Dec. 7, 1948. J. TRANTIN, JR 2,455,625

HYDRAULIC CONTROL VALVE

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Fig. 1.

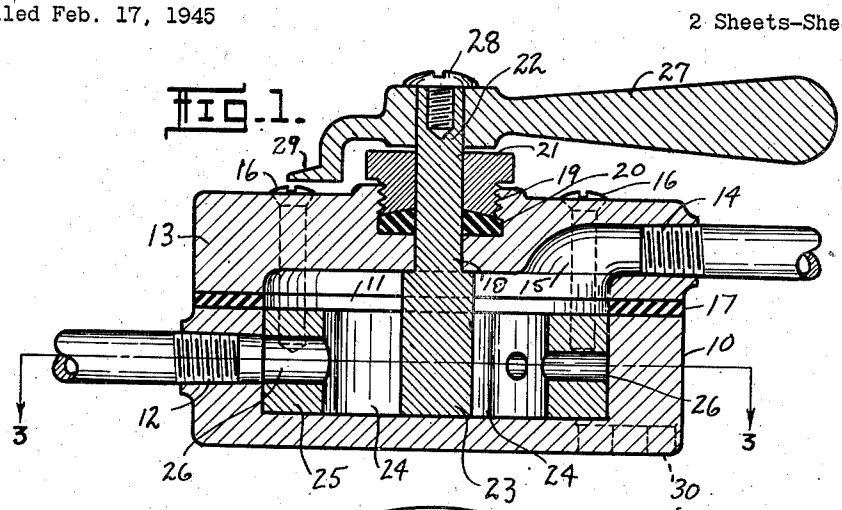


Fig. 2.

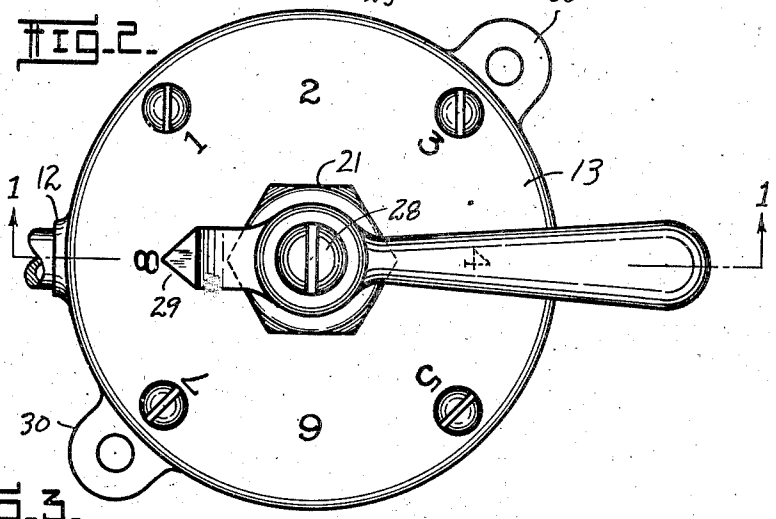
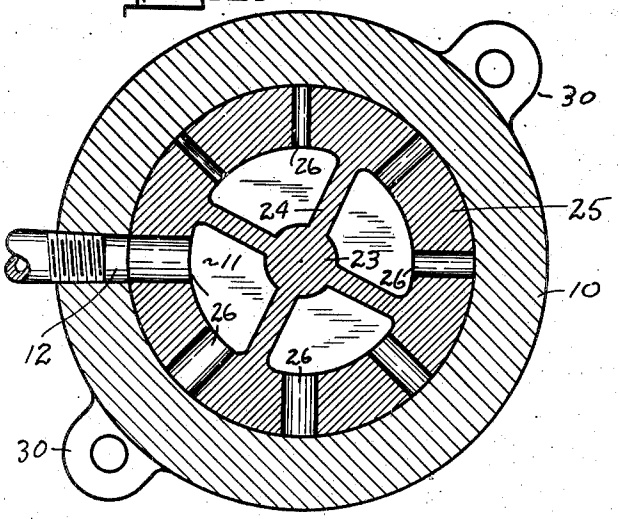


Fig. 3.



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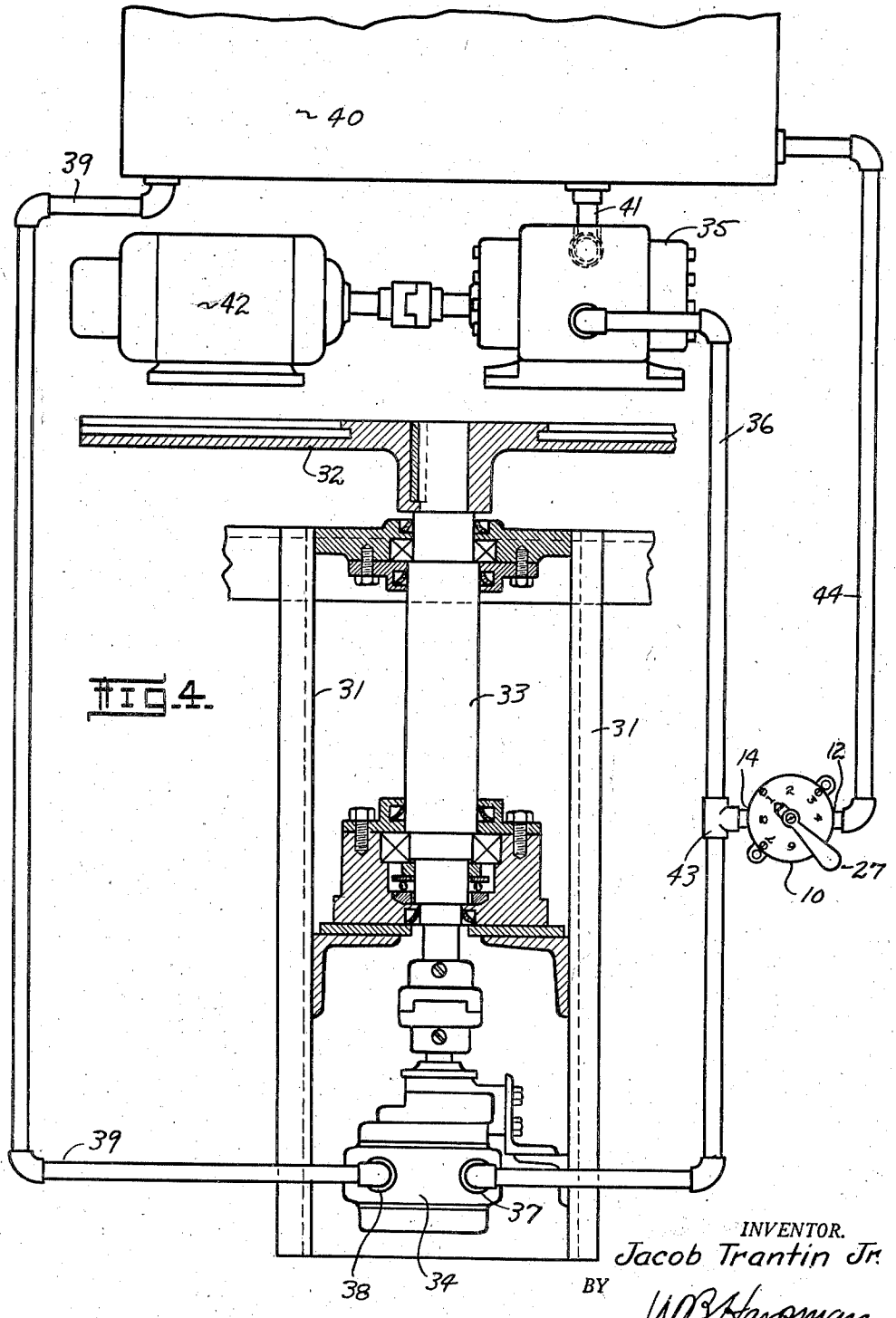


FIG. 4.

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HYDRAULIC CONTROL VALVE

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4 Claims. (Cl. 138—46)

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This invention relates to a control valve and more particularly to a valve adapted to be used in controlling centrifugal casting machines.

The principal object of the invention is the provision of a hydraulic control valve.

A further object of the invention is the provision of a hydraulic control valve having inlet and outlet orifices and a rotor operatively positioned thereabout for effecting control of fluid flowing therethrough.

A still further object of the invention is the provision of a hydraulic control valve incorporating a wheel-like rotor having a plurality of various sized orifices in the rim portion thereof and serving as a controlling element.

A still further object of the invention is the provision of a hydraulic control valve of simple design and construction providing means for effectively controlling hydraulic pressure without increasing the frictional engagement between its moving parts.

The hydraulic control valve shown and described herein has been designed to provide a convenient control means for a hydraulic medium such as is used in driving a centrifugal casting machine. The hydraulic control valve incorporates a novel rotor structure in that the rotor is so designed that fluid pressure in the body of the valve in no way affects the frictional engagement of the rotor with the portions of the valve adjacent thereto. This makes possible the ready adjustment of the valve as the same operates freely at all times. The hydraulic control valve is particularly adapted for use in controlling a centrifugal casting machine employing a directly coupled fluid motor, the valve being positioned between the fluid motor and the fluid power source and controlling a by-pass line with respect thereto.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein—

Figure 1 is a vertical cross section of the hydraulic control valve.

Figure 2 is a top plan view of the hydraulic control valve.

Figure 3 is a horizontal cross section of the hydraulic control valve taken on lines 3—3 of Figure 1.

Figure 4 is a plan view of an assembly of hydraulic apparatus and illustrates the use of the hydraulic control valve in the control thereof.

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By referring to the drawings and Figure 1 in particular wherein a cross section of the hydraulic control valve is illustrated, it will be seen that the valve consists of a cylindrical body 10 which defines a chamber 11 which is provided with an outlet orifice 12 in the wall thereof. The body 10 is adapted to receive a cap 13 which includes an inlet orifice 14, the innermost end 15 of which communicates with the chamber 11 formed in the valve body 10 and by the cap 13. A plurality of screws 16 serve to affix the cap 13 to the valve body 10 and an annular gasket 17 is positioned between the cap 13 and the valve body 10 to form a fluid tight seal between these parts. The cap 13 is provided with a central vertically positioned orifice 18, the uppermost portion 19 of which is threaded and adapted to receive a section of suitable packing material 20 which is held in position by means of a packing nut 21 threadably engaging the threaded area 19 of the orifice 18. This construction provides for a fluid tight seal about a vertical stem 22 of a cylindrical rotor 23 which includes a plurality of webs 24 and a rim 25. It will be observed that the outer diameter of the rim 25 of the cylindrical rotor 23 is slightly smaller than the diameter of the cylindrical chamber 11 formed in the valve body 10 so that when the wheel-like rotor 23 is positioned therein, as illustrated in Figures 1 and 3, an effective seal is established between the rim 25 of the rotor 23 and the valve body 10. It will be observed that the inlet orifice 14 and particularly its innermost end 15 communicates with the chamber 11 and those portions of the rotor 23 between the plurality of webs 24 so that fluid pressure contained in the fluid control valve is directed against the rotor 23 and specifically against the rim portion 25 thereof. As such fluid pressure is exerted equally in all directions, the net result is the free positioning of the rotor 23 in the valve body 10 as the rotor 23 itself withstands the fluid pressure directed thereagainst and the frictional engagement of its rim portion 25 against the valve body 10 is thereby not increased by the fluid pressure contained in the valve.

By referring to Figures 1 and 3 of the drawings it will be observed that the rim 25 of the wheel-like rotor 23 is provided with a plurality of horizontally positioned orifices 26 which extend through the rim portion 25 and establish communication between the area defined by the rim portion 25 and the webs 24 of the rotor 23 and the outlet orifice 12 in the body member 10 when in registry therewith. It will thus be seen that fluid introduced into the chamber 11 of the valve body 10 as by way of the inlet orifice 14 is placed in communication with the outlet orifice 12 by moving the cylindrical rotor 23 to bring one of the orifices 26 into registry with the outlet orifice

12. Such movement may be imparted to the wheel-like rotor 23 by means of a handle 27 affixed to the vertically positioned stem 22 of the rotor 23.

By referring to Figures 1 and 2 of the drawings it will be seen that the handle 27 is affixed to the vertical stem 22 of the rotor 23 of the hydraulic valve by means of a screw 28 which serves to hold the handle in place upon the stem 22. It is obvious that the stem engaging opening in the handle 27 may be formed with flattened surfaces to register with like surfaces formed on the uppermost end of the stem 22 to insure the positioning of the handle 27 thereon. The handle 27 is provided with a pointer extension 29 which, as may be seen by referring to Figure 2, is useful in indicating by means of numerals or symbols formed on the cap 13, the particular one of the orifices 26 in registry with the outlet orifice 12. The fluid control valve is also provided with a pair of mounting brackets 30 which enable it to be conveniently mounted on a supporting surface.

The hydraulic control valve as illustrated herein provides eight different sized orifices 26 in the rim 25 in the wheel-like rotor 23 thereof, which construction enables the valve to control a hydraulic line and specifically the quantity of fluid flow therethrough, in a desirable volume range.

By referring now to Figure 4 of the drawings it will be seen that a schematic layout of a centrifugal casting machine including a fluid motor 31 and suitable fluid power source for operating the same has been illustarted. The hydraulic control valve, the subject of this invention, is illustrated in operative connection with the fluid power source disclosed in Figure 4 and provides an effective means of controlling the operation of the centrifugal casting machine. In Figure 4 the centrifugal casting machine is generally indicated by the numeral 31, the rotatable casting table by the numeral 32, its supporting shaft by the numeral 33 and a fluid motor 34 is illustrated in direct connection with the supporting and driving shaft 33. A suitable pump 35 is shown connected by means of pipe 36 with the inlet orifice 37 of the fluid motor 34 and an outlet orifice 38 of the fluid motor 34 is connected by a pipe 39 with a fluid reservoir 40. A pipe 41 connects the fluid reservoir 40 with the pump 35 and an electric motor 42 is provided to operate the pump 35. The hydraulic control valve 10 is illustrated as being in communication with a T-fitting 43 in the pipe 36 which conveys hydraulic fluid from the pump 35 to the fluid motor 34. The outlet orifice 12 of the fluid control valve 10 is in communication with a by-pass pipe 44 which also communicates with the reservoir 43. It will thus be seen that the hydraulic control valve provides desirable control for the centrifugal casting machine in that the various sized orifices in the hydraulic control valve permits the by-passing of a suitable volume of the hydraulic medium used and enables the speed of the centrifugal casting machine to be easily and accurately controlled thereby. For example, the rotatable table 32 of the centrifugal casting machine 31 may be rotated very slowly by utilizing the largest orifice in the cylindrical rotor 23 of the control valve 10 and that when smaller orifices 26 are brought into registry with the outlet orifice 12 of the control valve 10, a smaller volume of the hydraulic medium is by-passed and hence higher speeds are inparted to the rotatable casting table 32 by the fluid motor 34.

It will thus be seen that a simple and extremely efficient hydraulic control valve has been disclosed which may be effectively used with relatively great hydraulic pressures and control the same easily due to its ability to handle any hydraulic pressure without effecting a frictional engagement of its operating parts.

Having thus described my invention, what I claim is:

1. A hydraulic control valve consisting of a body having a circular depression formed therein, a cap for said body, an outlet orifice in the side of said body and an inlet orifice in said cap, a cylindrical rotor positioned in the said circular depression in the body, said rotor having a hub spaced by a plurality of webs, an extension formed on said hub, an opening in said cap, the said hub extension extending through said opening in said cap and terminating outside of said body, means affixed to said hub extension for turning the said rotor thereby, a gland formed in said cap about said hub-like extension, and a plurality of openings formed in the rotor and adapted to register individually with the outlet orifice in the said body.

2. A hydraulic control valve including a body and cap structure defining a cylindrical chamber therein and having an inlet orifice in said cap structure and an outlet orifice in said body, a rotor having a hollow center positioned in said chamber, a plurality of radially spaced, various sized openings in said rotor for selective registry with said outlet orifice in said body, the said inlet orifice in communication with the hollow center of the said rotor, and means positioned externally of the said valve for rotating the said rotor.

3. A fluid control valve including a body having a circular depression formed therein, a cap for said body, an outlet orifice in the side of the said body and an inlet orifice in said cap, a rotor having a hollow center positioned in the said circular depression, the hollow center of the said rotor in communication with the said inlet orifice, a plurality of different sized openings formed in the said rotor, each opening positioned to register individually with the said outlet orifice in the said body when the rotor is revolved.

4. A hydraulic control valve including a body and cap, a rotor having a hollow center disposed in said body, an inlet orifice in said valve in direct communication with the hollow center of the said rotor and an outlet orifice in said valve in registry with the peripheral edge of the said rotor, a plurality of radially spaced openings of various sizes formed in said rotor and forming means of communication between the hollow center thereof and the peripheral edge thereof for individual selective registry with said outlet orifice in said body.

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