. Accordingly, I prefer to utilize the device of maintaining the telescoping relationship of the sleeve and well.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a hydraulic power unit comprising a cylinder, a piston within said cylinder, and means for supplying liquid under pressure to said cylinder, the improvement comprising a well fixed to and extending from a wall of said cylinder in communication therewith, and a tubular sleeve fixed to and extending from said piston, the interior of said sleeve communicating with the liquid supply means and having an outflow port in its wall, said sleeve telescoping within said well with a small, but finite, clearance therebetween for the passage of liquid from said port to said cylinder; the length of said well and sleeve being such relative to piston travel that telescoping relation is maintained until at a predetermined point of travel said outflow port emerges from said well to permit greatly increased discharge of liquid under pressure into said cylinder to perform work on said piston.

2. The improvement in hydraulic power units according to claim 1, in which said well is concentric with the piston.

3. The improvement in hydraulic power units according to claim 1, in which said sleeve is unitary with the piston head.

4. The improvement in hydraulic power units according to claim 1, in which the piston includes a concave head-forming member providing a chamber into which said liquid supply means directly discharges, said head-forming member serving also as a support means for said sleeve.

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