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H. CAMINEZ

ROTARY PUMP FOR HYDRAULIC TRANSMISSION

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Fig. 1.

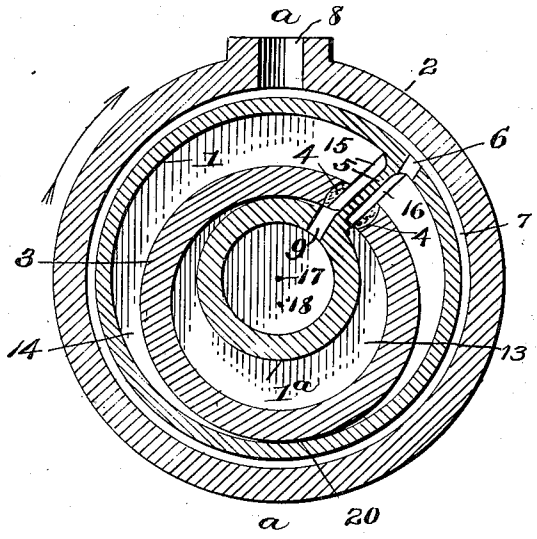
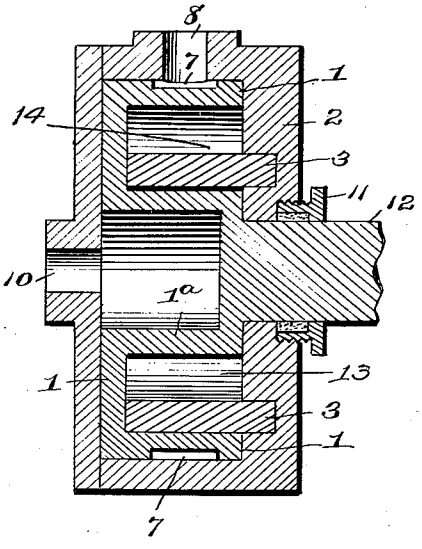


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ROTARY PUMP FOR HYDRAULIC TRANSMISSION.

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To all whom it may concern:

Be it known that I, HAROLD CAMINEZ, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Rotary Pumps for Hydraulic Transmission, of which the following is a specification.

This invention relates to fluid pumps in general and more particularly to a vane pump which will be suitable for a hydraulic transmission such as might be used for the supercharger drive on aero-engines, and will be capable of handling fluids at a high pressure and to operate at high speed.

It is proposed to provide a vane pump using only one vane or piston, which will be so held as to make positive surface contact with the walls of the chamber in which it operates, no springs or guides being required to assure this contact. By this arrangement it will be seen that if the pump is driven at a uniform speed, the displacement of the vane or piston will be constant. Therefore, when the fluid pumped is incompressible, the discharge of the pump will not fluctuate throughout the revolution.

It is further proposed to construct a device of the kind described, which will be compact, rugged and simple in operation.

While the device is described as adaptable to be used as a pump, fluid pressure may be introduced to the mechanism, and in this case it will operate as a rotary motor.

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 may be made within the scope of what is claimed without departing from the spirit of the invention, the precise embodiment of which is illustrated in the attached drawings, in which—

Fig. 1 is a transverse section through the rotary vane pump.

Fig. 2 is a section taken along line *a—a* of Fig. 1.

Referring more particularly to the drawings, 1 is a cupped member made integral with a driving shaft 12. Member 1 rotates within a casing 2, which encloses the cupped portion so that an enclosed annular compartment is formed. A ring 3 is fitted in an eccentric annular groove in the casing 2. Ring 3 thus divides the above mentioned annular compartment into two crescent-shaped compartments 13 and 14. Ring 3 is slotted to receive segments 4—4. Between these segments 4—4, vane 5, which is integral with member 1, has a sliding movement. Vane 5 operates in the two crescent-shaped compartments, and when the pump is driven in the direction shown by the arrow (Fig. 1), vane 5 forces the fluid, in the compartments 13 and 14, out through opening 6 in member 1, through annular groove 7 and out of the pump case through aperture 8. At the same time the vane 5 sucks the fluid into the crescent-shaped compartments 13 and 14 through the opening 9 in member 1. Inlet opening 10 in the pump case communicates with opening 9. Shaft 12 is provided with a stuffing box 11, screw threaded into the casing 2, to prevent leakage of fluid around said shaft.

The above described mechanism is adapted to function as a motor and will revolve in the direction shown by the arrow (Fig. 1) if fluid under pressure is led into the case through opening 10. With such an arrangement, any speed ratio may be maintained by varying the capacity of the pump or motor.

In order to obtain a speed ratio of ten, as is desirable in a supercharger drive, the pump will have an output per revolution of ten times that of the motor. With all of the fluid pumped flowing through the motor, a speed ratio inversely proportional to the capacities of both mechanisms will result. In order to reduce the speed of the motor, part of the fluid pumped may be by-passed. In this manner the speed ratio may be reduced to any desired amount. The action, in this case, is directly analogous to slipping a clutch to reduce speed.

In by-passing fluid under pressure, and in slipping a clutch, power is lost. In the case where the driven member is a fan, as in the supercharger drive, this loss varies from twelve to fifteen per cent of the power required to drive the fan at full speed, when the fan revolves at fifty to eighty per cent full speed. A variation, without incurring any power loss, may be obtained in a hydraulic transmission by having a pump or a motor with two or more separate compartments, so arranged that any of the compartments may be "short circuited" on themselves.

It will be seen by rererence to Fig. 1 that the inner and outer rings of members 1 and 1ª are integral and adapted to rotate about the same center 17, while the intermediate ring 3 rotates about a center 18, the three rings, 1, 1ª and 3 being further connected by vane 5 and adapted to rotate together in the same direction. The outer circumference of the ring 3 engages the surface of the outer ring 1 at a point 20, preventing the passage of fluid by said point. The same thing is true of the outer surface of the outer ring 1ª and the inner surface of the ring 3 at point 19.

Thus as the three rings are rotated together by the driving shaft 12, the fluid in the compartments 13 and 14 ahead of the vane in the direction of rotation is unable to pass the points 19 and 20, and a pressure is built up, forcing the fluid through passage 15, through outlet 6, into the passage way 7 and out through the opening 8. At the same time, a suction is formed in the compartments 13 and 14 behind the vane 5, due to the closures at points 19 and 20, which tends to suck the fluid through the inlet opening 10, said fluid passing through opening 9, through aperture 16, into the compartments 13 and 14, to replace the fluid just discharged.

Thus it will be seen that by this construction, a novel rotary vane pump is evolved and while it may be used as a transmission device for use in a supercharger, its utility is of a varied degree and it is, therefore, desired not to limit the present invention to the precise embodiment described in the specification, and illustrated in the drawings, but restrict it only to such an extent that it will be within the scope of the appended claims, in which—

I claim—

1. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and connected thereto by a vane.

2. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and connected thereto by a vane; crescent shaped compartments between said inner and intermediate and outer rings and an annular recess between said outer ring and said casing.

3. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and connected thereto by a vane; said rings being rotated by said driving shaft for the purpose of forcing the fluid, contained in said casing, through said outlet at a constant discharge.

4. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings, and connected thereto by a vane, said rings being rotated by said driving shaft for the purpose of forcing the fluid, contained in said casing, through said outlet at a constant discharge; crescent shaped compartments between said inner and intermediate and outer rings and an annular recess between said outer ring and said casing.

5. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and connected thereto by a vane; crescent shaped compartments between said inner and intermediate and outer rings and an annular recess between said outer ring and said casing; a staggered passageway between said inlet and outlet openings, said passageway extending through said rings and said compartments.

6. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and connected thereto by a vane; crescent shaped compartments between said inner and intermediate and outer rings and an annular recess between said outer ring and said casing; a staggered passageway between said inlet and outlet openings, said passageway extending through said rings and said compartments; a portion of the outer surface of said intermediate ring being in leak-proof positive contact with the inner surface of said outer ring, and a portion of the outer surface of said inner ring being in leak-proof positive contact with said inner surface of said intermediate ring.

7. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted concentrically within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and connect-

ed thereto by a vane; crescent shaped compartments between said inner and intermediate and outer rings and an annular recess between said outer ring and said casing; a portion of the outer surface of said intermediate ring being in leak-proof positive contact with the inner surface of said outer ring, and a portion of the outer surface of said inner ring being in leak-proof positive contact with said inner surface of said intermediate ring.

8. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and forming an inner and outer crescent shaped compartment between said inner and intermediate, and said intermediate and outer, rings, respectively.

9. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and forming an inner and outer crescent shaped compartment between said inner and intermediate, and said intermediate and outer, rings, respectively, and a vane operating in said crescent shaped compartments.

10. In a rotary pump, a casing with an inlet and outlet, a driving shaft, an inner and outer ring mounted within said casing and integral with said shaft, an intermediate ring mounted in a groove in said casing and eccentrically with relation to said inner and outer rings and forming an inner and outer crescent shaped compartment between said inner and intermediate, and said intermediate and outer, rings, respectively, and a vane rigidly held between said inner and outer rings and operating in said crescent shaped compartments.

In testimony whereof I affix my signature.

HAROLD CAMINEZ.