

Nov. 27, 1928.

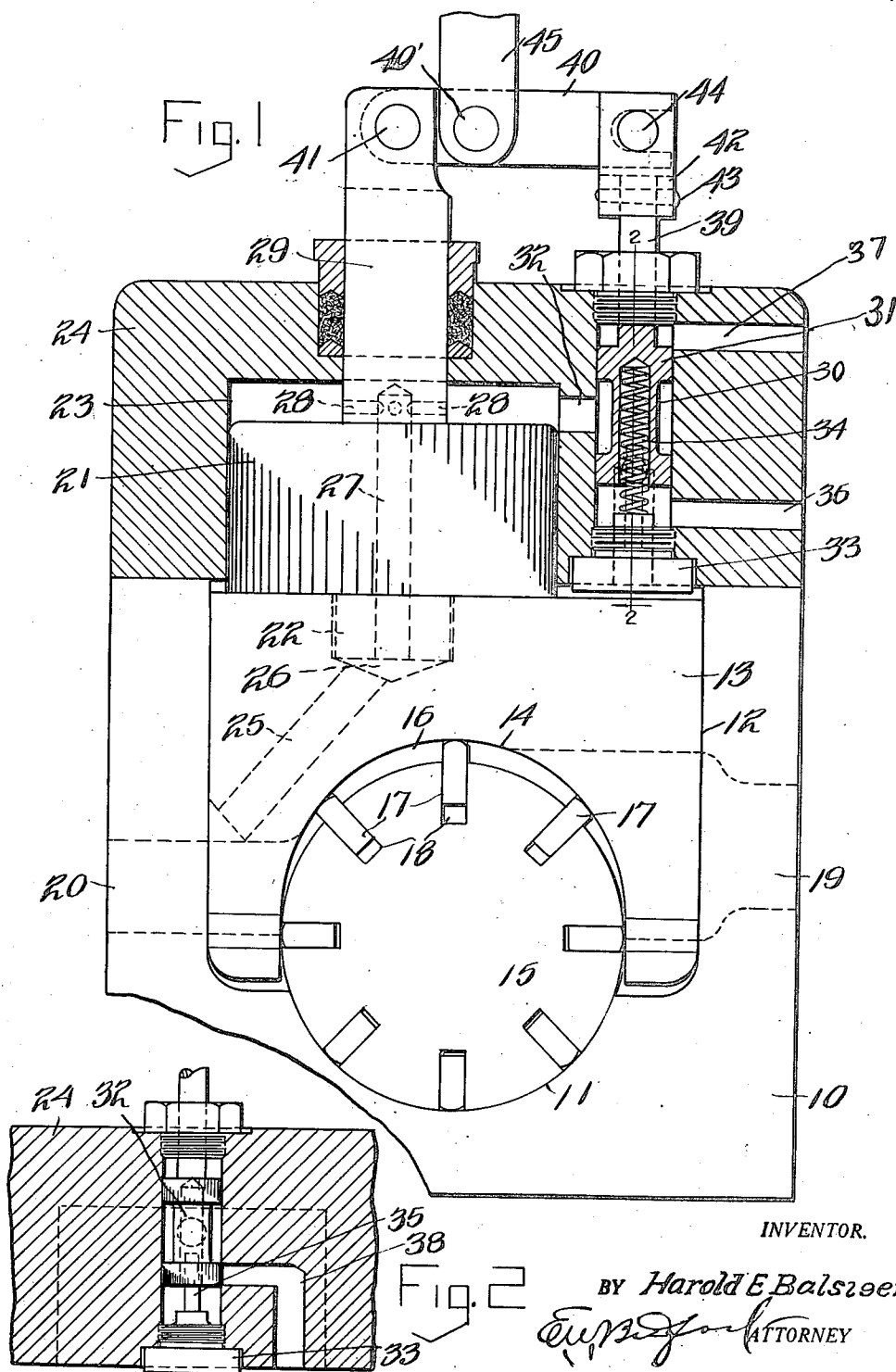
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H. E. BALSIGER

PUMP CONTROL DEVICE

Filed Nov. 8, 1927

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

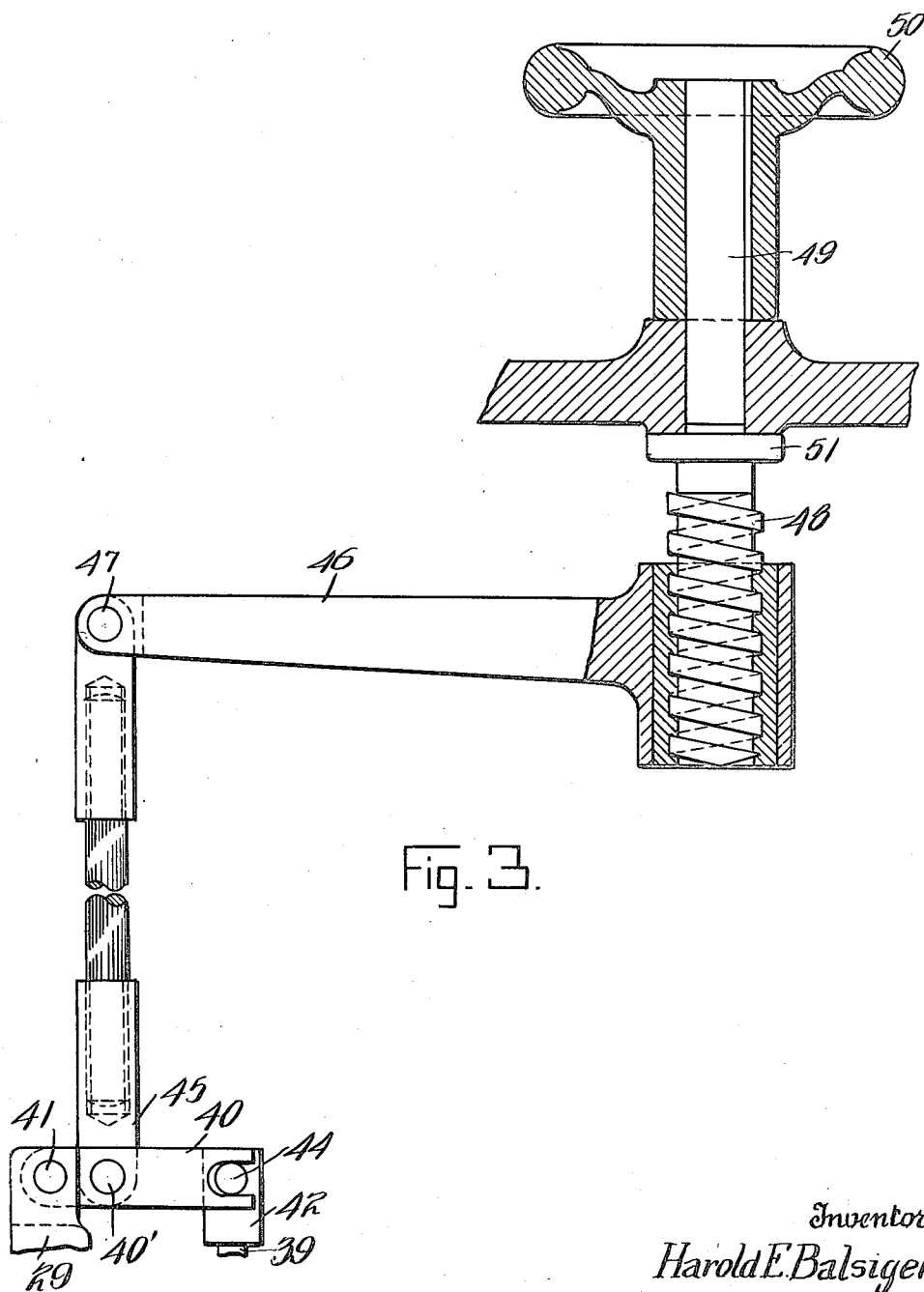


Fig. 3.

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UNITED STATES PATENT OFFICE.

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PUMP-CONTROL DEVICE.

Application filed November 8, 1927. Serial No. 231,877.

My invention relates to variable discharge pump control devices and it is an object of the invention to provide means for hydraulically controlling the volumetric capacity of the pump.

A further object of the invention is to provide manually operated means for controlling or regulating the capacity of the pump which shall be easily operated.

A further object of the invention is to provide a manual control which will be moved to regulate the volume delivered by the pump by a very slight movement of the manually operated member.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is an end elevation of the pump showing a cover piece and regulating device in section,

Figure 2, a fragmentary sectional view of the cover piece along the line 2-2, and

Figure 3, a view partly in section of the manually operated member for controlling the pump.

This invention is designed as an improvement in means for operating the controlling means in the variable flow pump described in my copending application, Serial No. 122,197, filed July 13, 1926.

In the drawings numeral 10 indicates a part of the pump casing having a semi-cylindrical hollowed portion 11 and a chambered portion 12 in which a sliding block 13 is positioned. The block 13 has a semi-cylindrical hollowed out portion 14 and a rotor 15 is mounted to rotate within the chamber formed between the casing of the pump and the sliding block. The cylindrical hollowed out portion in the sliding block provides a crescent-shaped chamber 16 between the inner end of the sliding block and the periphery of the rotor. The rotor is provided with vanes 17 which slide in radial slots 18. Rotation of the rotor will cause the vanes to be thrown out against the inner wall of the hollowed portions of the casing and the sliding block to provide a fluid seal between the end of the vanes and the inner surface of the chamber. The casing is provided with an intake port 19 and an outlet port 20. Upon rotation of the rotor fluid will be trapped between the

vanes and delivered from the intake to the discharge port in a well known manner.

As may be seen, vertical adjustment of the block 13, as shown in Figure 1, will vary the volume of the crescent-shaped chamber 16 and therefore vary the volumetric capacity of the pump. The sliding block is provided with a cylindrical portion 21 screw threaded therein at 22. This portion fits within a cavity 23 in the cover plate 24 of the pump and acts as a piston. The block 13 has a bore 25 leading from the discharge passage of the pump to a chamber 26 in the upper side of the block. A bore 27 in the piston 21 connects this chamber 26 with the space above the piston entering this space through radial passages 28 in the piston stem or rod 29.

The cover plate 24 is provided with a valve chamber 30 for receiving a piston valve 31. A port 32 connects the chamber 23 above the piston 21 with the chamber 30. The valve chamber is closed at its lower end by a screw plug 33. The valve 31 is drilled to receive the end of a spring 34. The plug 33 has a small stem 35 which extends up through the spring to prevent the latter from buckling. Ports 36 and 37 connect the lower and upper ends respectively of the chamber 30 with suitable pipes, not shown, leading to the fluid supply reservoir. A bore 38 connects the space between the top of the block 13 and the lower side of the cover plate 23 with the valve chamber 30 entering the latter intermediate the inner ends of the ports 32 and 36. From the construction just described, it may be seen that downward movement of the valve 31 will open communication between the port 30 and the bore 38 to admit fluid under pressure to the surface above the block 13. The area on the inner side of the block 13 is greater than the surface area above the piston 21. The total area above the block 13, however, is greater than the area of the inner side of the block. With the valve in position to close the port 38 the discharge pressure acts only on the area above the piston 21 and as this area is less than the area on the lower side of the block, which is also subject to the discharge pressure, the resultant pressure will be upward to move the block outward to increase the volume of the pumping chamber. With the valve in position to admit fluid under pressure from port 32 to the bore 38 the

whole area of the upper portion of the block 13 is under pressure and hence the resultant pressure will be downward or such as will tend to move the block 13 to decrease the volume of the pumping chamber.

The mechanism for operating the valve is as follows: Piston 21 and valve 31 are provided with stems 29 and 39 respectively extending up through the cover 24. A link 40 is pivoted at 41 to the upper end of stem 29. The valve stem 39 has a sleeve 42 held thereon by a pin 43. The upper end of this sleeve is bifurcated and has a pin 44 therethrough. The forked end of the link 40 fits over this pin. A link 45 pinned to the link 40 at 40' connects this link with an arm 46 at 47. The other end of the arm 46 has screw threads therethrough into which fits a screw 48 having threads of a large pitch. The screw is provided with a stem 49 having a hand wheel 50 thereon. The stem 49 preferably has a shoulder 51 thereon which cooperates with the hand wheel to hold the stem against axial displacement.

The operation of the device may now be readily understood:

In order to decrease the volume of the pump the hand wheel 50 is rotated to the right through a small arc of rotation. Through the instrumentality of the screw threads on the lower end, the arm 46 is moved downward carrying the link 45, the link 40, the valve stem 39 and the valve 31 to open communication between the port 32 and the port 38 to deliver fluid under pressure to the upper area on the sliding block. In the movement of the link 40 as just mentioned it should be noticed that the link is pivoting on the stem 29 at 41. Since pressure is now operating upon the whole surface on the upper area of the block, this block will be forced toward the rotor against the lesser pressure on the inner surface and will therefore diminish the capacity of the pumping chamber.

As soon as the block moves down, in accordance with the pressure on its outer surface, it carries with it the stem 29 on the upper end of the piston 21 and therefore causes the link 40 to pivot at 40' on the link 45 to move the stem 39 and the valve 31 to close communication between the ports 32 and 38. This cuts off pressure fluid from the whole area upon the outer surface of the block and prevents further movement of the block. At the same time it interrupts the fluid in the passage 38 and therefore holds the block firmly in position.

Rotation of the hand wheel in the opposite direction will open communication between the port 38 and the port 36 and allow the fluid above the block to be forced to the intake reservoir.

As soon as the fluid pressure is relieved above the block, the block moves up to cause the link 40 to pivot around the pivot point 40'

and to force the valve stem 39 in a downward direction to again close off the port 38 and prevent further movement of the block.

The movements of the valve stem 39 and valve 31 and the block 13 have been described as though they operated in sequence. As a matter of fact these movements are for all practical purposes simultaneous. That is, as soon as the valve uncovers the port 38 fluid pressure immediately forces the block down and causes the link 40 to pivot around the center 40' and move the valve stem to close off the valve and prevent further movement. Further rotation of the hand wheel in either direction will produce an immediate response in the movement of the block either toward or from the rotor to vary the pump chamber. A passage or port 37 provides a return for any fluid which may leak past the upper end of the valve and deliver this fluid to the reservoir at the intake of the pump.

While I have described my pump in language appropriate to the position of the figures as shown in the drawings, it of course should be understood that the pump does not necessarily operate in this vertical position and that these terms are used merely for convenience in description.

As may readily be seen only a slight movement of the hand wheel is necessary to provide sufficient adjustment of the pump to vary the volume from a very small to the maximum volume since the pitch of the threads on the hand wheel stem is relatively very great. It will be appreciated also that the hand wheel is not rotated against the pressure of the pump and there is very little resistance to the movement of the valve stem. When the valve has been moved to open the ports to pressure fluid the block is automatically adjusted by the pressure developed by the pump itself.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention, and I, therefore, do not limit myself to what is shown in the drawings and described in the specification, but only as set forth in the appended claims.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. A pump regulating device comprising means movable to vary the volumetric capacity of the pump, fluid pressure means for operating said capacity varying means, and manually operated means for controlling the admission of fluid to said last named means, substantially as set forth.

2. A pump regulating device comprising a block adapted to be reciprocated to vary the capacity of the pump, means for admitting fluid to the outer surface of said block to partially balance the pressure against the inner surface, and manually controlled means for admitting fluid to additional area on the

outer surface of said block to force the block toward the pumping chamber to diminish the output of the pump, substantially as set forth.

3. A pump comprising a casing, inlet and outlet ports to said casing, a rotor in said casing, one side of said casing being adapted to be adjusted toward or from said rotor to provide an adjustable pumping chamber, means for leading fluid from the discharge side of said pump to a chamber formed on the outside of said adjustable side of the pump, and manually controlled means for admitting additional fluid to the outer side to force said side toward the pump rotor to thereby diminish the output of the pump, substantially as set forth.

4. A pump comprising a rotor and a casing having one side adjustable toward and from the pump rotor to vary the volume delivered by the pump, means for adjusting the said side toward and from the said rotor, and manually operable means for causing a predetermined pressure difference upon said side to force it either toward or from the said pump rotor, substantially as set forth.

5. A pump comprising a casing and a rotary piston mounted therein, a sliding block forming in conjunction with the rotor a pumping chamber, the said block being adjustable toward and from the rotor to vary the capacity of the pump, the block and a portion of the casing providing a chamber above a portion of said block in communication with the discharge port of the pump, a valve controlling passage of fluid to the whole area above said block, and manually operable means for controlling said valve, substantially as set forth.

6. A variable capacity pump comprising a rotary piston, a pumping chamber formed by a side of said casing and a block slidable in a recess formed in the other side of the casing, a cover plate enclosing said recess and providing a chamber above a portion of said block, the inner surface of said block being subject to the pressure developed by the pump, a portion of the outer surface of said block being also subject to the pump discharge pressure, a valve chamber in said cover plate, a valve in said chamber adapted to control admission of pressure fluid from the said recess in the said cover plate to a space where it may act upon the whole outer area of said block, and manually operated means for con-

trolling said valve, the last named means providing means whereby a slight manual adjustment will provide a wide range of adjustment of the said valve, substantially as set forth.

7. A variable capacity pump having a side of the pump adjustable toward and from the pump rotor to vary the capacity of the pump, and having manually controlled means for admitting fluid to balance pressures on opposite sides of said adjustable side, substantially as set forth.

8. A variable capacity pump comprising a casing and a rotor mounted therein and a pumping chamber formed by an adjustable side of the pump casing and the pump rotor, fluid pressure means for balancing pressure on the inner and outer surfaces of said adjustable side, and manually operated means for controlling the relative pressures on the inner and outer areas on said side, substantially as set forth.

9. A pump regulating device, comprising adjustable means for varying the volumetric capacity of the pump, means for admitting fluid to balance pressures on both sides of said capacity varying means, and means to increase the pressure on one side of said capacity varying means, substantially as set forth.

10. A pump regulating device, comprising adjustable means for varying the volumetric capacity of the pump, means for admitting fluid to balance pressures on both sides of said capacity varying means, manually operable means to expose additional area on one side of said capacity varying means to fluid pressure to vary the position of said adjustable means, and means for cutting off automatically the supply of pressure fluid to said additional area, substantially as set forth.

11. A pump regulating device, comprising adjustable means for varying the volumetric capacity of the pump, manually controlled hydraulic means for moving said adjustable means to vary the capacity of the pump, and means for checking said movement automatically when said adjustable means is in the position to cause the pump to deliver a desired quantity of fluid.

In witness whereof, I have hereunto set my hand at Waynesboro, Pennsylvania this 3rd day of November, A. D. nineteen hundred and twenty-seven.

HAROLD E. BALSIGER.