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FLUID MOTOR.

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1,282,841.

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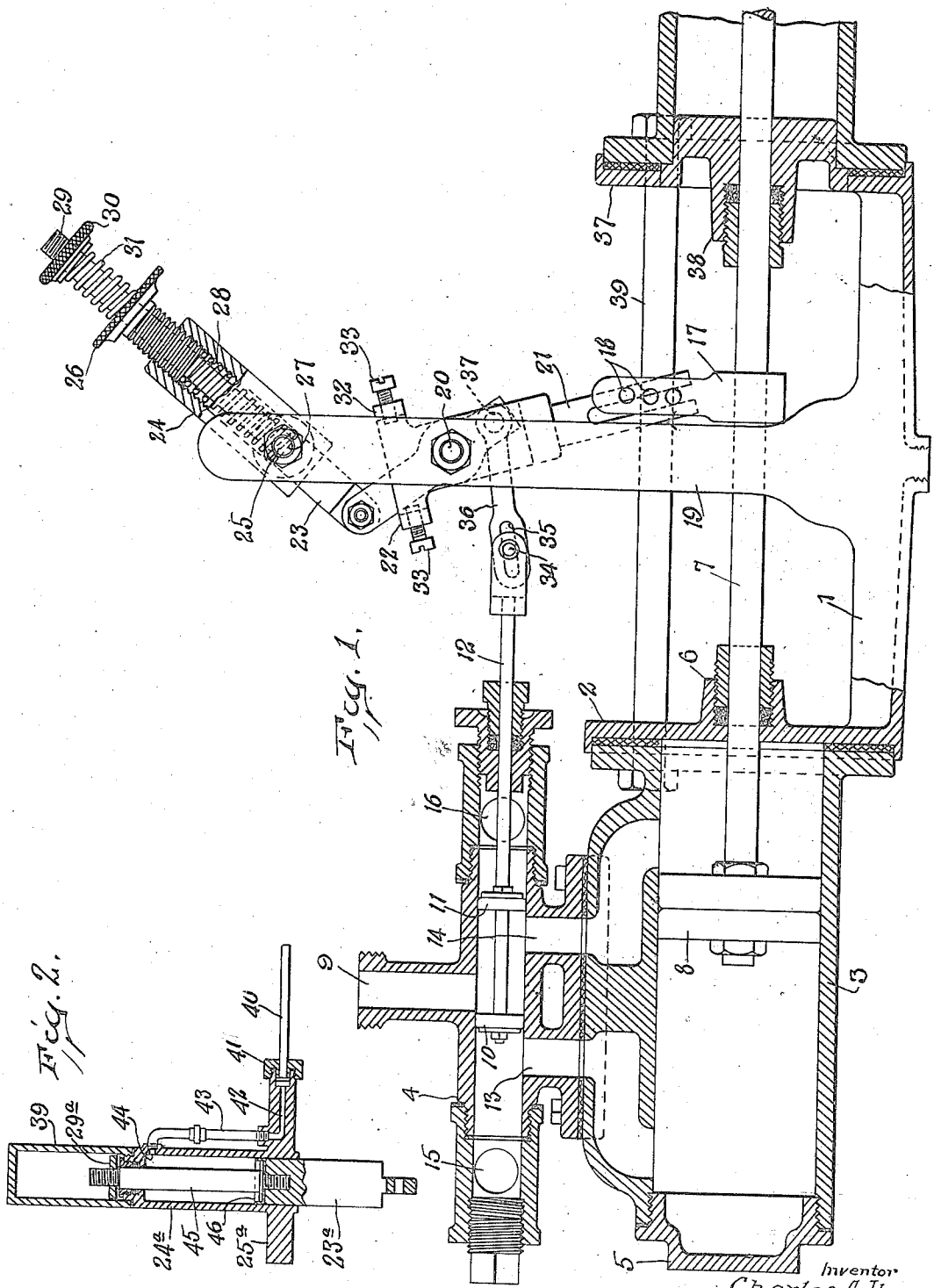


Fig. 1.

Fig. 2.

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FLUID-MOTOR.

1,282,841. Specification of Letters Patent. Patented Oct. 29, 1918.

Application filed September 7, 1917. Serial No. 190,093.

To all whom it may concern:

Be it known that I, CHARLES A. ILES, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Fluid-Motors, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to fluid motors and has for its main object to provide an improved construction of this type in which a pressure cylinder is provided with a valve mechanism quickly and certainly shifted so as to reverse the movement of the pump piston.

An additional object is to provide a valve mechanism for a fluid motor which is shifted by a toggle mechanism under control of a spring whereby to reverse the valve mechanism quickly and positively.

In the accompanying drawings, Figure 1 is a vertical longitudinal section taken centrally of the device showing the cylinder and the valve mechanism, the piston being shown as having just started its stroke toward the left of the figure; and Fig. 2 shows a modified form of valve operating mechanism.

Referring to the drawing the entire device is shown as mounted on a casing 1 which may also serve as a drip pan. This casing has an upward extension 2 at its left hand end and to this extension the cylinder 3 and the valve mechanism, indicated generally by the numeral 4, is fast. As shown, the end of the cylinder 3 is composed of a head 5 and at the other end of the cylinder may be provided a stuffing box 6, through which the piston rod 7 passes. The piston rod 7 is carried by a piston 8 moving in the cylinder 3 and serves to operate any desired mechanism.

The fluid under pressure enters the valve mechanism casting at the inlet port 9 and passes by the valve proper. This valve is composed of pistons 10 and 11 both carried by a rod 12 and the rod is adapted to be moved reversely at each end of the stroke of the piston 8.

From the inlet 9 the fluid moves through passages 13 and 14 into the cylinder 3. In the position of the valve shown the passage 14 is open to the fluid under pressure and therefore the piston 8 is being moved toward the left of the figure. The fluid which has been used on the preceding stroke of the piston passes in the position shown out through passage 13 and out of the valve casing through an outlet 15. A second outlet 16 serves to permit escape of the fluid when the piston 8 is moving in the other direction.

In order to shift the valve at the proper times the piston rod 7 is provided with a vertically extending standard 17, this standard having a plurality of holes 18, through which a connecting pin may be passed. The main frame 1 is provided with an upwardly extending standard 19 and pivoted loosely to this on a pin 20 is an oscillating lever arm 21 having extensions between which a pin may be passed through the holes 18 in the standard 17. As will be seen the pins connect the standard 17 to the lever 21 whereby the lever is oscillated with the movement of the piston rod 7. The provision of a number of the holes 18 serves to permit a variation of the stroke of the lever 21.

Also journaled loosely on the pin 20 on the standard 19 is one member 22 of a toggle, the other member 23 of which is slidable in a cylindrical casing 24 which is journaled on a pin 25 also carried by the stand 19. The casing 24 is provided with a cap screw or nut 26, and between the nut 26 and a collar 27 fast on the sliding toggle member 23 a spring 28 is confined. The toggle member 23 passes loosely through the cap 26 and has a screw-threaded end 29, an adjusting nut 30 being also screw-threaded to engage the threads 29. Between the cap 26 and the adjusting nut 30 a spring 31 is provided surrounding the toggle member 23.

The oscillating lever 21 is T-shaped at its upper end and through flanges 32 are passed adjusting screws 33. These screws serve to aid in the timing of the valve mechanism by controlling the movement of the toggle member 22. The valve piston rod 12 may be bifurcated at its outer end and be provided with a pin 34 passing through a slot 35 in a connecting rod 36 which is pivoted at its other end by a pin 37 to the toggle member 22. The slot 35 provides a lost motion connection between the valve piston rod 12 and the connecting rod 36 so that the valve will not be moved throughout the stroke of the connecting rod, but only at the desired time.

In the position of the parts shown the

piston 8 is moving toward the left of the figure as the passage 14 is opened to the liquid under pressure from entrance port 9. As the piston 8 moves toward the left the piston rod 7 is carried with it and thus through the pin 18 serves to oscillate the lever member 21. As shown, one of the screws 33 is pressing against the upper portion of the toggle member 22 and therefore the toggle is being gradually straightened, thus compressing the spring 28. Also the connecting rod 36 is moving toward the left, but this produces no movement of the valve piston rod 12 because of the lost motion slot 35. When the piston 8 is moved far enough to carry the toggle members 22 and 23 past the line joining pins 20 and 25 the spring 28 will operate and quickly break the toggle, thus moving the connecting rod 36 rapidly toward the left of the figure and as the lost motion of slot 35 has then been taken up the valve proper will be given a quick movement to the left, thus carrying the piston 10 past the passage 13 and carrying the piston 11 past the passage 14. In that position of the parts the passage 13 is open to the fluid pressure from entrance port 9 and thus the piston will reverse its motion and start toward the right. As it moves toward the right the oscillating lever 21 will move with it and the right hand one of the screws 33 will shortly engage the upper portion of the toggle member 22 and move it toward its straightened position. Toward the end of the stroke of the piston 8 toward the right a reversal of the movement of the toggle as above described will take place and the spring 28 will serve to break the toggle quickly so as to shift the valve mechanism again.

The spring 31 surrounding the toggle member 23 serves to limit the movement of the toggle when it is broken and moves under the force of spring 28. The adjusting nut 30 being carried on the toggle member 23 serves to compress the spring 31 when the toggle is broken and thus prevents it from moving too far.

It will be seen that the objects first stated are well accomplished by this construction. The valve mechanism is quickly and certainly shifted and is not moved at all until substantially the end of the piston stroke is reached. Then the toggle mechanism serves to shift the valve suddenly through its full stroke, thus changing the connections for entrance of the fluid under pressure and the reverse movement of the piston 8 begins promptly.

Fast to the supporting casting 1 may be a second vertical extension 37 and this may include a bearing 38 for the piston rod 7. Also a plurality of rods 39 may be passed between the extensions 2 and 37 of the supporting base 1 and held by nuts, as shown whereby an accurately alined construction is provided and the piston rod 7 is compelled to move in alinement with the piston 8.

In Fig. 2 I have shown a modified form of valve shifter, operated by water pressure, by which the valves 10 and 11 are shifted first in one direction and then in the other. Connected loosely to the toggle member 22 is a member 23^a slidable in a cylindrical member 24^a. This member 24^a has journals 25^a rotatably mounted in the standards 19. One end of the member 23^a is provided with a piston and rod 45 to which is secured a head 46 slidable in the cylinder 39. Somewhere in the supply line the conducting pipe 40 is connected while its other end is connected to one member of the journal 25^a. This connection, designated 41, to the journal 25^a is of a well known construction which allows the journal to be oscillated freely and remain water tight. A passage 42 in the journal for a part of its length conveys the fluid, through a pipe connection 43, to the upper end of the member 24^a into which the fluid enters causing the piston 46 to travel downward in the cylinder 39 carrying with it the member 23^a which throws the toggle 22 and its connecting mechanism to one side or the other, which operates on the valves 10 and 11 to cause the incoming fluid pressure to operate upon one or the other end of piston 8. The movement of the main piston 8 and rod 7 serves to push the valve piston 46 up in the cylinder 39 against the pressure of the water, but when the toggle passes the center the pressure will depress piston 46, thus breaking the toggle quickly, in the manner of the spring 28 in Fig. 1. An adjusting nut 29^a acts in the manner of the nut 29 of Fig. 1.

While I have shown and described one embodiment of the invention and a modification thereof it will be understood that the same has been chosen for purposes of illustration only and that I do not desire to be limited to the details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

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

1. In a fluid motor, the combination, with a cylinder having a piston and a piston rod therein, of a base supporting said cylinder, a standard projecting upwardly from said base, a T-shaped head pivoted to said standard and connected to said piston rod, a toggle having one arm pivoted to said standard at the pivotal point of said head, a casing pivoted to said standard in which the other arm of the toggle is slidably carried, and a valve for said cylinder having connections to one of said toggle arms.

2. In a fluid motor, the combination, with a cylinder having a piston and a piston rod

therein, of a base carrying said cylinder, a standard projecting upwardly from said base, a lever pivoted to said standard and connected to be oscillated by said piston rod, a toggle having one arm pivoted to the standard at the pivotal point of the lever and operable by the lever, a casing also pivoted to said standard in which the other toggle arm is slidably mounted, a spring tending to break said toggle, and a cylinder valve connected for operation by the toggle.

3. In a fluid motor, the combination, with a cylinder having a piston and a piston rod therein, of a standard supported in rigid relation to said cylinder, a lever pivoted to said standard, having oppositely positioned projections thereon and connected to be oscillated by said piston rod, a toggle having one arm pivoted to the standard at the pivotal point of the lever, and adapted to oscillate between said projections, a casing also pivoted to said standard and in which the other toggle arm is slidably carried, a spring carried in the casing and tending to break the toggle, a cylinder valve, and lost motion connections from one of said toggle arms to operate said valve.

4. In a fluid motor, the combination, with a cylinder having a piston and a piston rod therein, of a supporting member, a lever pivoted to said member ar l connected to be oscillated by the piston rod, said lever having oppositely positioned projections through which adjusting screws are passed, a toggle having one arm pivoted to the supporting member at the pivotal point of the lever, and movable between said adjusting screws, a casing also pivoted to the supporting member and in which the other toggle arm is carried, devices tending at all times to break said toggle, a cylinder valve and connections from said first-mentioned toggle arm to operate said valve.

5. In a fluid motor, the combination, with a cylinder having a piston and a piston rod therein, of a supporting member, a lever pivoted to said member and having opposite projections at one end thereof, a toggle having one arm pivoted to the supporting member at the pivotal point of said lever and movable between said opposite projections, devices connecting the other end of said lever to the piston rod for operation thereby, a cylinder valve, and means connecting said toggle arm to said valve.

In testimony whereof, I affix my signature.

CHARLES A. ILES.