

May 9, 1944.

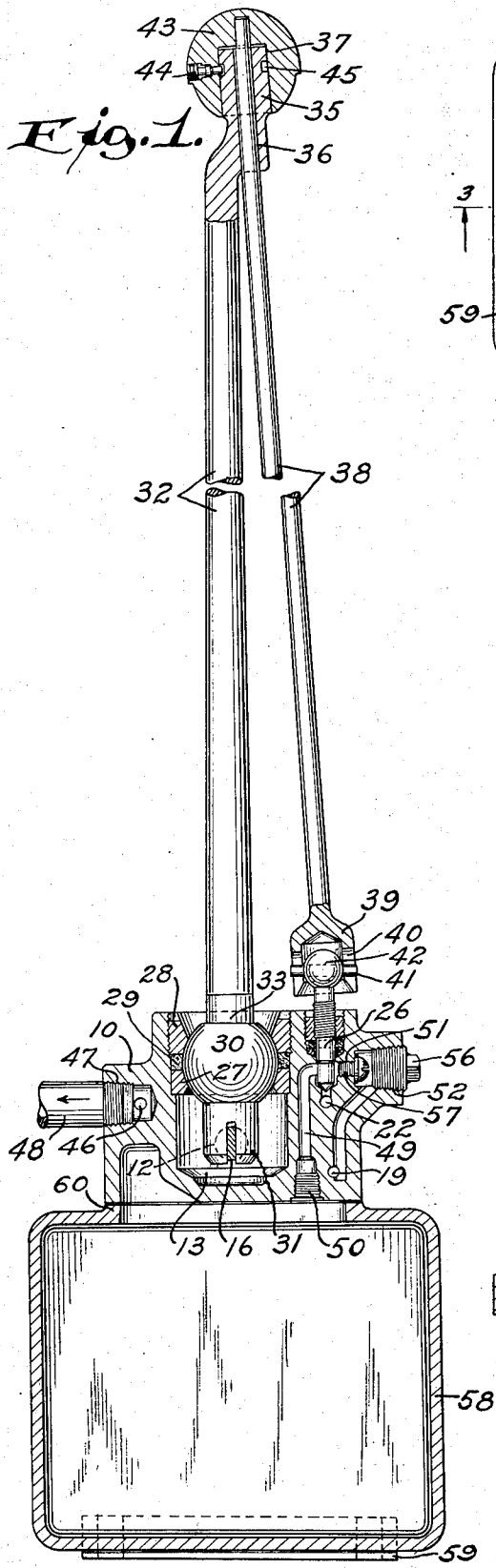
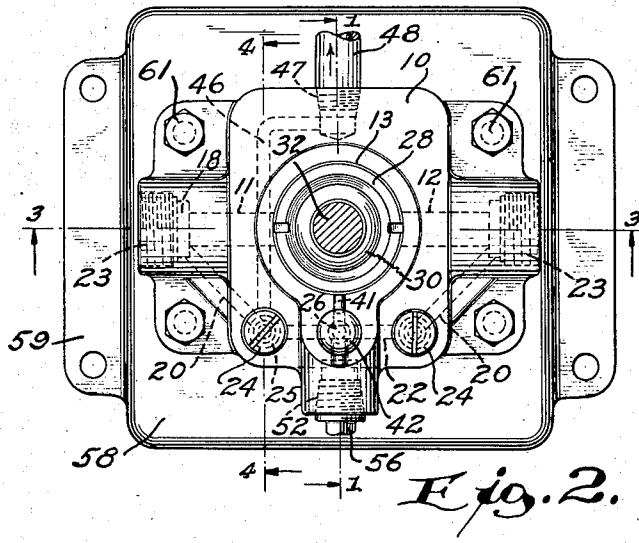
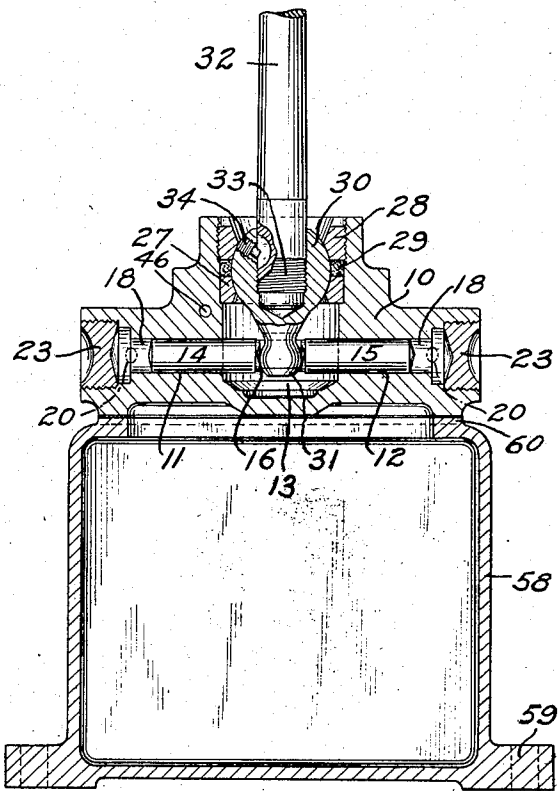
E. M. PFAUSER

2,348,412

PUMP ASSEMBLAGE

Filed Sept. 19, 1941

2 Sheets-Sheet 1



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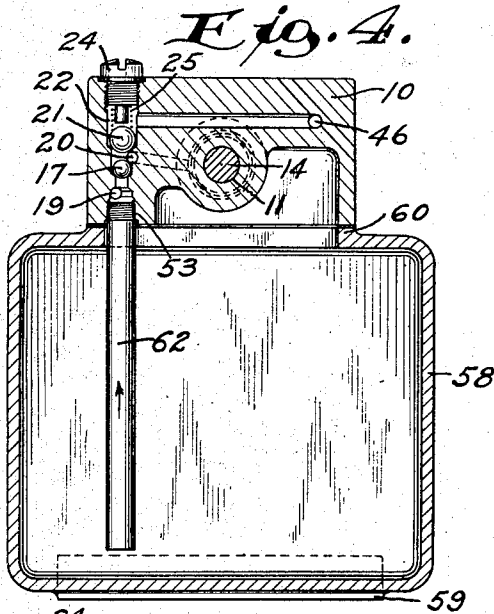
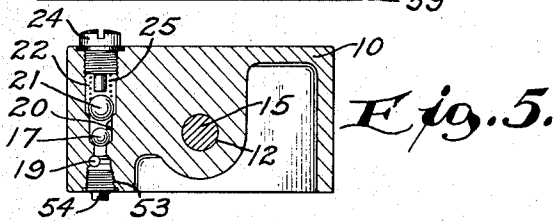
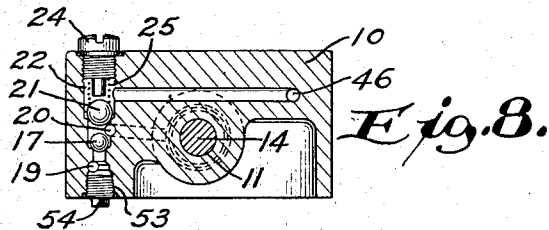
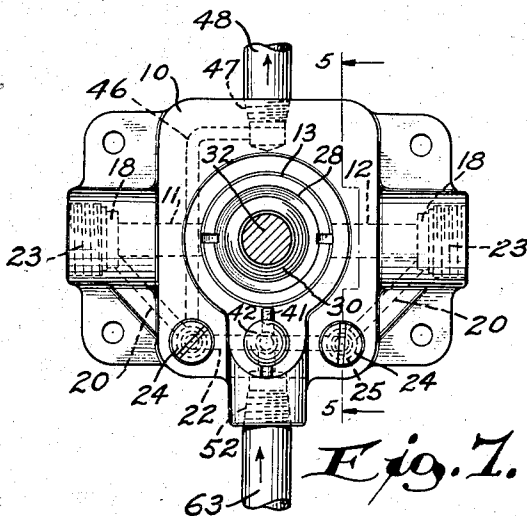
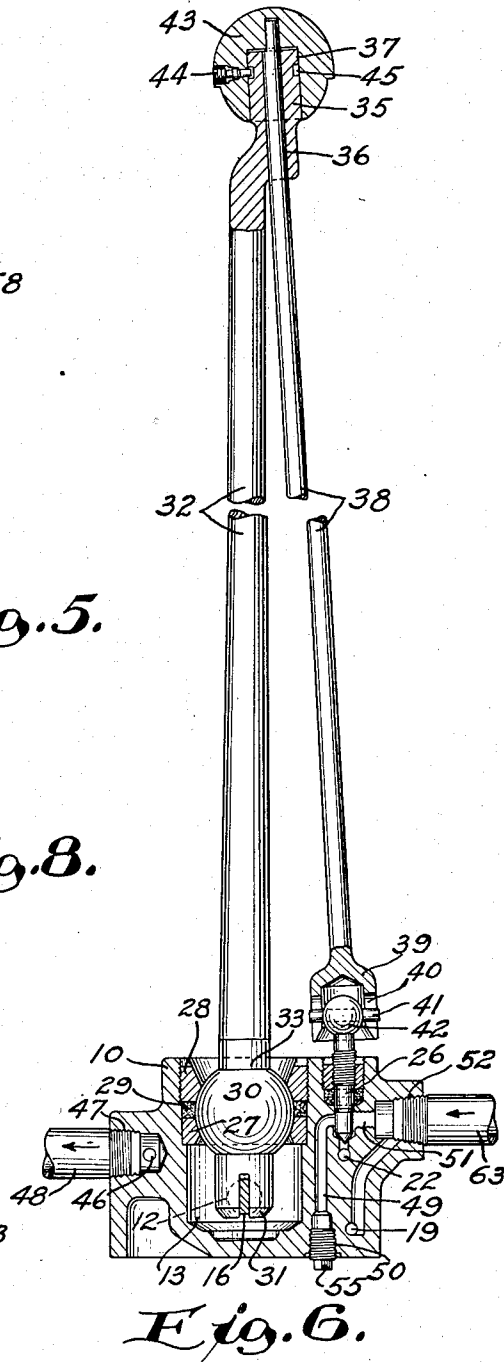
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PUMP ASSEMBLAGE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,348,412

PUMP ASSEMBLAGE

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Application September 19, 1941, Serial No. 411,517

11 Claims. (Cl. 103—41)

The present invention relates in general to improvements in pump assemblies, and relates more specifically to various improvements in the construction and operation of hydraulic pump or power units of the type disclosed generally in my prior Patent No. 2,214,257, granted September 10, 1940.

An object of my present invention is to provide various new and useful improvements in hydraulic units of the above mentioned type, whereby construction and operation thereof is facilitated, and the utility thereof is considerably enhanced. Some of the more specific objects and advantages of the present invention are as follows:

To provide improved actuating and control mechanism for a hydraulic pump, which may be located rather remote from the zone of power application, and which may also be equipped with unloading mechanism such as a relief or by-pass valve.

To provide an improved manually actuated and controlled power unit, provided with simple and readily manipulable actuating and control means for effecting most efficient operation of the unit.

To provide an improved actuating lever assembly for reciprocable hydraulic pump units or the like, which is also manipulable to effect convenient control of the pump functioning.

To provide an improved reciprocable twin pump actuating lever assembly having a gripping portion which is also manipulable to quickly adjust the relief or by-pass valve of the pump.

To provide an improved hydraulic pump of the high pressure reciprocable plunger type, which is extremely simple in construction, efficient in operation, and flexible in adaptation.

To provide an extremely compact high pressure pumping unit which can be readily interchangeably supplied with fluid from various selected sources.

To provide an improved hydraulic power unit comprising relatively few simple parts, which can be manufactured at moderate cost, which is adapted to be readily assembled or dismantled, which is operable in any desired position, and which is adapted for diverse uses.

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

A clear conception of the several features constituting the present improvement, and of the mode of constructing and of operating hydraulic power units built in accordance with the invention, may be had by referring to the drawings 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 transverse section through an improved twin plunger hydraulic pump and supply reservoir unit, wherein the pump is permanently associated with the reservoir, the section being taken along the line 1—1 of Fig. 2;

Fig. 2 is a top view of the pump and reservoir unit of Fig. 1, with the upper portion of the pump actuating handle broken away, and the relief valve actuating rod removed;

Fig. 3 is a central longitudinal section through the combined power unit of Figs. 1 and 2, with the upper part of the pump actuating handle broken away, the section being taken along the line 3—3 of Fig. 2;

Fig. 4 is another transverse section through the combined pump and reservoir assembly, taken along the line 4—4 of Fig. 2;

Fig. 5 is still another transverse section through the pump alone of the assembly of Figs. 1 to 4, inclusive, taken along the line 5—5 of Fig. 7;

Fig. 6 is a central transverse section similar to that of Fig. 1 but taken through the pump assembly alone, and showing the same equipped to receive supply liquid from any source remote from the pump;

Fig. 7 is a top view of the pump alone and also showing the same equipped for operation, as in Fig. 6; and

Fig. 8 is a transverse section like that of Fig. 4, taken through the pump alone but showing the same equipped as in Figs. 6 and 7.

While the invention has been shown and described herein as being embodied in a particular type of manually operable hydraulic pump or power unit, it is not my intention to thereby unnecessarily restrict the scope or utility of the several features constituting the present improvements, at least some of which may obviously be applied to other pump structures.

Referring to the drawings, the improved hydraulic pump assembly shown therein, comprises in general a one-piece pump casing 10 having aligned bores 11, 12 therein separated by a central well or socket 13; a pair of axially aligned pump pistons or plungers 14, 15 rigidly interconnected by a flat section 16, and being simultaneously but oppositely reciprocable within the casing bores 11, 12 respectively; a pair of similar suction or inlet valves 17, one for each pump displacement chamber 18, and both being communicable with a common liquid supply passage 19 and with an independent conduit 20 communicating with the corresponding chamber 18; a pair of similar discharge or outlet valves 21, one for each displacement chamber 18, and each communicating on one side with

the adjacent chamber 18 and conduit 20 and on its opposite side with a common liquid discharge passage 22; a cylinder closure plug 23 detachably secured to the casing 10 outwardly beyond each displacement chamber 18 in alignment with the corresponding plunger 14, 15; a removable valve confining cap or plug 24 removably secured to the casing 10 adjacent to each outlet valve 21, and each having a compression spring 25 interposed between it and the corresponding valve 21; a single by-pass or relief valve 26 adjustably associated with the casing 10 mid-way between the sets of valves 17, 21, and being operable to return liquid directly from the pump discharge passage 22 to the source of supply; a spherical pivot bearing consisting of an annular rocker seat 27 snugly confined in a bore in the casing socket 13, an adjustable ring or rocker cap 28 screw threaded within the socket 13, and an intermediate compressible sealing ring 29 interposed between the seat 27 and cap 28; a rocker element or ball member 30 oscillatably confined within the spherical pivot bearing between the seat 27 and cap 28, and having a slotted or bifurcated projection 31 engaging the aligned plungers 14, 15 and the intervening section 16; a pump actuating handle or lever 32 having its pivoted end 33 screw threaded within the pivot member 30 and locked against rotation therein by a set screw 34, while its opposite swinging end 35 is off-set and provided with an internal bore 36 and a concentric external bearing surface 37; a relief valve actuating rod 38 journaled for rotation in the lever bore 36, and having a cupped end 39 provided with transverse slots 40 coacting with a pin 41 piercing a ball 42 secured to or formed integral with the outer end of the relief valve to provide a universal pivotal connection; and a common lever and rod manipulating knob 43 keyed to the opposite swinging end of the rod 38 beyond the lever end 35, and being journaled for rotation on the bearing surface 37 and retained in coaction with the lever and rod by a set screw 44 engaging an annular groove 45 in the lever end 35.

The main pump casing 10 in addition to being provided with the supply and discharge passages 19, 22, and with the conduits 20 connecting the displacement chambers 18 with the spaces between the inlet and outlet valves 17, 21 respectively, is also provided with a liquid delivery conduit 46 extending around the central socket 13 and connecting the discharge passage 22 with a threaded socket 47 at one side of the casing, to which a discharge pipe 48 may be attached. This discharge pipe 48 may communicate with any desired type of apparatus such as a hydraulic ram or jack, adapted to periodically receive liquid under pressure from the pump, and to also return the liquid to the source of supply while by-passing the pump displacement chambers. The opposite side of the pump casing 10 adjacent to the relief valve 26 is furthermore provided with a conduit 49 the medial portion of which is adapted to be connected to the discharge passage 22, conduit 46 and discharge pipe 48 by opening the relief valve 26; and one end of which conduit 49 connects with a threaded socket 50 while the opposite end may be caused to communicate past a threaded port 51 with the suction port 19 and with another threaded socket 52, see Figs. 1 and 6. The opposite ends of the suction passage 19 communicate with still other threaded sockets 53, either or both of which may be closed by plugs 54 depending upon the performance de-

sired; and the socket 50 may under certain conditions be closed by a similar plug 55, while the larger socket 52 may under other conditions be closed by a plug 56 and the port 51 may be sealed by a screw 57. The improved pump assemblage is adapted to be interchangeably associated either with a liquid supply permanently secured to the pump casing 10, or with an outside source, and when converting the assemblage from one type to another, the plugs 54, 55, 56 and the closure screw 57 play an important part.

Referring specifically to Figs. 1 to 5, inclusive, the improved combined pump and reservoir assemblage shown therein can be installed or transported as a single unit, and comprises in addition to the pump above described, a liquid supply reservoir 58 having lower supporting feet 59 and an upper centrally open pad 60 to which the pump casing 10 may be firmly but detachably secured by means of cup screws 61. When such a unitary pump and liquid supply reservoir 58 is utilized, either or both of the plugs 54 should be removed from the plug sockets 53, and a suction pipe 62 which extends below the level of the liquid within the reservoir 58 should be attached to the socket or sockets 53 in place of the removed plugs 54. The plug 55 should be removed from the plug socket 50 thereby opening the lower end of the conduit 49 to the interior of the reservoir, and the screw 57 should be applied to seal the port 51 and the plug 56 should also be applied to close the plug socket 52, thereby closing off communication between the suction passage 19 and the by-pass or relief valve 26, while still maintaining open communication between the suction sides of the two inlet valves 17 and with the suction pipe or pipes 62 through the passage 19, see Figs. 1, 4 and 5.

With the power unit thus assembled, and when the relief valve 26 is closed as shown in Fig. 1, the lever 32 may be oscillated in the vertical plane of the common axis of the bores 12, 13, to thereby reciprocate the plungers 14, 15 simultaneously but in opposite directions relative to their respective displacement chambers 18. Whenever a plunger 14, 15 is being withdrawn from its confining plug 23, liquid will be drawn into the displacement chamber 18 past its corresponding inlet valve 17 through the passage 19 and suction pipe 62 from the reservoir 58, and during the return stroke of each plunger 14, 15 the liquid is delivered under pressure from the displacement chamber 18 past its corresponding outlet valve 21 through the passage 22 and conduit 46 to the discharge pipe 48. When one plunger 14, 15 is withdrawing liquid from the reservoir 58, the other will be discharging liquid under pressure, and vice versa, so that the delivery of liquid to the pressure utilizing device will be continuous. If it becomes desirable to permit return of liquid from the liquid pressure operated device to the reservoir 58, it is only necessary to open the by-pass or return valve 26 by twisting or turning the same manipulating knob 43 which was utilized to oscillate the lever 32 during the pumping operation. Such twisting or turning of the knob 43 rotates the rod 38 and the rotary motion is transmitted to the relief valve 26 through the universal joint interposed between these elements. Since the relief valve 26 has screw thread coaction with a ring nut secured to the casing 10, the rotation thereof in one direction will open this valve thereby connecting the pump discharge passage 22 and hence the conduit 46 and pipe 48, with the conduit 49 which is open to the reservoir 58

through the plug socket 50, thus allowing liquid to return freely from the liquid actuated device to the liquid supply source. Reversal of the direction of twisting or rotation of the knob 43 will again close the relief valve 26, thereby restoring the system to pumping condition.

Referring specifically to Figs. 5 to 8, inclusive, the pump as shown therein may be connected to any suitable source of liquid supply remote from the pump assemblage, through a liquid supply pipe 63 which may be connected to the casing socket 52 as shown in Figs. 6 and 7. When such an arrangement is utilized, the plug 55 should be applied to the plug socket 50 to close the adjacent end of the conduit 49; and besides removing the plug 56 to permit application of the pipe 63, the closure screw 57 should also be removed from the threaded port 51, thereby placing the pipe 63 in direct communication with the relief valve 26 and with the common suction passage 19, see Figs. 6 and 7. The suction passage 19 should also have both ends thereof sealed by the application of pipe plugs 54 to both plug sockets 53 as shown in Figs. 5 and 8, but the medial portion of the passage 19 will still communicate with the conduit 49 as clearly indicated in Fig. 6.

With the power unit thus interchangeably assembled, and when the relief valve 26 is closed as in Fig. 6, the lever 32 may again be oscillated in the vertical plane of the axis of the casing bores 12, 13, to thereby reciprocate the plungers 14, 15 and pump liquid from the supply pipe 63 to the discharge pipe 48. During the successive suction strokes of the plungers 14, 15, liquid will be withdrawn from the pipe 63 directly into the passage 19 and from thence past the suction or inlet valves 17 into the displacement chambers 18; and during the successive return or delivery strokes of the pump, the liquid under pressure will be delivered from the chambers 18 past the discharge or outlet valves 21 and through the passage 22 and conduit 46 to the discharge pipe 48 from whence the liquid flows to the liquid operated device. If it again becomes desirable to permit return of liquid from the pressure operated device to the supply pipe 63, it is again only necessary to open the by-pass or return valve 26 by manipulating the common handle knob 43, whereupon the discharge pipe 48 will be placed into direct and open communication with the supply pipe 63 through the conduit 46, passage 22, conduit 49 and port 51. By subsequently closing the relief valve 26 in the manner previously described, the pump system can be quickly reconverted into condition for pumping operation.

It will thus be apparent, that the improved pump assemblage can be quickly, conveniently and effectively converted from the type shown in Fig. 1 into the type shown in Fig. 6, at the option of the user and without additional cost. The improved pump unit will operate just as efficiently in either form, and the conversion requires no change whatsoever in the actuating and control structure. The common handle knob 43 may be utilized to manipulate both the lever 32 for pumping purposes, and the rod 38 for valve adjustment purposes; and the single set screw 44 coacting with the groove 45 serves to maintain the knob 43 and the rod 38 in assembled position, while the other set screw 34 serves to lock the lever 32 against possible rotation which would cause binding in the rod 38. The entire assemblage is obviously simple, compact and durable in construction, and has proven highly efficient in actual operation and extremely flexible in its

adaptations. The improved power unit can also be manufactured and sold at moderate cost since all parts are relatively simple in structure, many parts are interchangeable with each other, and standard plugs, screws and valves are utilized wherever possible.

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 operation and use, herein shown and described for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. In combination, a casing having a bore and a socket adjoining the bore, a pump plunger movable in said casing bore, a pivot member swingable in said socket and coacting with said plunger to move the same, a relief valve associated with said casing laterally adjacent to said socket, a lever for oscillating said pivot member, a rod journaled for rotation in the swinging end of said lever and being operatively connected to said valve, and an actuating knob for said lever and valve secured to said rod and journaled for rotation on the swinging end of the lever.

2. In combination, a casing having a bore and a socket adjoining the bore, a pump plunger movable in said casing bore, a pivot member swingable in said socket and coacting with said plunger to move the same, a relief valve associated with said casing laterally adjacent to said socket, a lever for oscillating said pivot member, a rod having one end universally movably connected to said valve and its opposite end portion journaled for rotation in the swinging end of said lever, and a common actuating knob for said lever and valve fixedly secured to said rod and journaled for rotation on said swinging lever end.

3. In combination, a casing having a bore and a socket adjoining the bore, a pump plunger movable in said casing bore, a pivot member swingable in said socket and coacting with said plunger to move the same, a relief valve associated with said casing laterally adjacent to said socket, a lever for oscillating said pivot member, a rod journaled for rotation in the swinging end of said lever and being operatively connected to said valve, an actuating knob for said lever and valve secured to said rod and journaled for rotation on the swinging end of the lever, and means carried by said knob and coacting with said lever to prevent displacement of the knob and rod longitudinally of the lever.

4. In combination, a casing having aligned bores and a socket between the adjacent bore ends, pump plungers movable in said casing bores, a pivot member swingable in said socket and coacting with said plungers to move the same, a relief valve associated with said casing laterally adjacent to said socket and between said bores, a lever for oscillating said pivot member and having its swinging end provided with a bore and a bearing surface surrounding said bore, a rod journaled for rotation in said lever bore and being operatively connected to said relief valve, and a common actuating knob for said lever and rod journaled for rotation on said bearing surface and keyed to said rod.

5. In combination, a casing having aligned bores and a socket between the adjacent bore ends, pump plungers movable in said casing bores, a pivot member swingable in said socket and coacting with said plungers to move the same, a relief valve associated with said casing

laterally adjacent to said socket and between said bores, a lever for oscillating said pivot member and having its swinging end provided with a bore and a bearing surface surrounding said bore, a rod journaled for rotation in said lever bore and being operatively connected to said relief valve, a common actuating knob for said lever and rod journaled for rotation on said bearing surface and keyed to said rod, and a set screw secured to said knob and coacting with an annular recess in said lever end for retaining said knob upon the lever and the rod drivingly connected to the knob.

6. In combination, a casing having a bore, a pump plunger reciprocable in said bore, an oscillatory member pivotally suspended from said casing and cooperating with said plunger to reciprocate the same, a lever for oscillating said pivot member, a relief valve mounted in said casing laterally of said bore, a rod journaled for rotation in the swinging end of said lever and being operatively connected to said relief valve by a universal connection which is separable by axial movement of the rod, and a common actuating knob for oscillating said lever and for turning said rod about its axis, said knob normally being fixed against displacement longitudinally of the lever but being axially removable from said rod when disconnected from the lever.

7. In combination, a casing having a bore, a pump plunger movable in said bore, an oscillatory member carried by said casing and cooperating with said plunger to move the same, a relief valve associated with said casing laterally adjacent to said member, a lever for oscillating said member and having its swinging end provided with a longitudinal bore and a bearing surface surrounding said bore, a rod journaled for rotation in said lever bore and pivotally connected to said valve, and a common actuating knob for said lever and said rod journaled for rotation on said surface.

8. In combination, a casing having a bore, a pump plunger movable in said bore, a pivot member carried by said casing and cooperating with said plunger to move the same, a relief valve associated with said casing near said member, a lever for swinging said member, a rod having one end portion journaled for rotation in the swinging end of said lever, a universal connection interposed between the opposite end of said

rod, and a common actuating knob for swinging said lever and for rotating said rod.

9. In combination, a casing having a bore, a pump plunger movable in said bore, a pivot member carried by said casing and cooperating with said plunger to move the same, a relief valve associated with said casing near said member, a lever for swinging said member, a rod having one end portion journaled for rotation in the swinging end of said lever, a universal connection interposed between the opposite end of said rod and said relief valve, and a common actuating knob for swinging said lever and for rotating said rod, said knob normally being secured to said lever but being detachable therefrom to simultaneously release said rod.

10. In combination, a casing having a bore, a pump plunger movable in said bore, a pivot member carried by said casing and cooperating with said plunger to move the same, a lever for swinging said member and having one end screw threaded within the member and its opposite end provided with a laterally off-set longitudinal bore, means for locking said lever against rotation relative to said pivot member, a relief valve associated with said casing laterally of said member, a rod having one end operatively pivotally connected to said relief valve and having its opposite end journaled for rotation in said lever bore, and a common knob for swinging said lever and for rotating said rod.

11. In combination, a casing having a bore, a pump plunger movable in said bore, a pivot member carried by said casing and cooperating with said plunger to move the same, a lever for swinging said member and having one end screw threaded within the member and its opposite end provided with a laterally off-set longitudinal bore, means for locking said lever against rotation relative to said pivot member, a relief valve associated with said casing laterally of said member, a rod having one end operatively pivotally connected to said relief valve and having its opposite end journaled for rotation in said lever bore, and a common actuating knob journaled for rotation on the swinging end of said lever for swinging said lever in the plane of the axis of said casing bore and for effecting rotation of said rod about the axis of said lever bore.

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