

Jan. 6, 1948.

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2,433,918

HYDRAULIC OIL PUMP

Filed March 14, 1946

2 Sheets-Sheet 1

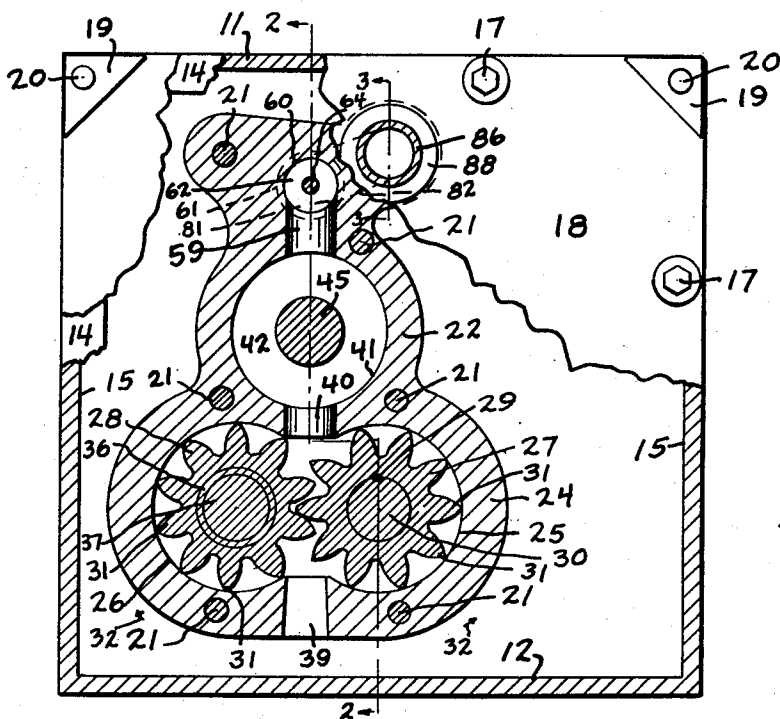


Fig. 1

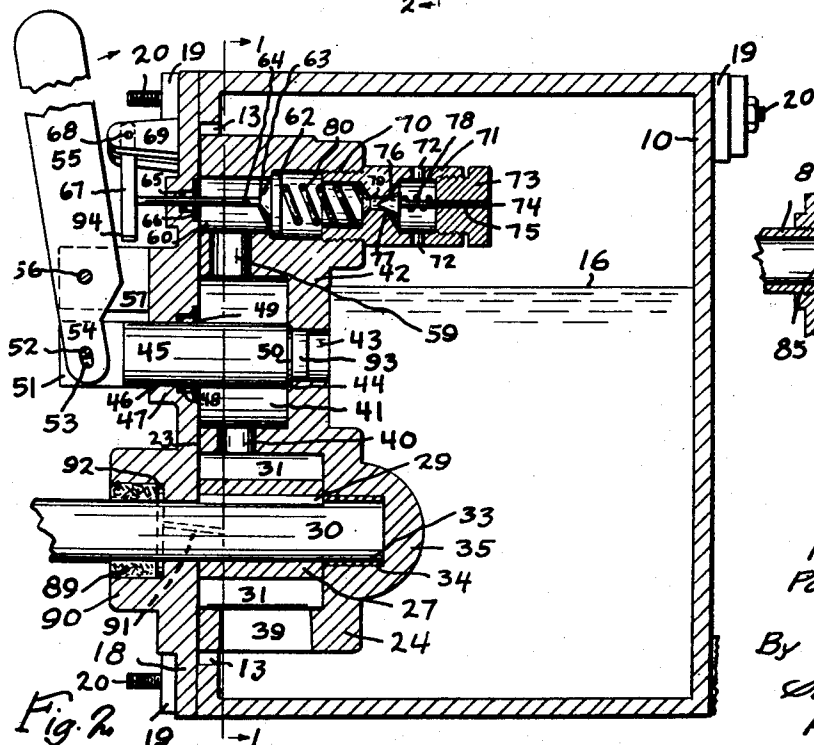


Fig. 2

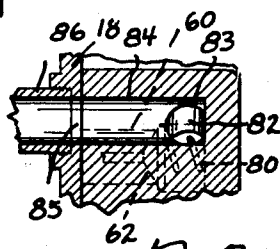


Fig. 3

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2 Sheets-Sheet 2

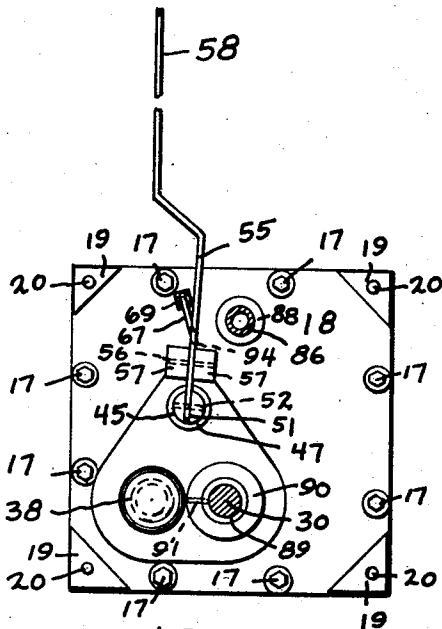


Fig. 4

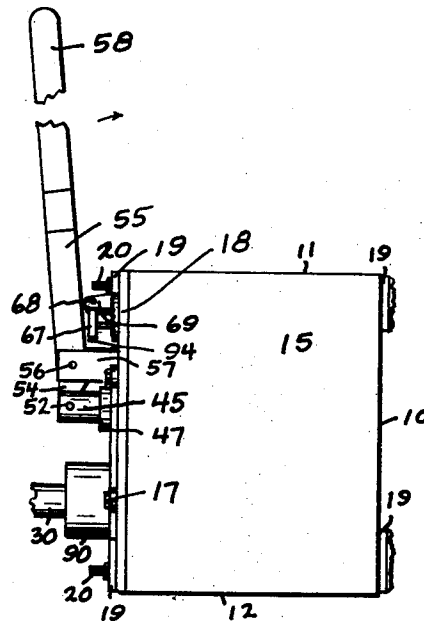


Fig. 5

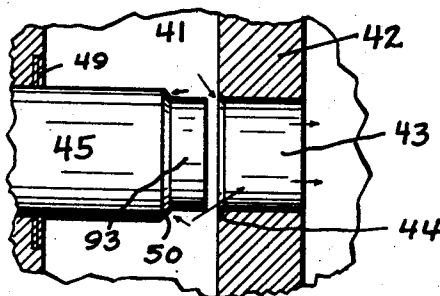


Fig. 6

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HYDRAULIC OIL PUMP

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4 Claims. (Cl. 103—41)

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My invention relates to a hydraulic oil pump.

An object of my invention is to provide a hydraulic oil pump which can be attached to a tractor power take off shaft, or to any other driving portion of the tractor, and which can also if desired, be attached to other driving arrangements.

A further object of my invention is to provide an oil pump which is efficient in operation, which is compact, and which includes certain valved arrangements whereby such arrangements will operate both during operating pressure conditions as well as when the oil is being returned to its reservoir.

A further object of my invention is to provide a combined pump and reservoir in one integral unit.

A further object of my invention is to provide an easily operable control arrangement for controlling the pump during the power cycle, as well as the return cycle.

A further object of my invention is to provide a synchronized valve arrangement which in returning oil during the release cycle will be adjusted in its rate of flow so that abrupt stoppages in any parts of the oil circuit will not affect the operation of the arrangement.

A further object of my invention is to provide a special valve control having by-pass features so that the valve will allow uniform adjustment of the power desired and will further provide means for allowing exhaustion of the oil back to its reservoir after the power cycle.

A further object of my invention is to provide an oil pump having the above characteristics, which will also allow control of a hydraulic circuit and still allow the rotatable pump elements to run during such control.

A further object of my invention is to provide a special plunger valve having features wherein the control lever of the arrangement will be brought back to normal position without requiring the use of springs and so forth.

A further object of my invention is to provide all of the above objects in a simple construction.

With these and other objects in view, my invention consists in the construction, arrangement, and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a sectional view of the pump taken substantially along the lines 1—1 of Figure 2,

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Figure 2 is a sectional view of Figure 1 taken substantially along the lines 2—2 thereof.

Figure 3 is a sectional detail taken along the lines 3—3 of Figure 1,

5 Figure 4 is a forward elevation of the unit,

Figure 5 is a side view of Figure 4, and

Figure 6 is a detail of one of the valves.

I have used the character 10 to designate the rear wall of a reservoir having the top wall 11, 10 the bottom wall 12 and the forward opening 13 adjacent to the flanges 14. The character 15 designates the side walls of the reservoir which reservoir is adapted to receive an oil supply 16. Attached by means of suitable bolts 17 to the 15 flanges 14 is a square plate 18 which plate includes corner bosses 19 into which are received the studs 20. The rear wall 10 also includes similar bosses and studs 19 and 20. Attached by means of the bolts 21 to the forward plate 18 20 is a casting 22 which is securely retained against the thin gasket 23. The casting 22 includes a lower portion 24 which includes the partially cylindrical openings at 25 and 26, in which are positioned the snugly engaged pump members 27 25 and 28, the member 27 being keyed at 29 to the shaft 30. Both gear members include the inter-engaging teeth 31 for forcing the oil in the desired direction, the gears being driven in the direction of the arrows 32.

30 The gear 27 is the driving gear which is driven by the shaft, and the gear 28 is the driven gear driven by the gear 27. The shaft 30 is suitably journaled at 33 within a bushing 34 which is secured within the portion 35 of the casting. The 35 gear 28 includes a bushing 36 which rotates upon a short shaft 37 which extends into a suitably bushed socket within the plate portion 38 (see Fig. 4), and which is suitably journaled at the rear thereof in a further portion 35.

40 Extending through the bottom of the casing portion 24 is an oil inlet opening 39 which communicates to the pump elements as shown and a further opening 40 communicates with a cylindrical cavity 41 which terminates in a rear wall 42, and the rear wall 42 includes a cylindrical 45 opening 43 which communicates to the oil in the reservoir and which terminates in the annular seat 44. A cylindrical plunger 45 is received at 46 within a boss 47 and is packed by means 50 of the rubber ring 48 and washers 49. The member 45 includes a shoulder 50 adapted to register with the seat 44. The plunger 45 also includes the slotted end at 51 through which is received a pin 52, the pin 52 being received within the elongated slot 53 formed in the end 54 of a con-

trol lever 55 which is pivoted at 56 between the pair of raised bosses 57, the lever 55 being slightly pitched from the vertical as shown in Figure 4 and extending into the end handle portion 58.

Communicating with the cylindrical cavity 41 is an opening 59 which communicates with a further opening 60 having a valve seat at 61 against which the valve 62 is adapted to bear. Attached to the valve 62 at 63 is the valve control rod 64 which passes through the packing ring 65 secured by the washers 66. The end of the rod 64 bears against a lever member 67 which is pivoted at 68 to the outwardly extending boss 69 which is attached to the plate 18, the member 67 being inclined angularly as shown. Threadably secured at 70 is a relief valve member 71 having the openings 72 and the threadably engaged end nut 73 which includes an opening 74 which receives a pin 75 which is attached to the valve 76 which is held against the valve seat 77 by means of the compression spring 78.

This valve serves to protect the oil circuit against excessive pressure, such pressure being passed through the opening 79. A further spring 80 is received between the opening 79 and the valve 62. Communicating at 81 with the opening 60 is a further port 82 which communicates at 83 with a further opening 84 which passes forwardly and communicates with the opening 85 provided in the forward plate 18. The end of the pipe line which communicates to the apparatus to be operated, is indicated generally by the character 86 which can be attached at 87 to the boss 88 which boss is attached to the plate 18. The pipe 86 can pass to a hydraulic cylinder including a piston for lifting purposes, or can be attached to any other type of hydraulic power circuit. The reservoir containing the pump can be attached to the tractor by means of the extending studs 20 in any suitable manner, the shaft 30 can be the power take-off shaft of the tractor, or can be attached to the power take-off shaft by means of any suitable coupling and the like.

The shaft 30 is suitably packed in a packing ring 89 which ring is received in the boss 90. An opening 91 communicates from the space 92 next to the packing to the inside of the plate 18 and between the gears 27 and 28 to entrap and return excess oil attempting to pass out of the packed shaft joint.

Now that I have described the structure of my device I shall explain the operation thereof.

When it is desired to apply power to the hydraulic circuit by means of oil pressure, the lever 55 is in the position shown in Figure 2 or Figure 5. When the lever is in this position the opening 43 is blocked or closed by means of the extending portion 93 of the plunger 45, as well as by the shoulder 50 against the seat 44. The oil which is forced upwardly through the opening 59, into the opening 60 where such oil pressure will force the valve 62 open, the oil then continuing through the port 82, thence through the port 84 and out through the pipe 86 into the circuit where the work is to be performed.

For releasing the pressure completely and to allow the oil in the circuit to pass backwardly into the reservoir, the lever 55 is pushed forwardly in the direction of the arrow in Figure 2. This action causes the plunger 45 to be pulled outwardly with the portion 93 being pulled out of the opening 43 and the seating surfaces 50 and 44 to be disengaged, which causes the oil from the pump to pass directly into the reservoir. As the lever 55 is forced inwardly, it will also bear against

the end 94 of the lever member 67, which forces the valve 62 inwardly allowing the oil in the system to return in the reverse manner at the same time, where it also exhausts into the reservoir.

In this manner the control of the upper and lower ports are synchronized so that the oil will pass at a uniform rate, so that sudden stoppages in the oil circuit or pump will not cause shock to the entire hydraulic system, eliminating the danger of breakages and so forth. It will also be seen that this arrangement allows operation of the circuit while the pump is continuously rotating.

It will be noted from Figure 6 that the oil pressure passing upwardly and downwardly will act against the shoulder 50 of the plunger 45 forcing the lever 55 to normal position, without the use of springs and the like, the annular shoulder thereby providing this advantage as well as an efficient valve seat.

It will now be noted that I have provided a compact unit oil pump having the various advantages mentioned in the objects of my invention with further advantages being readily apparent.

Some changes may be made in the construction and arrangement of the parts of my invention 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 or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. A hydraulic oil pump comprising a reservoir, a pump unit attached within said reservoir, said pump unit having an outlet communicating from the pump exteriorly of the reservoir, means for causing flow of oil in said reservoir to pass through said outlet under pressure developed by said pump unit, said pump unit including by-pass means for providing return of oil pumped into said outlet incidental upon control of an operator, said by-pass means including a cavity communicating into said reservoir, a plunger normally seating against said cavity whereby movement of said plunger away from said cavity will cause oil to pass into the reservoir, a control lever pivotally attached to said pump unit and to said plunger for operating the plunger, a cavity of substantially greater diameter than said plunger in which said plunger is mounted, ports communicating from said larger cavity to said outlet, a valve controlling said ports, said valve having a stem extending outwardly of said unit, said control lever adapted to force said stem and valve inwardly to open said ports when said plunger is moved outwardly.

2. A hydraulic oil pump comprising a reservoir, a pump unit attached within said reservoir, said pump unit having an outlet communicating from the pump exteriorly of the reservoir, means for causing flow of oil in said reservoir to pass through said outlet under pressure developed by said pump unit, said pump unit including by-pass means for providing return of oil pumped into said outlet incidental upon control of an operator, said by-pass means including a cavity communicating into said reservoir, a plunger normally seating against said cavity whereby movement of said plunger away from said cavity will cause oil to pass into the reservoir, a control lever pivotally attached to said pump unit and to said plunger for operating the plunger, a cavity of substantially greater diameter than said plunger in which said plunger is mounted, ports communicating from said larger cavity to said outlet, a valve controlling said ports, said valve having a stem extending outwardly of

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said unit, said control lever adapted to force said stem and valve inwardly to open said ports when said plunger is moved outwardly, said plunger receiving cavity having an annular shoulder, said plunger having a shoulder registering with said annular shoulder, the shoulder on said plunger being adapted to provide pressure means against said plunger to return the control lever to normal position.

3. A hydraulic oil pump comprising a reservoir, a pump unit attached within said reservoir, said pump unit having an outlet communicating from the pump exteriorly of the reservoir, means for causing flow of oil in said reservoir to pass through said outlet under pressure developed by said pump unit, said pump unit including by-pass means for providing return of oil pumped into said outlet incidental upon control of an operator, said by-pass means including a cavity communicating into said reservoir, a plunger normally seating against said cavity whereby movement of said plunger away from said cavity will cause oil to pass into the reservoir, a control lever pivotally attached to said pump unit and to said plunger for operating the plunger, a cavity of substantially greater diameter than said plunger in which said plunger is mounted, ports communicating from said larger cavity to said outlet, a valve controlling said ports, said valve having a stem extending outwardly of said unit, said control lever adapted to force said stem and valve inwardly to open said ports when said plunger is moved outwardly, said plunger receiving cavity having an annular shoulder, said plunger having a shoulder registering with said annular shoulder, the shoulder on said plunger being adapted to provide pressure means against said plunger to return the control lever to normal position, said pump unit including engaged pump gears, one of said gears being a driving gear, an opening communicating from said gears to said larger cavity.

4. A hydraulic oil pump comprising a reservoir, a pump unit attached within said reservoir, said pump unit having an outlet communicating from the pump exteriorly of the reservoir, means for

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causing flow of oil in said reservoir to pass through said outlet under pressure developed by said pump unit, said pump unit including by-pass means for providing return of oil pumped into said outlet incidental upon control of an operator, said by-pass means including a cavity communicating into said reservoir, a plunger normally seating against said cavity whereby movement of said plunger away from said cavity will cause oil to pass into the reservoir, a control lever pivotally attached to said pump unit and to said plunger for operating the plunger, a cavity of substantially greater diameter than said plunger in which said plunger is mounted, ports communicating from said larger cavity to said outlet, a valve controlling said ports, said valve having a stem extending outwardly of said unit, said control lever adapted to force said stem and valve inwardly to open said ports when said plunger is moved outwardly, said plunger receiving cavity having an annular shoulder, said plunger having a shoulder registering with said annular shoulder, the shoulder on said plunger being adapted to provide pressure means against said plunger to return the control lever to normal position, said pump unit including engaged pump gears, one of said gears being a driving gear, an opening communicating from said gears to said larger cavity, a lever member normally abutting against said valve stem, said control lever adapted to force said lever member and said valve stem upon movement of said control lever.

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