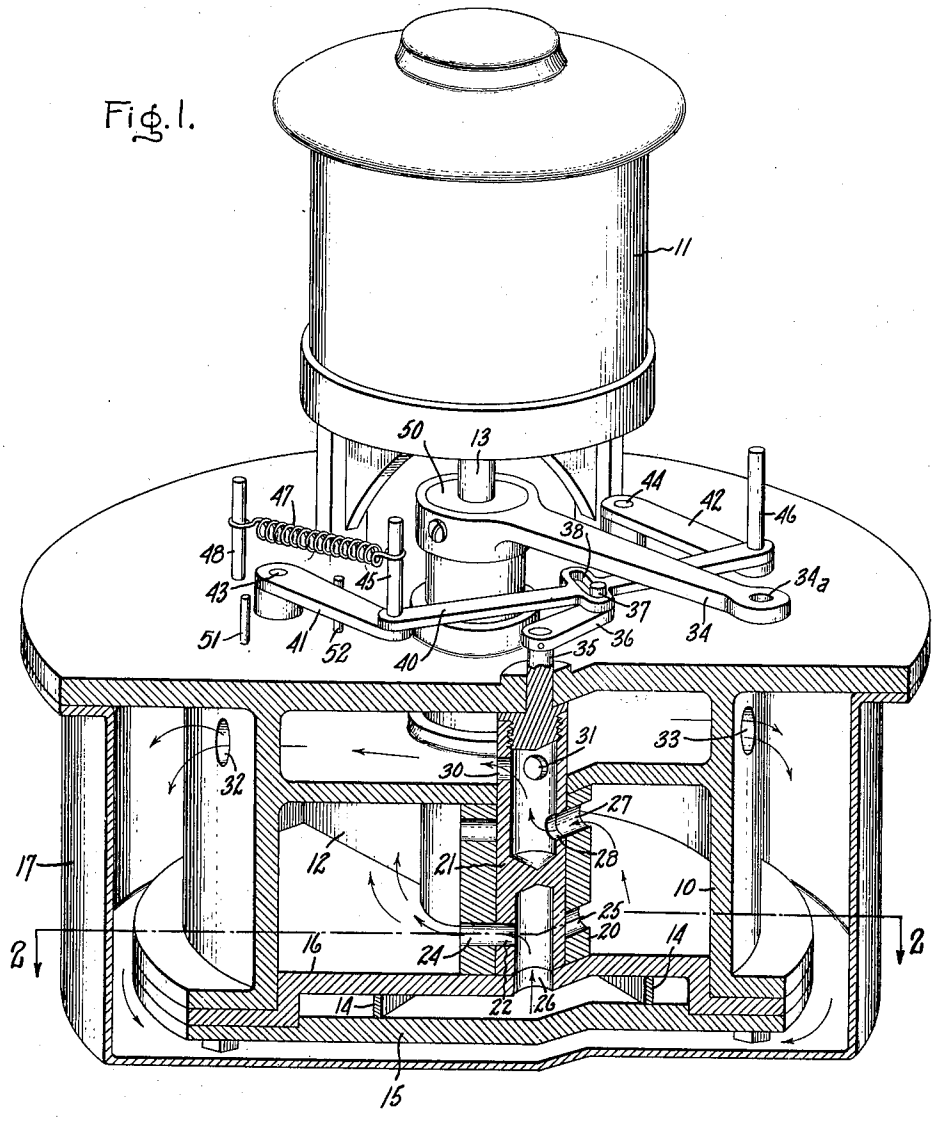
Dec. 24, 1935. R. H. COLLINGHAM 2,025,573

HYDRAULIC OPERATING MECHANISM

Filed May 7, 1934 2 Sheets-Sheet 1

Fig. 1.



Inventor:
Robert H. Collingham,
by Harry E. Dunham
His Attorney.

Dec. 24, 1935. R. H. COLLINGHAM 2,025,573

HYDRAULIC OPERATING MECHANISM

Filed May 7, 1934 2 Sheets-Sheet 2

Fig. 2.

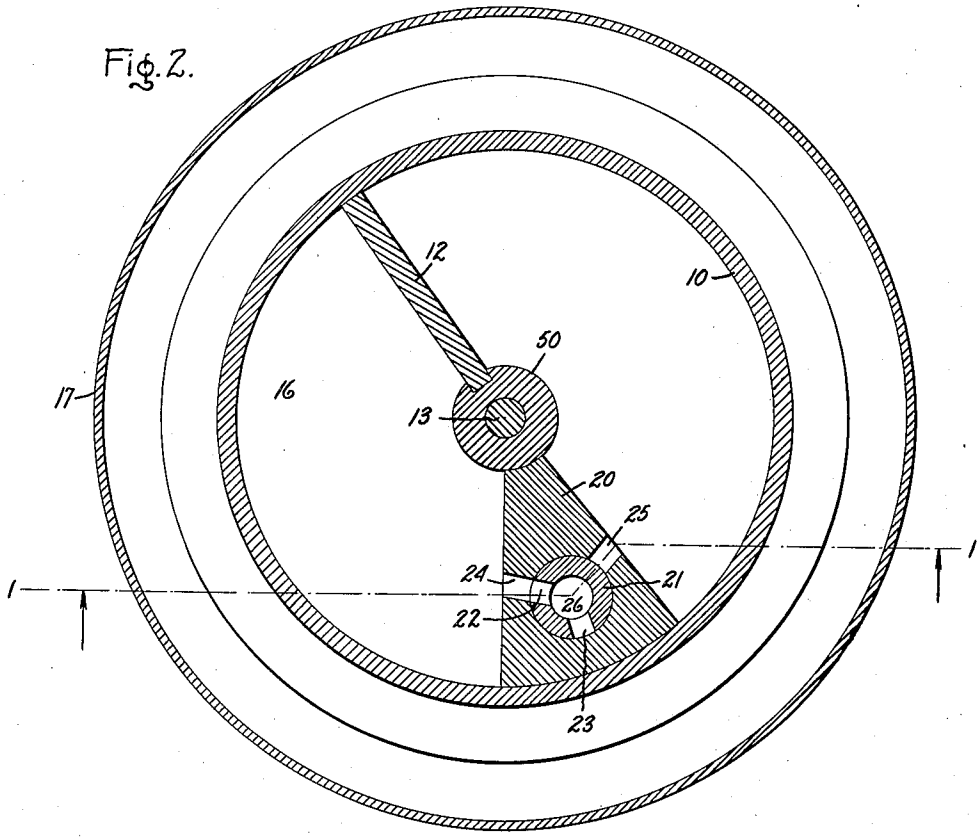


Fig. 3.

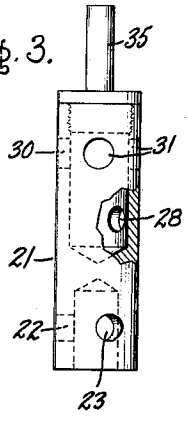
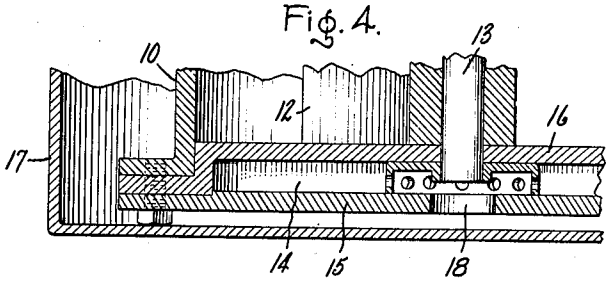


Fig. 4.



Inventor:
Robert H. Collingham,
by Harry E. Dunham
His Attorney

UNITED STATES PATENT OFFICE

2,025,573

HYDRAULIC OPERATING MECHANISM

Robert H. Collingham, Rugby, England, assignor to General Electric Company, a corporation of New York

Application May 7, 1934, Serial No. 724,419
In Great Britain May 24, 1933

2 Claims. (Cl. 60—52)

This invention relates to hydraulic operating mechanism, more particularly to hydraulic mechanism of the movable vane type, and it has for an object the provision of a simple, reliable and improved device of this character.

The present invention is an improvement of the hydraulic operating mechanism disclosed and claimed in my earlier patent application, Serial No. 707,619, filed January 20, 1934 and assigned to the same assignee. Nothing disclosed in my earlier filed application is claimed herein.

The movable vane of the earlier filed application is operated in one direction by liquid pressure generated by an impeller and is returned to its initial position by means of a spring when the impeller motor is stopped. An object of the present invention is the provision of means for operating the vane in both directions by means of liquid pressure.

In carrying the invention into effect in one form thereof, means are provided for establishing a differential pressure across the vane, and means are also provided for controlling the direction of rotation of the vane.

For a better and more complete understanding of the invention reference should now be had to the following specification and to the accompanying drawings, of which Fig. 1 is a perspective view taken partly in section on the line 1—1 of Fig. 2; Fig. 2 is a plan view taken in section on line 2—2 of Fig. 1; and Figs. 3 and 4 are details.

Referring now to the drawings, a casting 10 supports the casing 11 which contains suitable driving means such for example as an electric motor. The casting 10 is designed to provide a chamber in which a vane 12 is rotatably mounted.

The electric motor within the casing 11 drives a shaft 13 to the lower extremity of which an impeller 14 is secured to rotate therewith. A bottom plate 15 is secured to the casting 10 by any suitable fastening means, illustrated as stud bolts. A second plate 16 serves as a bottom plate for the vane chamber and is arranged in spaced relationship with respect to the plate 15 to provide an impeller chamber. A casing 17 is secured to the top flange portion of the casting 10 and surrounds the portion of the casting below the flange in such a manner as to provide lateral spacing between the walls of the casting 10 and the walls of the casing as well as the space beneath the bottom plate 15 with which the impeller chamber communicates through a central orifice 18 (see Fig. 4).

A fixed abutment 20 in the vane chamber is hollowed to receive a cylindrical rotatable valve 21. This valve is provided with ports 22 and 23 which cooperate with ports 24 and 25 respectively of the abutment. The arrangement of the ports in the valve and the ports in the abutment is such that by rotation of the valve liquid is admitted from the impeller chamber through the valve to either side of the vane 12, depending upon the position to which the valve is rotated.

The casing 17 is substantially filled with a liquid such for example as oil. Thus, it will be clear that the impeller chamber, vane chamber and the space above the vane chamber are filled with liquid since communication is provided from the space between the casting wall and the casing to the chambers within the casting 10 as indicated by the arrows of Fig. 1.

In operation, the impeller 14 is rotated at a suitable speed by means of the electric driving motor within the casing 11. The impeller delivers liquid through the exhaust 26 to the central aperture in the lower end of the valve 21 and from this central aperture through the valve port 22 and the cooperating abutment port 24 to the interior of the vane chamber where it acts against the vane 12.

The space within the vane chamber on the opposite side of the vane communicates with the intake of the impeller through the abutment port 27, valve port 28, upper central aperture of the valve, ports 30 and 31, orifices 32 and 33 in the side wall of the casting 10 and intake orifice 18 of the impeller. This produces a differential liquid pressure across the vane 12 which causes it to rotate. A lever 34 arranged above the cover plate is connected to the vane. This lever is provided with an eye 34_a by means of which it may be connected to the load member. Thus rotation of the vane effects rotation of the lever 34 and movement of the load member connected thereto.

By rotating the valve 21 in a counter-clockwise direction, the inlet and outlet ports are both reversed, and the differential liquid pressure across the vane is also reversed, thus causing the vane to rotate in the opposite direction.

In order to obtain a quick action when opening and closing the valve and also to provide for a full stroke of the vane in either direction, the valve 21 is provided with a spindle 35 to which a lever 36 is secured. This lever carries a pin 37 which is arranged to engage in a slot 38 formed in a link 40. This link is pivotally mounted at its extremity on swinging levers 41 and 42 which are respectively pivoted on pins 43 and 44. The link 40 is free to move on the vertical pins 45 and 46 and the pin 45 is connected by means of a

spring 47 to a fixed pin 48. A lever which may be and preferably is the load operating lever 34 is arranged to engage with the pins 45 and 46. This lever 34 is connected to a hollow shaft 50 which is also secured to the vane 12. Stop pins 51 and 52 are provided on opposite sides of lever 41 for limiting its movement. The effect of the spring 47 is to hold the lever against one or the other of pins 51, 52 and thus to hold the valve 21 in a definite position relative to either side of the fixed abutment 20.

It will be seen that when the lever 34 engages the pin 45 it will actuate the pin toward the left carrying with it the levers 41 and 42 as well as the link 40 which in turn operates the lever 36 through the pin 37 and thus rotates the valve 21 in a counter-clockwise direction. The movement of the link 40 places an increasing tension on the spring 47 until a position is reached at which the tension in the spring will cause a rapid movement of the lever 41 and link 40 thereby causing the pin 45 to move out of engagement with the lever 34 and thus quickly move the valve 21 into a position to admit liquid from the exhaust of the impeller to the opposite side of the vane 12. This, of course, will cause the lever 34 to rotate in the opposite direction until it comes into contact with the pin 46 when a cycle of operation similar to that just described, will take place. By this means a continuous reciprocating motion is obtained as long as the impeller driving motor is maintained energized.

Although in accordance with the provisions of the patent statutes, this invention is described as embodied in concrete form, it will be understood that the structure and elements shown and described are merely illustrative and that the invention is not limited thereto since alterations and modifications will readily suggest themselves to persons skilled in the art without departing from the true spirit of the invention or from the scope of the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An hydraulic operating mechanism comprising a cylindrical liquid container, a partition transverse to the axis thereof separating said container into a vane chamber and an impeller chamber having intake and discharge ports, an impeller rotatably mounted in said impeller chamber for producing a liquid pressure, an electric motor mounted on said container and having a shaft projecting through said chambers to drive said impeller, a vane in said vane chamber rotatably mounted on a sleeve surrounding said shaft, means providing communication from said discharge port to both sides of said vane and from both sides of said vane to said intake so as to produce a differential pressure for rotating said vane, and valve means controlled by said vane for controlling said communications to effect oscillating movement of said vane.

2. An hydraulic operating mechanism comprising a liquid container having a cover plate, base and side wall, a pair of partitions spaced from said base and cover plate to provide an impeller chamber having intake and discharge ports and an exhaust chamber, and spaced from each other to provide a vane chamber between said impeller chamber and said exhaust chamber, an impeller shaft extending through said chambers and an impeller in said impeller chamber mounted on said shaft, an electric motor mounted on said container and connected to rotate said impeller shaft, a vane in said vane chamber mounted for rotation on a sleeve surrounding said shaft, a casing surrounding and spaced from said container wall and providing a return path from said exhaust chamber to said intake port, a fixed abutment in said vane chamber for limiting the movement of said vane, said abutment having ports providing communication from said discharge port to both sides of said vane and from both sides of said vane to said exhaust chamber, a rotatable valve in said abutment for controlling said abutment ports, and mechanism actuated by said vane for actuating said valve to effect oscillating movement of said vane.

ROBERT H. COLLINGHAM.