July 26, 1949. R. D. HARTZLER 2,477,371

VARIABLE DELIVERY, REVERSIBLE FLOW VANE PUMP FOR FLUID TRANSMISSIONS

Filed Oct. 1, 1945

3 Sheets-Sheet 1

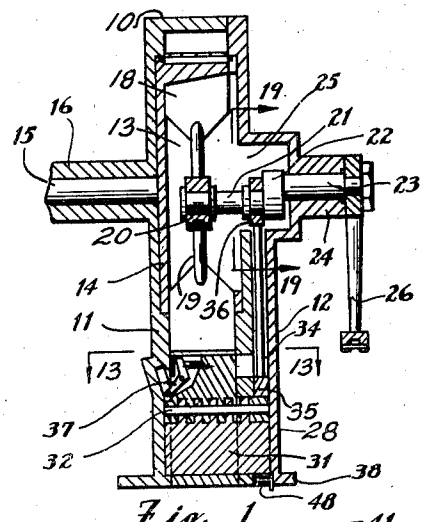


Fig. 1

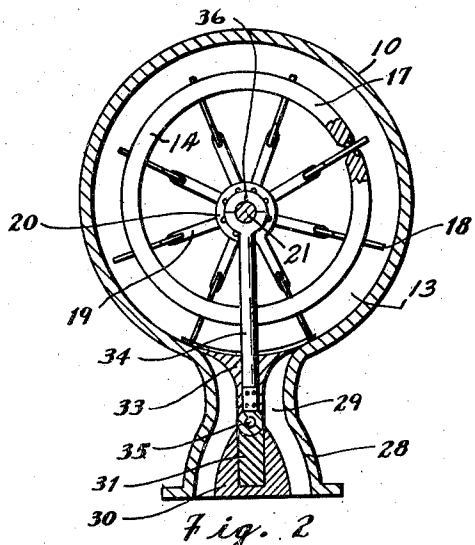


Fig. 2

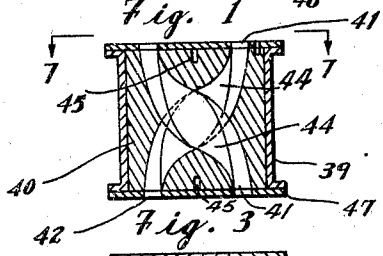


Fig. 3

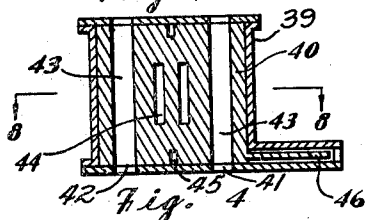


Fig. 4

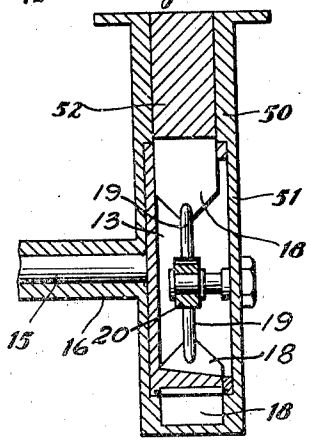


Fig. 5

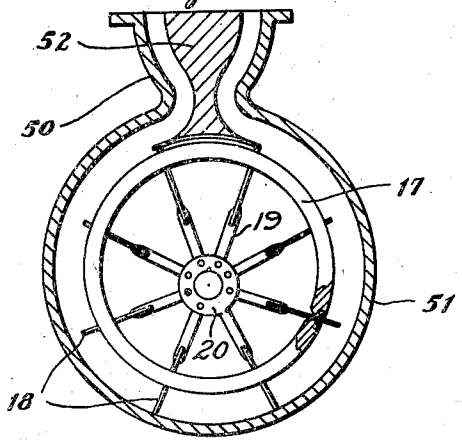


Fig. 6

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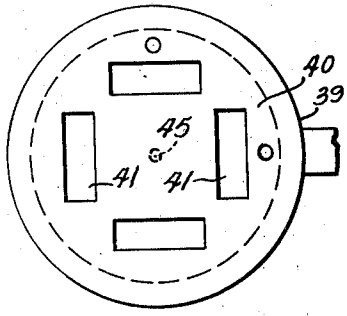


Fig. 7

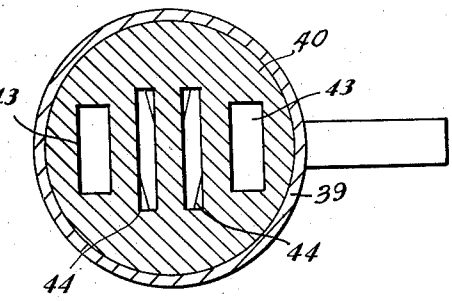


Fig. 8

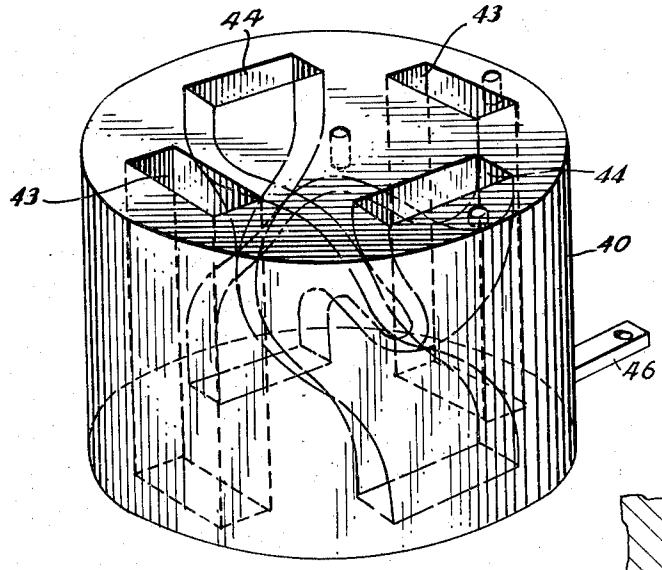


Fig. 9

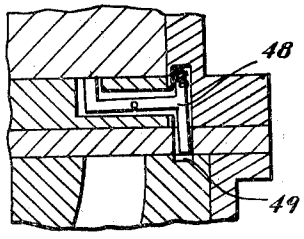


Fig 10

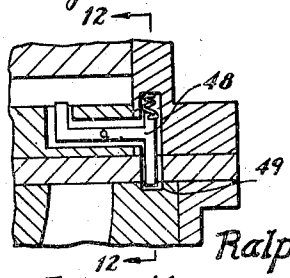


Fig. 11

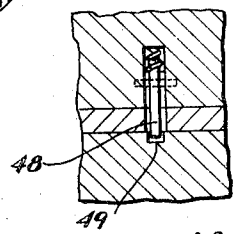


Fig. 12

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Fig. 13.

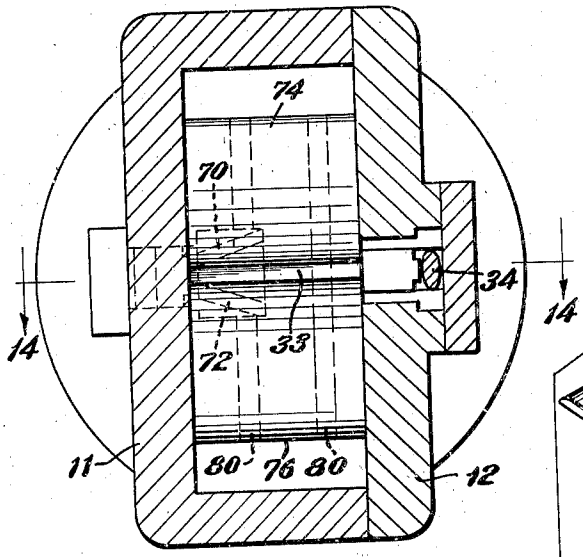
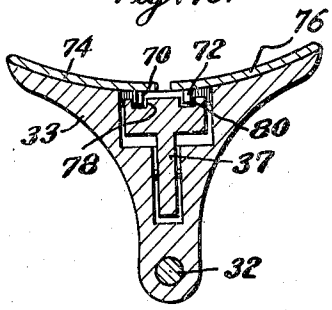


Fig. 15.



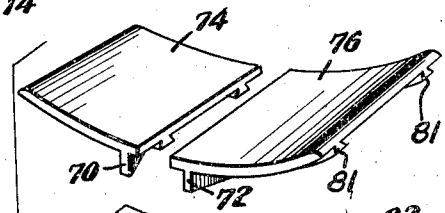
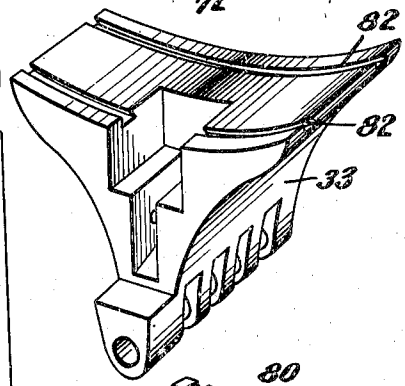


Fig. 16.



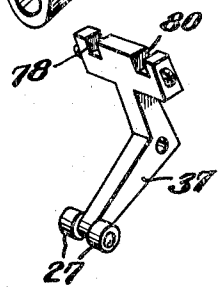
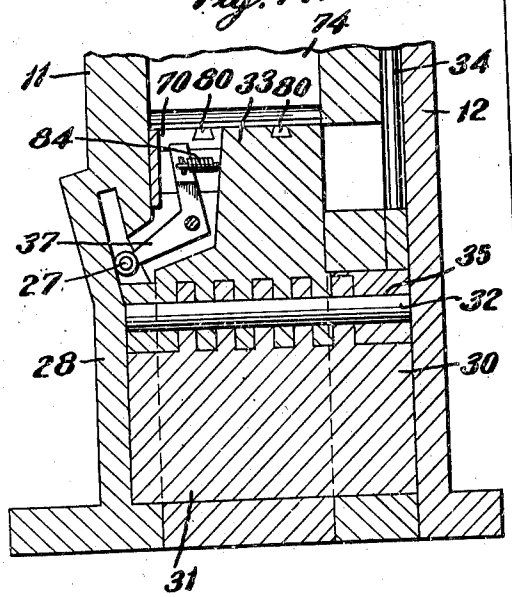


Fig. 14.



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Patented July 26, 1949 2,477,371

UNITED STATES PATENT OFFICE

2,477,371

VARIABLE DELIVERY, REVERSIBLE FLOW VANE PUMP FOR FLUID TRANSMISSIONS

Ralph Daniel Hartzler, East Lynne, Mo.

Application October 1, 1945, Serial No. 619,543

1 Claim. (Cl. 103—3)

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The invention relates to a liquid power transmission and more especially to an adjustable rotary power unit, motor or the like.

A primary object of the invention is the provision of a unit of this character in the form of a rotary pump or motor provided with reverse mechanism, which is susceptible of unlimited variation of speed and power.

Another object of the invention is the provision of a unit of this character, utilizing very light non-expansible oil or hydraulic fluid which is practically frictionless to operate with resultant smoothness in such operation.

A further object of the invention is the provision of a unit of this character, which is simple in construction, thoroughly reliable and efficient in operation, strong, durable, assured of maximum power transmission, possessed of few parts, devoid of gear transmission, and inexpensive to manufacture and install.

With these and other objects in view, the invention consists in the features of construction, combination and arrangement of parts, as will be hereinafter more fully described in detail, illustrated in the accompanying drawings, which disclose the embodiment of the invention, and pointed out in the claim hereunto appended.

In the accompanying drawings:

Figure 1 is a vertical longitudinal sectional view centrally through a transmission unit constructed in accordance with the invention.

Figure 2 is a view similar to Figure 1 taken substantially at right angles thereto.

Figure 3 is a vertical central sectional view through the reversing mechanism for the unit and in one adjusted position.

Figure 4 is a view similar to Figure 3 taken sectionally at right angles to the position of the mechanism shown in Figure 3.

Figure 5 is a view similar to Figure 1 showing a slight modification.

Figure 6 is a view similar to Figure 2 showing the modification shown in Figure 5.

Figure 7 is a plan view of the mechanism shown in Figure 3 looking toward the same from the line 7—7 of Figure 3 as indicated by the arrows.

Figure 8 is a sectional view taken on the line 8—8 of Figure 4 looking in the direction of the arrows.

Figure 9 is a perspective view of the adjustable element of the reversing mechanism shown in Figures 3, 4, 7 and 8 of the drawings.

Figure 10 is a fragmentary vertical sectional view through the unit and the reversing mechanism showing in detail the latching of the latter.

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Figure 11 is a view similar to Figure 10 showing the latch in a latching position.

Figure 12 is a fragmentary sectional view taken on the line 12—12 of Figure 11 looking in the direction of the arrows.

Figure 13 is an enlarged transverse sectional view taken on the line 13—13 of Figure 1.

Figure 14 is an enlarged sectional view taken on the line 14—14 of Figure 13.

Figure 15 is a sectional view through the adjustable flow divider of the device.

Figure 16 is an exploded perspective view of the elements of the divider.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings in detail, particularly the views therein excepting Figures 5 and 6, the hydraulic power transmission unit constituting the present invention, comprises an upstanding circular shaped casing or housing 10 having opposed end plates 11 and 12, respectively, to form interiorly of such casing or housing 10 a rotor chamber 13 for a power rotor 14 from which extends a power shaft, a portion thereof being indicated at 15 journaled in a bearing 16. Rotor 14 is formed with an annular rim 17 provided with uniformly spaced clearances for a plurality of impact blades or fins 18 having radial spokes 19 extending from a hub 20 journaled upon a stud axle 21 from an eccentric 22 with its turning arbor 23 fitted in a bearing 24 built outwardly from plate 12. Plate 12 is also provided with a recess or pocket 25 for the eccentric 22. Eccentric 22 has fixed thereto a throw crank or arm 26 shown in Fig. 1 whereby the eccentric 22 can be shifted to change the axis of rotation of the blades or fins 18, which are adapted to travel in an impact fluid space 27 concentric with the rotor 14 within the housing 10. The axis of rotation of the blades is changed in this manner. The stub shaft 21 rotatably mounted in eccentric 22 is moved when arm 26 is rotated, therefore, shaft 21 and the axis of rotation is accordingly changed.

The housing 10 is formed with a throat extension 28 having divided passages 29, respectively at opposite side of a stationary wall 30 including an interfitted slidable partition 31 which latter has hinged at 32 thereto a control gate or valve 33, opened and closed by a pitman 34 having swinging pivotal connection 35 therewith and a bearing connection 36 with the stud axle 21,

The gate 33 is for the purpose of regulating and controlling the communication of the throat extension 28 with the space in the rotor chamber 13 concentrically about the rotor 14, and in this manner the speed of rotation of the rotor can be increased or decreased on the adjustment of the throw lever 26, which may be manually or otherwise controlled. The gate or valve 33 is automatically latched in its adjusted position by a latching device 37 coacting with the plate 11 as best seen in Figures 13–16 of the drawings.

When the divider seen best in Figure 15 is raised, the crank shaped latch 37 which is pivoted to the divider 33, is also raised. Accordingly, the rollers 27 at the end of the latch 37 ride in the cam track (unnumbered) seen in Figure 14, thereby pivotally actuating the crank shaft latch 37.

A pair of converging tongues 70 and 72 are disposed on the undersurface of the slidable plates 74 and 76 on the divider 33. Accordingly, when the divider 33 is lowered, the crank shaped latch 37 having openings 78 and 80 at the top thereof with said tongues therein spreads the plates 74 and 76 apart due to the cam action associated therewith, the spread position shown in Figure 13. However, when the divider is raised, the cam actuated latch 37 contracts the two plates for free flow of liquid through the throat.

In order to retain the plates 74 and 76 in proper position on the divider 33, they are retained for sliding movement thereon by means of dovetailed tongues and grooves 81 and 82 respectively formed on the bottom surface of the plates and on the top of the divider.

A spring 84 is fixed at one end to said latch 37 and to said divider at the other end to press the rollers 27 firmly against the cam track.

Associated with the base portion 38 of the throat 28 is a fluid reversing mechanism, which includes a cylinder 39 having therein a reversing valve body 40. Cylinder 39 is provided with ports 41 and 42, at its opposite ends which are aligned diametrically opposite and connect with straight and curvilinear fluid flow passages 43 and 44, respectively, extending through the body 40 as best seen in Figures 3, 4, 7, 8 and 9 of the drawings for the proper directing of fluid under pressure to the throat 28 and thence to the chamber 13 within the casing or bushing 10. The body 40 is centrally pivoted at 45 for the turning thereof by a control lever 46. By operating the lever 46, the body 40 can be turned to regulate the flow of fluid under pressure to the rotor 14 to drive the same in either direction. The fluid under pressure is delivered to and from the casing or housing 10 through the end 47 of the cylinder 39, the supply and discharge leads of the fluid being not shown. The body 40 is locked in adjusted position by a spring-tensioned latch 48 which can be tripped from latching position to unlatching position or vice versa by rotation of control lever 46. Latch 48 engages in keeper notches 49 in the body 40 as is best shown in Figures 10, 11 and 12 of the drawings.

In Figures 5 and 6 of the drawings there is shown a slight modification of the invention, wherein the throat 50 of the casing or housing 51 has arranged therein a fixed fluid flow divider 52 and this and the divider heretofore described are wiped by the blades or fins 18 through the eccentric movement imparted thereto by the eccentric 22.

The transmission unit hereinbefore described, completely eliminates clutch, transmision, drive shaft, universal joints and differential when equipped in an automobile or other motor vehicle. The unit has only one control lever to be operated by the foot or hand and one reverse lever which may be operated manually, electrically or hydraulically. The unit has an unlimited variation of speed and power, thus providing smooth and economical operation.

From the foregoing it will now be seen that there is herein provided a device accomplishing all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment herein shown and described it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

What is claimed is:

A unit of the kind described, comprising a housing having a fluid supply and discharge throat, a rotor operating within the housing, eccentrically adjusted impact blades associated with the rotor, a fluid divider within the throat for controlling the admission and discharge of fluid through said throat to and from the housing, an adjustable reversing mechanism associated with the throat for regulating the direction of flow of fluid to and from the said throat, means including an eccentric for adjustment of the said blades with relation to the rotor, means coacting with the blade adjusting means for adjusting the divider, means for latching the reversing means in adjusted position, and means for latching the divider in adjusted position through the action of the eccentric means.

RALPH DANIEL HARTZLER.

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