F. J. CROUCH.

PUMP.

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1,246,241.

Patented Nov. 13, 1917.

2 SHEETS—SHEET 1.

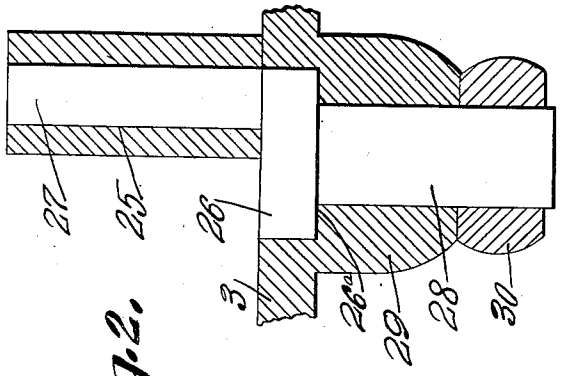


Fig. 2.

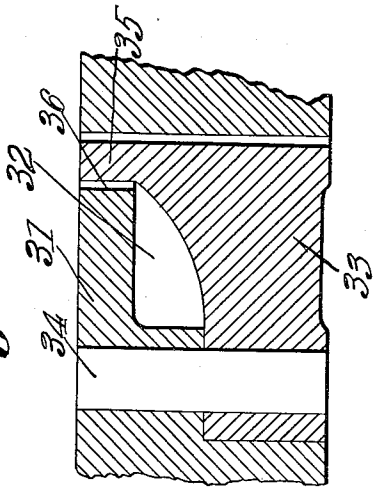


Fig. 3.

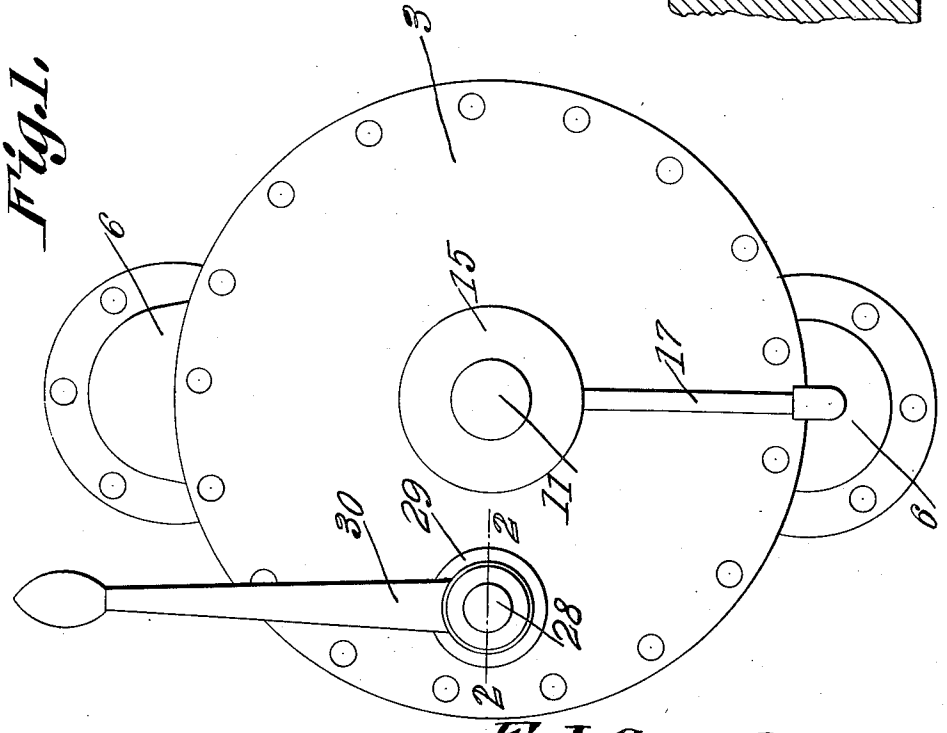


Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

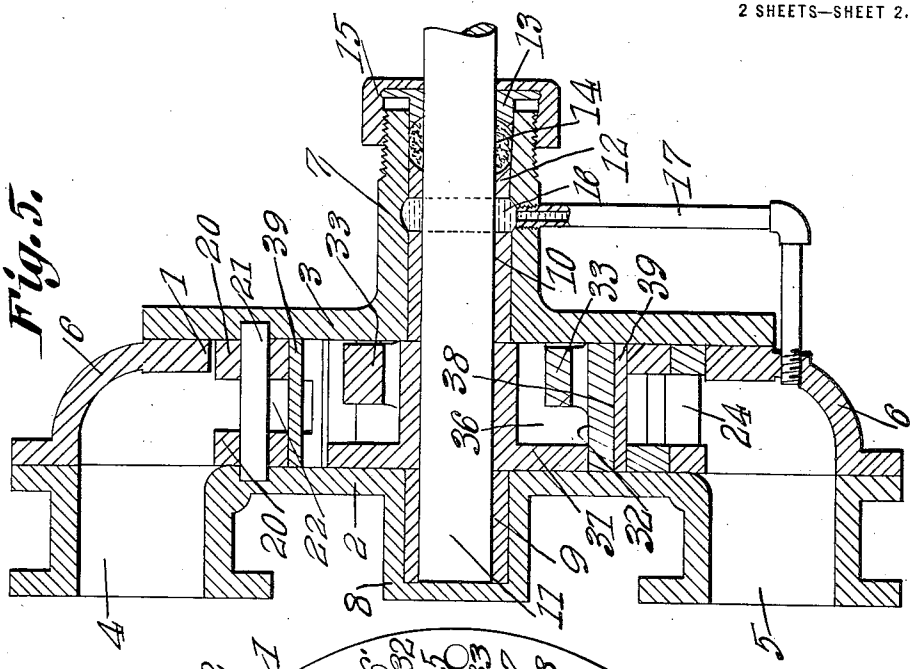
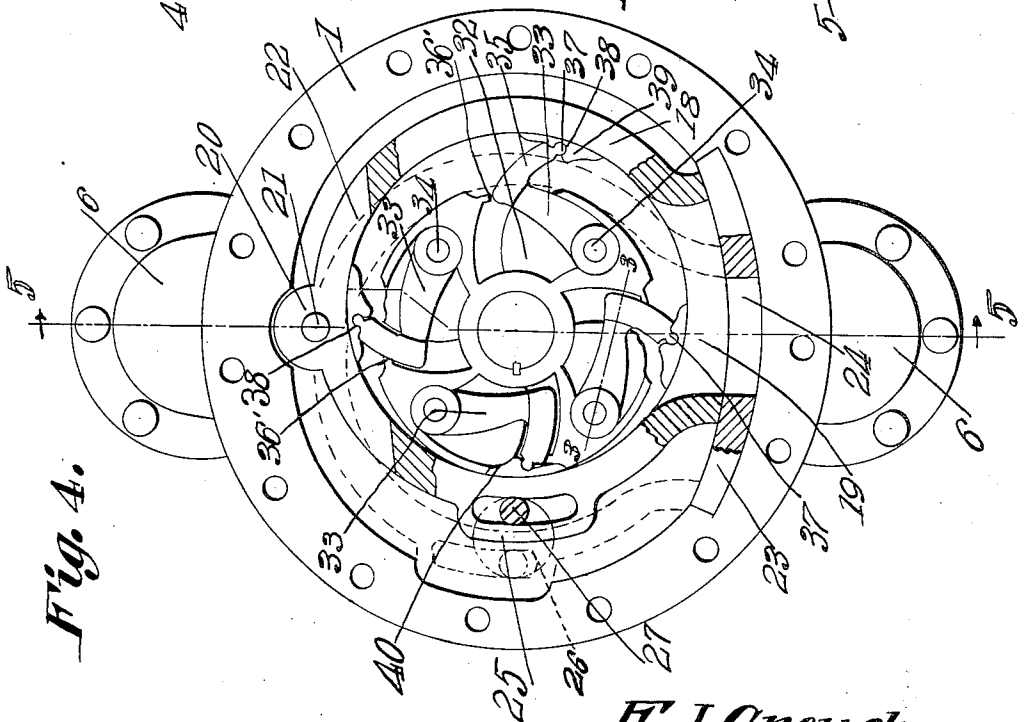


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PUMP.

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Application filed February 12, 1917. Serial No. 148,116.

To all whom it may concern:

Be it known that I, FRANK J. CROUCH, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Pump, of which the following is a specification.

The present invention appertains to pumps, and aims to provide a novel and improved high speed, high pressure, reversible and variable flow oil transmitting pump, which can be employed to advantage for power transmission, being operated by an engine, electric motor, or other prime mover, and although especially designed for pumping oil or equivalent liquid, can be used for pumping water and other fluids.

It is the object of the invention to provide a pump of such construction and operation, that the same can, with a steady full speed operation thereof, be manipulated for varying the quantity of fluid moved thereby in either direction, for reversing the flow of the fluid, and for regulating and stopping the flow of fluid, the change in the capacity of the pump and direction of flow being effected by a simple operation without effecting the speed of operation of the working parts.

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 drawings, wherein:—

Figure 1 is a front view of the improved pump.

Fig. 2 is an enlarged sectional detail taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged sectional detail taken on the line 3—3 of Fig. 4.

Fig. 4 is a front view with the front plate or cover removed and portions broken away and shown in section.

Fig. 5 is a diametrical section taken on the line 5—5 of Fig. 4.

The housing or casing inclosing the working parts is constructed of three castings or sections as illustrated, including the intermediate or peripheral section 1 and the back and front plates or covers 2 and 3 secured in any suitable manner to the opposite sides of the section 1. The back plate 2 has rearwardly projecting outlet and inlet bosses 4 and 5, respectively, having openings for the flow of oil or other fluid therethrough. The casing 1 is provided with diametrically opposite elbow portions 6 providing an outlet and an inlet for the casing communicating with the ports 4 and 5.

The back plate is provided with a central out-standing socket portion 8, while the front plate 3 is provided with a central out-standing sleeve 7, a bearing 9 being fitted within the socket portion 8 and a similar bearing 10 being fitted within the sleeve 7 adjacent to its butt end. A shaft 11 is journaled within said bearings and projects from the sleeve 7 to be operated by an engine, electric motor or other prime mover.

A collar 12 is fitted within the sleeve 7 upon the shaft 11, and a gland 13 fits within the free end of the sleeve 7 and is forced into place by means of a socket nut 15 threaded upon the end of the sleeve to compress the packing 14 between the collar 12 and gland 13 whereby the packing embraces the shaft to prevent leakage.

The collar 12 and bearing 10 are spaced apart to provide an annular oil chamber 16 for lubricating the shaft, and oil can be supplied to said chamber by means of a pipe 17 connected to the sleeve 7 and to the one elbow or portion 6 of the casing.

Movably mounted within the housing or casing is an annular stator 18 disposed snugly between the plates 2 and 3 which close the sides of the stator. The stator is provided at one point with an inlet opening 19, and is provided diametrically opposite said opening with ears 20 pivotally engaging a pivot pin 21 which has its ends seated in recesses in the plates 2 and 3 adjacent to the one opening of the housing or casing, the stator having an elongated outlet opening 22 extending between the ears 20 and communicating with the other opening of the casing. The openings 19 and 22 are diametrically opposite to one another, and an arcuate guide and wear plate 23 is seated in the section 1 of the casing and has an opening 24 establishing communication between the opening 19 of the stator and the respective opening of the casing. That portion of the stator remote from the pivot 21 and surrounding the opening 19 is movable snugly along the plate

23, as will be apparent by reference to Fig. 4, with the opening 19 always in communication with the opening 24.

As a means for oscillating the stator to change the position thereof within the casing and to thereby control the flow of fluid, the stator is provided at one side with an elongated slot 25, and a rotatable disk 26 seated in a recess 26[a] of the plate 3 is provided with an eccentrically located pin 27 projecting therefrom toward the plate 2 and working within the slot 25 in order that when the disk 26 is oscillated, this will oscillate the stator. A stem 28 secured centrally to the disk 26 is journaled through and projects from a boss 29 of the plate 3, and a suitable lever or handle 30 is secured to the end of the stem 29, whereby the lever can be swung for changing the position of the stator conveniently. When the lever projects upwardly, as seen in Fig. 1, the stator is swung to the right, as seen in full lines in Fig. 4, and when the lever is swung so as to project downwardly, the stator is swung to the left, as seen in dotted lines in Fig. 4, whereas when the lever is in intermediate or neutral position, the stator will be in a similar position practically concentric with the rotor and shaft 11.

The rotor 31, which is of cylindrical form, is keyed or otherwise fastened upon the shaft 11 and is disposed snugly between the plates 2 and 3 within the stator, the stator being of larger diameter than the rotor. The rotor 31 is provided in its forward face with annular series of recesses 32 accommodating oscillatory arms 33 mounted therein and having certain ends pivotally engaging pivot pins 34 carried by the rotor, whereby the arms 33 are swingable toward and away from the shaft 11. The arms 33 are provided at their free ends with integral arcuate vanes 35, and the rotor 31 has arcuate slots 36 receiving the vanes and in which they are movable toward and away from the center of the rotor. The arms 33 project in the direction in which the rotor revolves (counter clockwise as seen in Fig. 4), and the vanes 35 project outwardly from the arm so that their outer portions are movable along the inner cylindrical surface of the stator. The vanes 35 have their side edges working snugly against the plates 2 and 3, and the rotor 31 is provided with abutments 36′ in front of the respective vanes and snugly fitting the convexed forward surfaces of said vanes, to prevent leakage.

As illustrated, the outer ends of the vanes 35 are provided with shoes, although they can be eliminated if not wanted. Thus, the outer ends of the vanes have transverse ribs 37 of cylindrical form received by similarly shaped transverse grooves 38 which the shoes 39 have, thus enabling the shoes and vanes to oscillate a limited extent relative to one another. The shoes are curved to fit the inner surface of the stator, and the periphery of the rotor is provided with recesses 40 for accommodating and receiving the shoes, whereby they can move within the outline of the rotor when necessary, as at the left hand side of the rotor as seen in Fig. 4.

In operation, the rotor moves counter clockwise, as seen in Fig. 4, with the arms 33 projecting in the direction of rotation and their vanes 55 projecting outwardly and rearwardly whereby the pressure or resistance imposed upon the vanes, and their shoes, will tend to swing the arms and vanes outwardly to bring and hold the shoes against the interior surface of the stator. Now, supposing that the stator is shifted to the right, as seen in Fig. 4, with the left hand side of the stator in contact with the rotor, then the fluid cannot flow between the left hand sides of the stator and rotor, but can flow in the crescent-shaped face between the right hand sides of the rotor and stator, and as the rotor operates, the vanes will force the fluid ahead of them, thereby discharging the fluid through the port 4, and at the same time sucking in the fluid from the port 5. By shifting the stator to the left, as seen in dotted lines in Fig. 4, so that the right hand portions of the stator and rotor are in contact, the direction of the fluid is reversed, since the vanes in moving away from the port 4 toward the port 5 at the left hand side will move the fluid in the corresponding direction, as will be apparent. When the stator is shifted to an intermediate or neutral position so that it is practically concentric with the rotor, the fluid can flow in one direction at one side of the rotor, and in the opposite direction at the opposite side, so that the fluid within the stator is merely rotated with the rotor, without the fluid being moved through the ports 4 and 5. As the stator is shifted in either direction from neutral or intermediate position, the flow of fluid at one side of the rotor will become greater than at the other side, thereby moving the fluid through the ports 4 and 5 according to the direction in which the stator is shifted, and as the rotor is moved farther, the flow of fluid through the ports 4 and 5 is accelerated. It is thus possible by manipulating the lever or handle 30 to control both the direction of the flow and the volume, while the rotor rotates at practically the same speed. The present pump is therefore particularly useful for the transmission of power, providing for the change of speed and the reversal of the mechanism actuated by the fluid.

Having thus described the invention, what is claimed as new is:

1. A pump embodying a casing having openings and a curved portion provided with an opening communicating with one of

the first mentioned openings, an oscillatory stator mounted within the casing and having its free portion working along and in contact with said curved portion and provided with an opening registering with the opening of said curved portion, the stator having an opposite opening, a rotor mounted within the casing and disposed within the stator, and vanes carried by the rotor to engage and work along the interior of the stator.

2. A pump embodying a casing having opposite openings and a curved portion adjacent to one opening provided with an opening communicating with said opening, a stator within the casing pivotally mounted therein at one point near the other of the first mentioned openings, the free portion of the stator working along and in contact with said curved portion and having an opening communicating with the opening of said curved portion, the opposite portion of the stator having an opening near the pivot communicating with the second mentioned opening of the casing, a rotor carried by the casing within the stator, and vanes carried by the rotor working along the interior of the stator.

3. A pump embodying a casing having side plates and peripheral openings, the casing having at its peripheral portion a curved portion provided with an opening communicating with one of said openings, an annular stator disposed snugly between said plates and pivoted at one point thereto, the stator having a free portion working along and in contact with said curved portion and provided with an opening communicating with the opening of said curved portion, the stator having an opposite opening near its pivot, a shaft journaled in the casing, a rotor carried by the shaft within the stator, and vanes carried by the rotor working along the interior surface of the stator, the rotor and vanes being disposed snugly between said plates.

4. A pump embodying a casing having openings, and a curved portion having an opening communicating with one of said openings, a stator mounted for oscillation within the casing having its free portion working along and in contact with said curved portion and provided with an opening communicating with the opening of said curved portion, the stator having an opposite opening, a rotor carried by the casing within the stator, vanes carried by the rotor working along the interior surface of the stator, the stator having a slot, and a rock shaft carried by the casing having an eccentric member working in said slot of the stator.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

FRANK J. CROUCH.

Witnesses:
JOHN R. TYRRELL,
E. P. SCHMIDT.