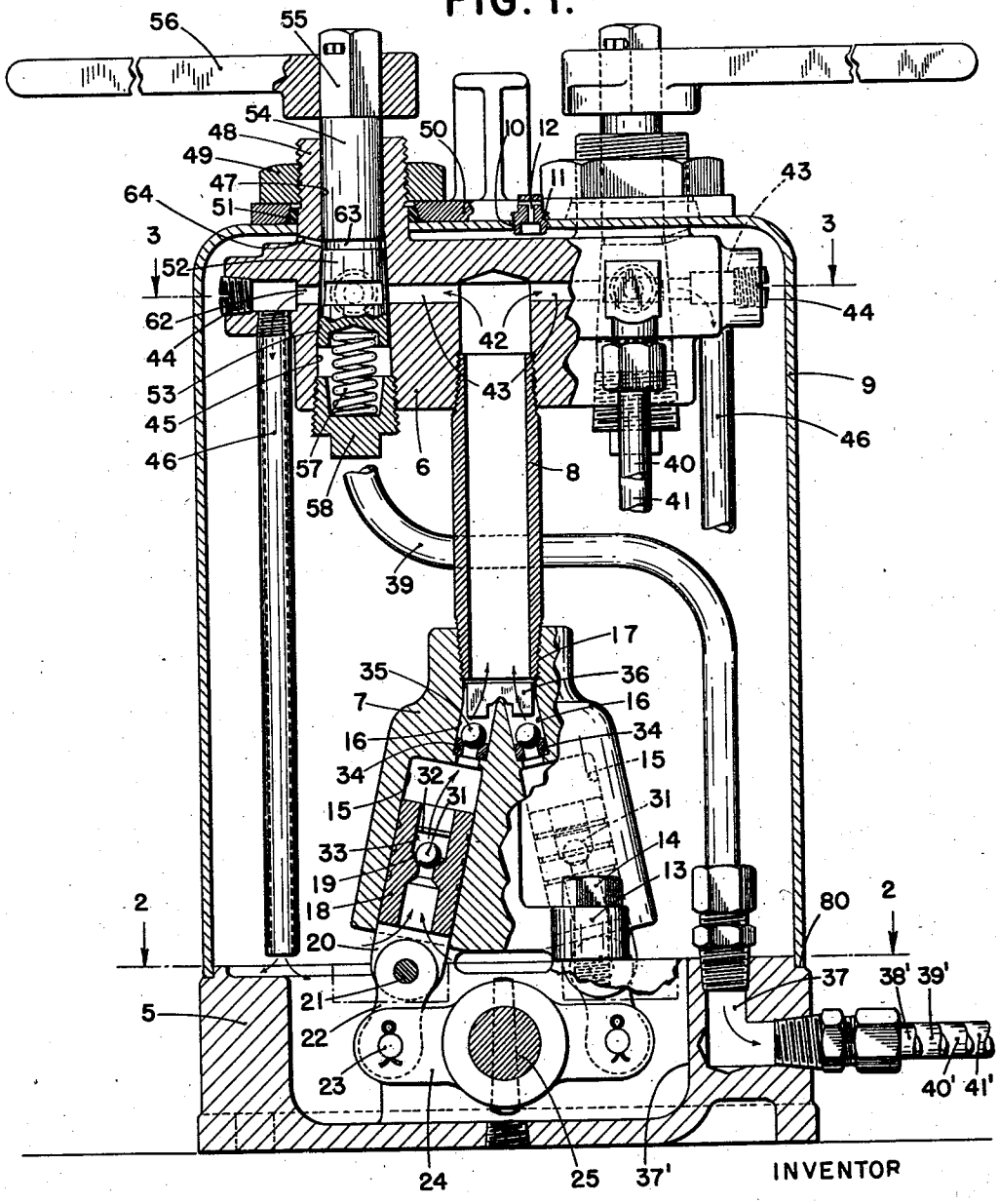
Jan. 16, 1940. J. H. KERBER 2,187,036

HYDRAULIC APPARATUS

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FIG. 1.




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HYDRAULIC APPARATUS

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FIG. 4.

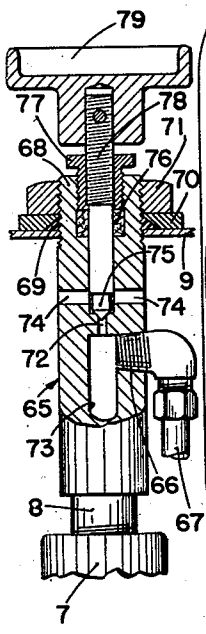



FIG. 2.

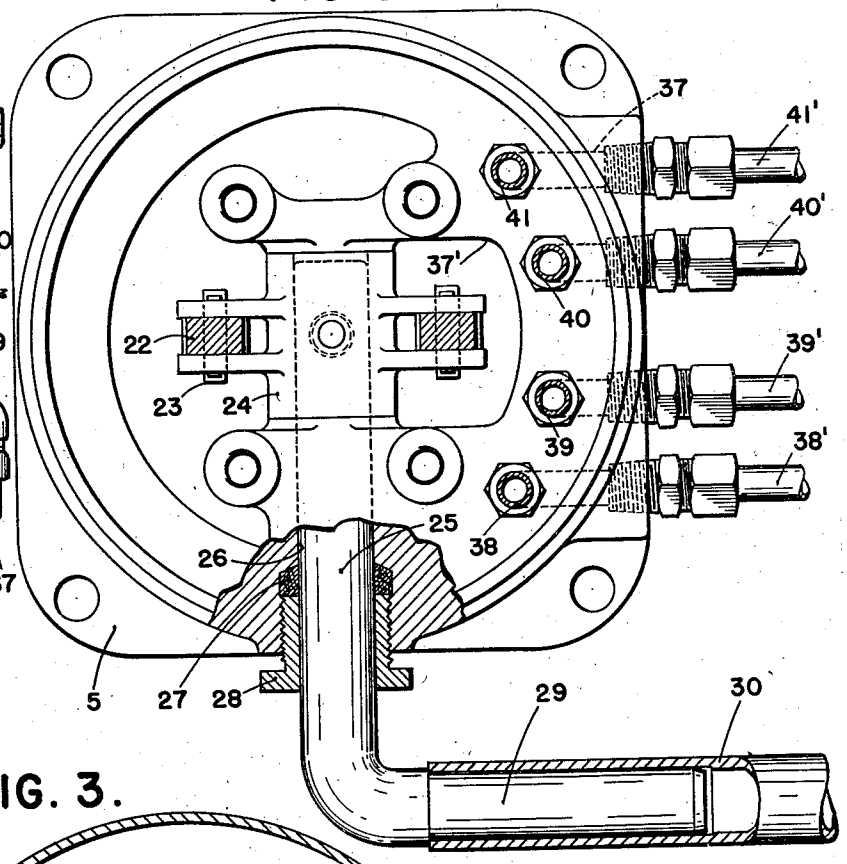
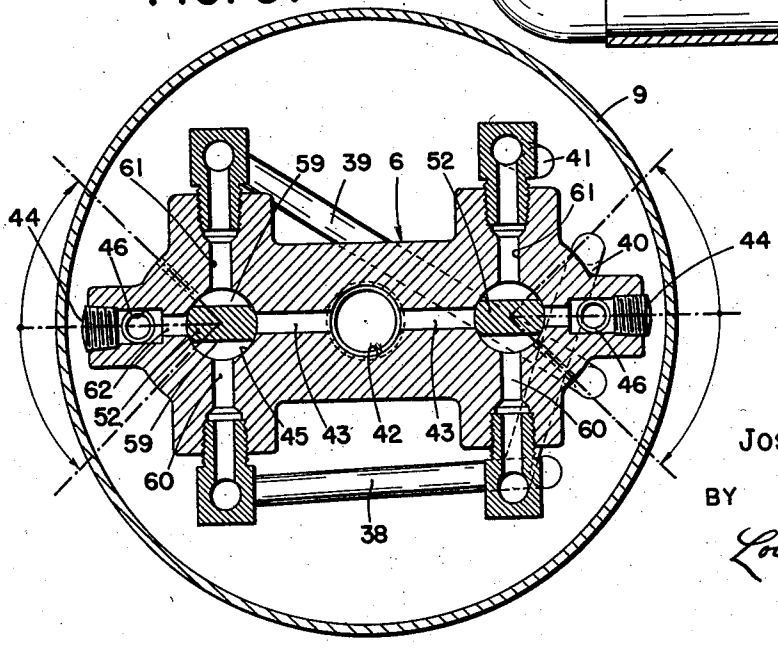



FIG. 3.




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Patented Jan. 16, 1940 2,187,036

# UNITED STATES PATENT OFFICE

2,187,036

## HYDRAULIC APPARATUS

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Application March 1, 1937, Serial No. 128,338

4 Claims. (Cl. 103—218)

The invention relates to hydraulic power producing apparatus.

One of the objects of the invention is to provide an hydraulic apparatus wherein the pump and control valve mechanism are mounted in a casing containing the working fluid, and any leakage from the high pressure side of the pump and valve is free to drain into the casing, and in this respect the present invention is an improvement on that of my prior U. S. Patent No. 2,031,166, dated February 18, 1936.

A further object of the invention is to provide an apparatus of the character described wherein the pump may operate a plurality of units.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a vertical sectional view of a device embodying the invention, parts of the interior structure being shown in full;

Fig. 2 is a detail sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a detail sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view showing certain modifications.

Referring to the drawings, the numeral 5 designates a base member, 6 a control valve housing, 7 a pump body mounted on said base member and connected to said housing 6 by a pipe 8 supporting said housing on said pump body, and 9 a housing or casing member enclosing said valve housing and pump body and having fluid tight connection at its lower end with said base and forming a casing therewith into which oil or other suitable working fluid is introduced through a filling opening 10 in the casing 9 normally closed by a pipe plug 11 provided with a vent opening 12.

The pump block or body 7 is provided with spaced lugs 13 for receiving bolts 14 which secure it to the pump body and is provided wth spaced bores 15 inclined at an acute angle to each other so that the discharge ports 16 converge toward each other and communicate with a common discharge conduit 17 which is threaded to receive the lower threaded end of the pipe 8 which may be integral with the valve housing 6. Plungers 18 reciprocate in the bores 15, and each of these plungers is hollow and formed with a suction valve seat 19 intermediate its ends and bifurcated lower end portions 20 apertured to receive a pin 21 pivotally connecting it with a link 22 whose other end is connected by a pin 23 with the slotted arm of an oscillatory lever 24 which is secured intermediate its ends to a shaft 25 journalled in a laterally extending bore 26 in the base, a stuffing box 27 surrounding the shaft and including a gland nut 28 in threaded engagement with said base. The shaft has a crank arm 29 for receiving the tubular end of an extension handle 30. Ball valves 31 seat on the seats 19 by gravity and are limited in their upward movement by pins 32 having tight fit with the sides of the bores 33 of the plungers 18. The discharge ports 16 have seat rings 34 mounted therein on which the ball discharge valves 35 seat by gravity and are limited in their upper movement by a stop bar 36 mounted in the discharge conduit.

The base member 5 is recessed at 37' to accommodate the pump plungers and their actuating mechanism and is provided with four angular passages 37 threaded at their inner ends to receive the couplings for pipes 38, 39, 40, and 41 and at their outer ends to receive the couplings for pipes 38', 39', 40', and 41'.

The valve housing 6 is formed to provide a central bore 42 in which the upper threaded end of the pipe 8 is mounted and bores 43 extending laterally therefrom and closed off by pipe plugs 44, these last named bores being intercepted by tapered bores 45 and communicating beyond these bores with the lower part of the interior of the casing by pipes 46 in threaded engagement with said bores 43. The tapered bores 45 communicate with straight bores 47 formed in tubular extensions 48 of the housing member 6, the upper ends of said extensions being threaded to receive clamping nuts 49 which as here shown engage a plate 50 abutting the top of the casing 9, there being a packing 51 interposed between each extension, the casing, and the plate to prevent any leakage at this point.

A plug valve 52 has a tapered valve portion 53 fitting the similarly tapered bore 45 of the housing 6 and has a shank 54 extending through the straight bore 47 and provided wtih a polygonal end 55 on which the socketed end of an operating hand 56 is mounted. Each plug valve is normally held in seating relation with the housing by a spring 57 interposed between the end of the valve and a plug 58 which has threaded engagement with the threaded end of the bore 45. The valve is recessed on opposite sides at 59 and is adapted to control the flow of working fluid from the discharge of the pump and back to the suction side thereof, and in the present instance control the flow of fluid from the portion of the passage 43 ahead of the valve to either of the pas-

sages 60 or 61 and to connect either of these last named passages with that portion 62 of the passage 43 beyond the valve.

The left hand conduit 60 is connected by piping including the pipe 38 to one of the angular passages 37 which connects with the pipe 38'. The left hand passage 61 is connected by piping including the pipe 39 with that one of the passages 37 connected with the pipe 39'. The conduit 60 for the right hand unit is connected by piping including the pipe 40 with that one of the angular passages 37 connected with the pipe 40'. The passage 61 for the right hand unit is connected by a piping including the pipe 41 connected to that one of the angular passages 37 that connects with the pipe 41'. The pipes 38' and 39' lead to one of the devices to be operated while the pipes 40 and 41' lead to another of the devices to be operated, such as an hydraulic ram.

In Fig. 3 the valves 52 are shown in shut-off position, but on turning either one of these valves hydraulic fluid under pressure from the pump may be delivered to one of the conduits 60 or 61 while fluid is being returned through the other of said conduits, the return passing through the passage portion 62 and down into the sump of the device through the pipe 46.

The valve 52 works under high pressure and, to prevent leakage along the shank 54 to the outside, a groove 63 is formed adjacent the head of the valve part 53 and communicates with a duct 64 which leads to the space within the casing 9 so that any leakage from the valve is returned back to the suction side of the pump.

In some instances the device may be used for operating a single unit, as a hydraulic jack in which only one line leads to the device. In such instances the valve housing is formed as a tubular member 65 as shown in Fig. 4 connected at its lower end to the pipe 8 and having an oulet 66 connected by piping 67 to a passage in the base similar to the passage 37 and connected to an exterior pipe. The member 65 has a threaded upper end 68 extending through an opening in the top of the casing 9 and mounted in fluid tight engagement therewith by the packing 69, washer or plate 70, and the clamping nut 71.

The member 65 is provided with a relief passage 72 connecting its discharge bore 73 with transverse ports 74 leading into the interior of the casing. The relief port or passage 72 is controlled by a manually operable needle shut-off valve 75 whose stem works through a stuffing box 76 including a gland nut 77 whose inner bore is threaded to engage the upper threaded end 78 of said stem which carries an operating handle 79 by which said needle valve may be turned to open or closed position.

It will be noted that when the parts of the apparatus are assembled together, the nuts 49 or the nut 71 acting on the top of the casing 9 will act to hold the lower edge 80 of said casing in tight engagement with the recessed edge of the base member 5.

It is also to be noted that the operating handle is journalled in the relatively rigid base member and that its packing and that for the extended end or ends of the control valve housing only have to seal against the normal pressure of the operating liquid within the container formed by the base member 5 and the casing 9.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the claims.

What I claim as my invention is:

1. In an hydraulic apparatus, the combination of a base, a pump cylinder mounted on said base, a plunger working in said cylinder, a control valve housing, a discharge conduit for said pump cylinder connected with said housing and forming a support for said housing, a control valve mounted in said housing and controlling the discharge from said pump cylinder, a casing member having a fluid tight connection with said base and said housing and forming therewith an enclosure for said pump cylinder, plunger, and the main part of said valve housing, means for admitting fluid from said casing to said pump cylinder, discharge valve means for said pump cylinder and means for actuating said plunger.

2. In an hydraulic apparatus, the combination of a base, a pump cylinder mounted on said base, a plunger working in said cylinder, a control valve housing having an extension, means for supporting said housing on said pump cylinder, a control valve mounted in said housing and operatively connected to the pump cylinder to control the discharge therefrom, a casing having a fluid tight connection with said base and a fluid tight connection with said extension of said housing, said last named connection including means for clamping said casing against the base, said casing enclosing said pump cylinder and plunger, means for admitting fluid from said casing to said pump cylinder, and means for actuating said plunger.

3. In an hydraulic apparatus, the combination of a base, a pump body having a discharge passage and plunger bores converging toward said passage, valve controlled discharge ports connecting said bores with said passage, plungers reciprocating in said bores and having inlet passages, suction valve means mounted in said inlet passages in said plungers, an oscillatory lever for moving said plungers, a shaft mounted in said base for operating said lever, a valve housing and discharge conduit connected to said pump cylinders and supported thereby, a valve mounted in said housing to control the discharge from said pump body, a casing enclosing said pump body and forming with the base a reservoir for operating fluid with which said inlet passages in said plungers communicate.

4. In an hydraulic apparatus, the combination of a base, a pump cylinder mounted on said base, a plunger working in said cylinder, inlet valve means for said cylinder, a control valve housing, a discharge conduit for said pump cylinder forming a support for said housing, a control valve mounted in said housing and controlling the discharge from said pump, a casing member enclosing said pump, said discharge conduit and the major portion of said housing and engaging said base and forming a reservoir for said pump, and means for clamping said casing member against said base including a threaded member forming a part of said housing, said housing, discharge conduit and cylinder acting as a unit to take the entire reaction between said base and clamping member due to the clamping of said casing member to said base.

JOSEPH H. KERBER.