Oct. 20, 1942. E. M. PFAUSER 2,299,492

PUMP ASSEMBLY

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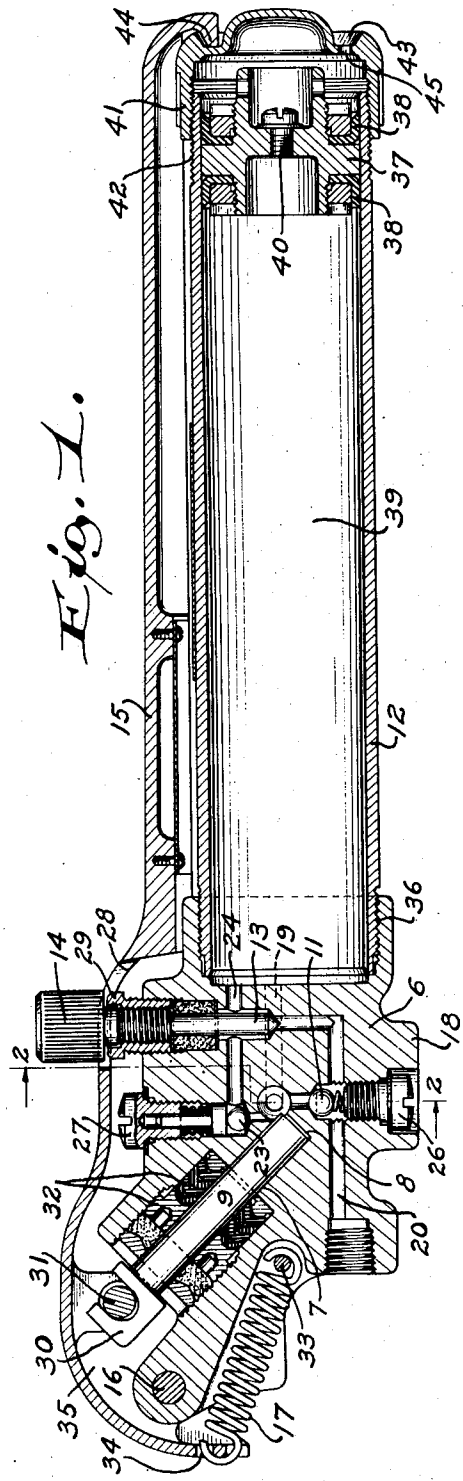

Fig. 1.

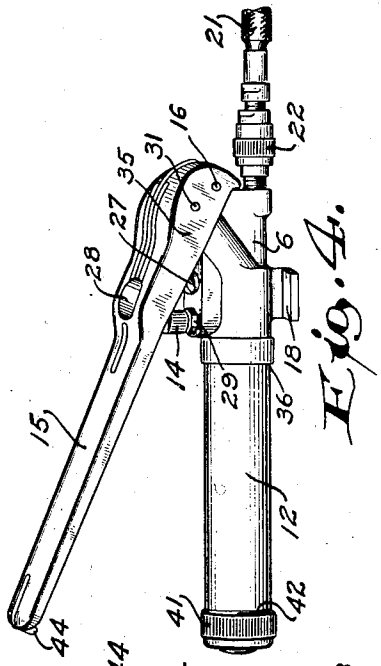

Fig. 4.

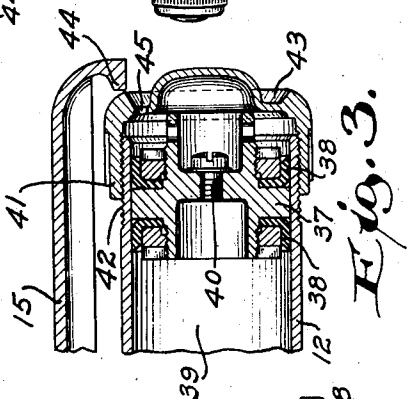

Fig. 3.

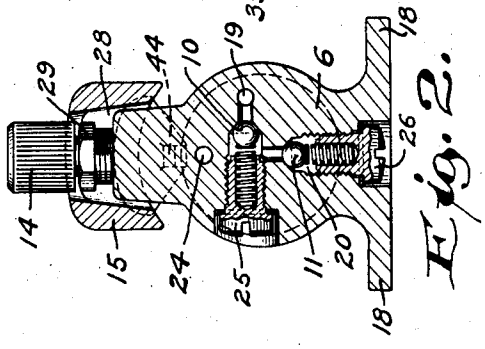

Fig. 2.

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PUMP ASSEMBLY

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15 Claims. (Cl. 103—41)

The present invention relates in general to improvements in pump assemblages, and relates more specifically to various improvements in the construction and operation of relatively compact but powerful manually operable pumps of the general type shown and described in my prior Patent No. 2,165,504, granted July 11, 1939, and which are especially useful in effecting operation and manipulation of metal bending machines or tools of various kinds.

An object of my present invention is to provide an improved pump assembly which is simple in construction and efficient in operation.

As disclosed in my prior patent above identified, it has heretofore been proposed to utilize hydraulic power for various purposes such as repairing damaged automobile parts or the like; and the requisite power may be generated with the aid of a manually operated hydraulic pump adapted to deliver liquid through a flexible conduit or hose, to a ram or jack coacting either directly with the work, or indirectly therewith through diverse types of ram attachments. While relatively large portable pumps and rams may be utilized for most classes of work, where the available space is not undesirably restricted and the operator is free to use both hands in order to manipulate the pump; it frequently happens that the available working space is extremely limited, and that the operator is obligated to utilize one hand for positioning and holding the work engaging tool thereby leaving only the other hand free for manipulation of the pump. Then too, such equipment is used extensively in garages and other places where it is subject to rough usage, and since the pumping unit must necessarily be provided with relatively delicate valves and control elements, it is desirable to protect these parts as much as possible against damage or breakage due to abuse. If the size of the pump assembly is materially reduced, the power available must still be maintained at a maximum; and in order to permit convenient carrying of these pump units it is also desirable to have them constructed so that they may be collapsed and locked in compact condition.

It is therefore a more specific object of the present invention to provide an improved hydraulic pump unit which is extremely compact in structure but powerful in action.

Another specific object of the invention is to provide a new and useful manually operable hydraulic pump which is adapted to be manipulated with one hand on the order of a pair of pliers or tongs.

A further specific object of my invention is to provide an improved relatively powerful pump assembly which can be conveniently operated in extremely cramped quarters, and which is adapted to be carried in an ordinary coat pocket or the like.

Still another specific object of my present invention is to provide an improved hydraulic pump assemblage having a self-contained liquid supply reservoir, and which is adapted to be compactly collapsed into inactive position and locked in such condition.

An additional specific object of this invention is to provide an improved hydraulic pump structure which is manually operable with least effort, and wherein relatively delicate parts are amply concealed and protected.

Another specific object of the invention is to provide an improved portable pump unit capable of being operated in any position, which is extremely neat and attractive in appearance, and which can be manufactured and sold at moderate cost.

A further specific object of my invention is to provide an improved lever actuated hydraulic pump in which the actuating force is most effectively applied, and which can be safely operated by a novice.

These and other specific objects of the present invention will be apparent from the following detailed description.

A clear conception of the several features constituting my present improvement, and of the mode of constructing and of manipulating hydraulic pumps embodying the invention, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a central longitudinal vertical section through one of my improved manually operable hydraulic pump units, showing the actuating handles locked in inactive position;

Fig. 2 is a transverse vertical section through the pump unit of Fig. 1, taken along the irregular line 2—2 of Fig. 1.

Fig. 3 is a fragmentary section through the rear ends of the manipulating handles, showing the same released for action; and

Fig. 4 is a reversed perspective view of the pump assemblage, drawn to a reduced scale, and showing the actuating levers released for action.

While the several improved features have been shown and described as being specifically embodied in a pocket-size manually operable port-

able handle-actuated hydraulic pump assemblage especially cooperable with a hydraulic ram, it is not my intent or desire to thereby unnecessarily restrict the scope of the invention or the adaptation of these features to other types of pumps.

Referring to the drawing, the improved hydraulic pump unit comprises in general, a main pump casing 6 having a bore 7 therein forming a liquid displacement chamber 8; a piston or plunger 9 reciprocable within the casing bore 7 to introduce liquid into the chamber 8 past a suction valve 10, and to deliver the liquid from said chamber past a discharge valve 11; an elongated tubular liquid supply reservoir 12 communicable with the valve 10 and chamber 8, and projecting away from the casing 6 to provide one actuating handle for the pump; a release or by-pass valve 13 operable by means of a handle or knob 14 disposed externally of the casing 6, to permit return of liquid to the reservoir 12 around the pump displacement chamber 8; a lever 15 swingably suspended from the main casing 6 by means of a pivot pin 16, and extending across the top of the plunger 9 and in the same general direction as the reservoir 12 to provide another actuating handle for the pump swingable toward and away from the reservoir handle; one or more tension springs 17 connecting the forward end of the lever 15 with the casing 6 so as to constantly urge the lever handle away from the reservoir handle; and means associated with the corresponding ends of the reservoir 12 and lever 15 remote from the casing 6, for detachably locking the handles in inactive position.

The main pump casing 6 may be provided with lower supports or feet 18, as shown in Figs. 2 and 4. The suction valve 10 is located in a conduit 19 formed in the casing 6 and communicating with the liquid supply reservoir 12; while the discharge valve 11 is located in the medial portion of a conduit 20, one end of which is communicable with a ram or other pressure operated device through a flexible hose 21 and coupling 22, shown in Fig. 4, and the opposite end of which is communicable past the manual release valve 13 with the reservoir 12, as shown in Fig. 1. A safety valve 23 located in a conduit 24 which is communicable with the reservoir 12, may also be provided, and all of the automatic valves 10, 11, 23 may be of the ball type normally urged toward their seats by compression springs as shown. The suction valve 10 is accessible by means of a removable plug 25, while the discharge valve 11 is likewise accessible by means of another removable plug 26; and the tension or pressure at which the safety valve 23 will act, is adjustable by means of shim washers of proper thickness coacting with a screw plug 27 which also serves to permit access to this valve. The by-pass or release valve 13, is the only manually controlled valve of the group, and is readily manipulable with the aid of the knob 14 which is adapted to project through a central opening 28 formed in the pump actuating lever 15. The medial portion of the stem of the valve 13 has adjustable screw thread coaction with an adjustable packing sleeve 29 carried by the casing 6, and this sleeve 29 as well as the knob 14 and adjusting plug 27 are protected by the handle lever 15 which extends thereover.

The common axis of the bore 7 and plunger 9, is preferably disposed at an oblique angle relative to the longitudinal central axis of the tubular handle reservoir 15 as shown in Fig. 1, and while the lower end of the plunger 9 coacts with the displacement chamber 8, the upper end thereof is provided with a bifurcated head 30 which slidably engages a pin 31 carried by the lever 15 close to the lever pivot 16. With this arrangement, the leverage available for actuation of the plunger 9 is increased to a maximum, and the plunger 9 is embraced by a suitable packing 32 so as to prevent leakage of liquid therealong. The tension springs 17 are secured at one end to the main casing 6 by means of a pin 33 and have their opposite end hooked through openings 34 in the extreme forward end of the lever 15; and the portion of the lever 15 adjacent to the pump, is widened and provided with opposite side walls 35 thus forming a hood which conceals and protects the hidden parts.

The tubular liquid supply reservoir 12 may be formed of a piece of pipe of suitable length and is rigidly secured to the end of the main casing 6 remote from the pivot pin 16 and springs 17 in any suitable manner, as by means of brazing, shrink fitting, or screw threads 36, see Fig. 1. The interior of the reservoir 12 is provided with a freely slidable piston or division wall 37 provided with opposed cup-shaped packings 38, and the reservoir chamber 39 on the pump side of this movable partition wall 37 is in constant communication with the suction and release conduits 19, 24 and is normally completely filled with liquid such as oil. The opposite side of the liquid confining wall 37 is constantly exposed to the atmosphere, and a removable screw 40 disposed centrally of the wall 37 serves to effect venting of the chamber 39 and introduction of the liquid supply. With this assemblage, atmospheric pressure will constantly urge the wall 37 toward the pump, so that when liquid is withdrawn from the chamber 39 past the suction valve 10 the piston wall 37 will move toward the casing 6, whereas return of liquid to the chamber 39 past the release valve 13 will cause the wall to move away from the pump.

The improved means for locking the lever 15 in inactive position as shown in Fig. 1, comprises a closure cap 41 coacting with screw threads 42 formed on the free end of the reservoir 12 remote from the casing 6, and having an annular groove 43 therein adapted to receive a lug 44 formed integral with the corresponding end of the lever 15. The reservoir closure cap 41 is also provided with one or more vent openings 45 for permitting air to enter the space within the reservoir 12 on the outer side of the wall 37, and the periphery of the cap 41 is preferably knurled or otherwise roughened so as to facilitate rotation thereof. When the cap 41 is positioned as shown in Fig. 3, the pump actuating lever 15 is free to be oscillated toward and away from the reservoir 12, but if the lever 15 is pressed down and the cap 41 is screwed outwardly so that the lever lug 44 becomes confined within the cap recess or groove 43 as shown in Fig. 1, then the lever 15 will be locked in inactive position and the pump assemblage will assume its most compact form.

While the normal operation and use of the improved pump assembly should be apparent from the foregoing description of its construction, a short résumé thereof will be given. In order to place the pump in condition for operation, it is only necessary to rotate the cap 41 at the end of the reservoir handle, to cause the same to move along the screw threads 42 from the position shown in Fig. 1 to that shown in Fig. 3; and as soon as the locking lug 44 is released, the springs 17 will become effective to swing the lever

15 away from the reservoir 12 to the position shown in Fig. 4. Liquid may then be pumped from the reservoir chamber 39 to the work, by closing the release valve 13 and manipulating the lever and reservoir handles in the manner of a pair of plier or tong handles, and this operation may be effected with one hand since the spring or springs 17 will always tend to separate the handles whenever the collapsing pressure exerted by the operator's hand is released. The oscillation of the lever 15 will reciprocate the pump plunger 9, which during its outward or suction stroke will withdraw liquid from the supply chamber 39 past the suction valve 10, and during its inward or delivery stroke will force liquid from the displacement chamber 8 past the discharge valve 11 into the conduit 20. From the conduit 20, the liquid will flow under pressure through the coupling 22 and hose 21 to the ram or other hydraulically actuated apparatus, and this apparatus is ordinarily provided with means for urging the liquid back toward the pump when the work has been performed. Upon such completion of the work, relative oscillation of the handles may be discontinued, and the by-pass or release valve 13 may be opened by turning the knob 14. Liquid under pressure from within the hose 21 and conduit 20 will then be free to flow around the pump and directly into the reservoir chamber 39 through the conduit 24; and in the event that the pressure created in the chamber 8 should exceed the setting of the safety valve 23, then liquid will also be returned through the conduit 24 directly to the supply reservoir. As previously indicated, the piston wall 37 within the reservoir 12 will float to accommodate the withdrawal and return of liquid from and to the reservoir chamber 39, and when the pump is no longer in use, the lever 15 may be locked in inactive position with the aid of the cap 41 as shown in Fig. 1.

From the foregoing detailed description it will be apparent that the present invention provides an improved pump assembly which is extremely simple and durable in construction, and which is moreover highly efficient and flexible in use. The improved assemblage is very compact but powerful in action, by virtue of the specific construction and formation of the lever 15, and the inclined disposition of the pump plunger 9, whereby the pins 16, 31 may be located closely adjacent to each other. The formation of this handle lever 15 also insures maximum protection of the relatively delicate working parts, and furthermore protects the release valve knob 14 which while being completely surrounded by the lever, is still conveniently manipulable irrespective of the position of the pump actuating handle. The improved assemblage for locking the lever 15 in collapsed or inactive position, makes it possible to readily transport and store the pump assemblage in minimum space, and the use of the spring or springs 17 facilitates manipulation of the pump and permits operation with one hand. The new pump assemblage can obviously be conveniently operated in relatively cramped quarters, and the reservoir assemblage performs the dual function of storing the necessary supply of liquid and of facilitating ready operation of the pump assembly. The improvement has proven highly successful in actual commercial use, especially for the purpose of actuating a ram or similar device provided with means for returning the liquid under pressure after the work has been performed. The assemblage can be manufactured at moderate cost, and obviously presents a neat and attractive appearance besides possessing considerable utility.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of use, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. In combination, a pump casing having a displacement chamber therein, a displacement member reciprocable in said chamber, an elongated supply reservoir projecting from said casing and being communicable with said chamber, a pump displacement member actuating lever pivotally attached to said casing and extending in the same general direction as said reservoir to urge said member in one direction, and means constantly tending to urge said lever away from said reservoir.

2. In combination, a pump casing having a bore, a displacement plunger reciprocable in said bore, an elongated tubular supply reservoir projecting from said casing and being communicable with said bore, a pump plunger actuating lever pivotally associated with said casing and extending across said plunger in the same general direction as said reservoir, said lever being swingable toward said reservoir to urge said plunger into said bore, and resilient means coacting with said lever to constantly urge the same away from said reservoir.

3. In combination, a pump casing having a bore, a displacement plunger reciprocable in said bore, an elongated tubular supply reservoir forming an actuating handle rigidly attached to and projecting laterally from one side of said casing, a pump plunger actuating lever pivotally associated with the opposite side of said casing and forming another actuating handle extending across an end of said plunger in the same general direction as said reservoir, said lever being swingable toward said reservoir to move said plunger in one direction within said bore, and a spring coacting with said lever to constantly urge the same away from said reservoir and said plunger in the opposite direction.

4. In combination, a pump having a reciprocable displacement plunger, an elongated tubular supply reservoir rigidly secured to and projecting laterally away from said pump, a pump plunger actuating lever pivotally associated with said pump and coacting with said plunger to move the same, said lever extending in the same general direction as said reservoir and cooperating therewith to provide a pair of plier handles manipulable with one hand, means coacting with said lever and constantly urging the same away from said reservoir, and means for detachably interconnecting the free ends of said handles to lock said lever in a position closely adjoining said reservoir.

5. In combination, a pump having a reciprocable displacement plunger, an elongated tubular supply reservoir rigidly secured to and projecting laterally away from said pump, a pump plunger actuating lever pivotally associated with said pump and coacting with said plunger to move the same, said lever extending in the same general direction as said reservoir and cooperating therewith to provide a pair of plier handles manipulable with one hand, means coacting with said lever and constantly urging the same away from said reservoir, and a closure cap adjusta-

bly associated with the free end of said reservoir and being cooperable with the corresponding end of said lever to lock said handles in inactive position.

6. In combination, a pump having a displacement plunger, an elongated tubular liquid supply reservoir forming an actuating handle for said pump, a plunger actuating lever pivotally associated with said pump and forming a second actuating handle therefor, said handles extending in the same general direction and being relatively oscillatable with one hand, and a closure cap for said reservoir movable along the latter and being co-operable with said second handle to lock said handles to each other.

7. In combination, a pump having a displacement plunger, an elongated tubular liquid supply reservoir forming an actuating handle for said pump, a plunger actuating lever pivotally associated with said pump and forming another actuating handle therefor, said handles extending in the same general direction and being relatively oscillatable with one hand, and an end closure cap for said reservoir having an annular groove cooperable with a lug on the corresponding end of said lever to lock said handles in inactive position.

8. In combination, a pump casing having a displacement chamber, an elongated tubular reservoir secured to said casing and being communicable with said chamber, a plunger movable in said casing at an oblique angle relative to the axis of said reservoir, and a lever pivotally suspended from said casing and cooperating with said reservoir to provide a pair of handles operable with one hand to actuate said plunger, said lever being operatively connected to said plunger.

9. In combination, a pump having a displacement plunger, an elongated tubular liquid supply reservoir secured to said pump, a release valve mechanism for by-passing liquid to said reservoir around said plunger and projecting externally of said casing, and an actuating lever for said plunger extending in the same general direction as and foldable over said reservoir and having portions surrounding said projecting release valve mechanism.

10. In combination, a pump having a displacement plunger and externally manipulable means for by-passing liquid around the plunger, a tubular reservoir forming a handle for manipulating the pump, and a lever forming another handle for effecting actuation of said plunger with one hand, said lever being formed to conceal said plunger and to protect said by-pass means.

11. In combination, a pump having a displacement plunger and a valve provided with an externally manipulable knob for by-passing liquid around the plunger, and a lever for actuating said plunger, said lever being foldable over said pump and having a central opening therein for receiving and protecting said knob.

12. In combination, a pump having a displacement plunger and a valve provided with an externally manipulable knob for by-passing liquid around the plunger, and a lever swingable toward and away from said pump to actuate said plunger, said lever having an opening therethrough for receiving and protecting said knob and the latter being manipulable with the lever in either extreme position.

13. In combination, a pump casing having a tubular liquid supply reservoir projecting laterally therefrom and being provided with a displacement bore extending at an oblique angle away from the reservoir axis, a plunger reciprocable in said bore, and a plunger actuating lever pivotally associated with said casing near the outer end of said plunger and cooperating with said reservoir to provide cooperating pump actuating handles operable with one hand.

14. In combination, a pump casing having a tubular liquid supply reservoir projecting laterally away from one side of the central casing axis and being provided with a bore extending at an oblique angle in the opposite direction away from the point of intersection of said casing and reservoir axes, a displacement plunger reciprocable in said bore and having a bifurcated end head disposed externally of the casing, and a plunger actuating lever pivotally suspended from said casing closely adjacent to said plunger head and being operatively connected to the bifurcation thereof, said lever extending across said plunger and cooperating with said reservoir to provide a pair of plier pump actuating handles operable with one hand.

15. In combination, a pump casing having a tubular liquid supply reservoir projecting laterally away from one side of the central casing axis and being provided with a bore extending at an oblique angle in the opposite direction away from the point of intersection of said casing and reservoir axes, a displacement plunger reciprocable in said bore and having a bifurcated end head disposed externally of the casing, a plunger actuating lever pivotally suspended from said casing closely adjacent to said plunger head and being operatively connected to the bifurcation thereof, said lever extending across said plunger and cooperating with said reservoir to provide a pair of plier pump actuating handles operable with one hand, and a tension spring connecting said casing with the extreme end of said lever adjacent to its suspension pivot.

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