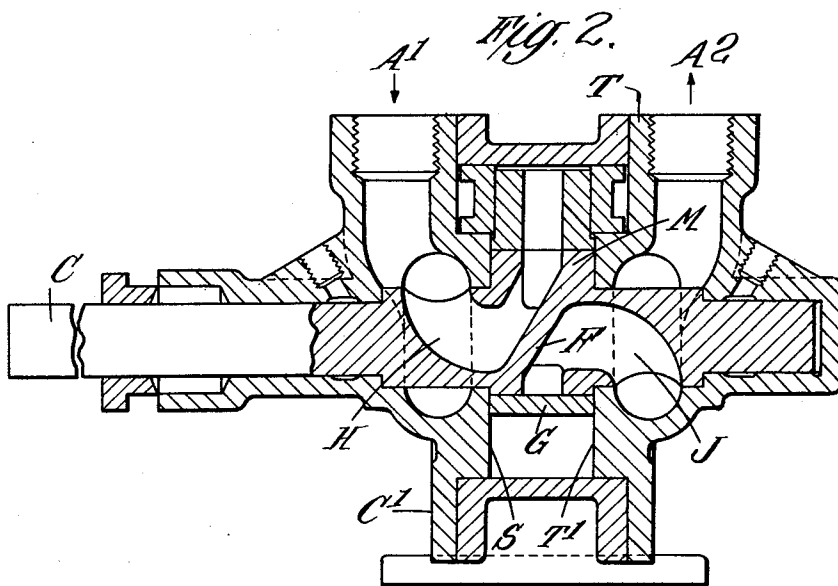
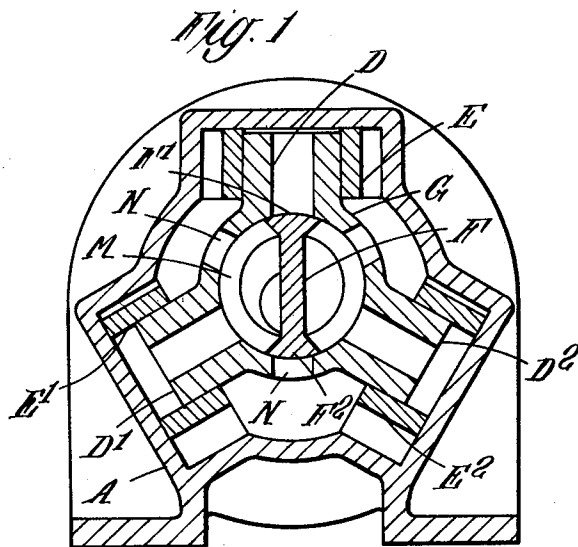


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ROTARY FLUID PRESSURE PUMP, ENGINE, VARIABLE  
SPEED POWER TRANSMITTER, OR BRAKE  
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## UNITED STATES PATENT OFFICE

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ROTARY FLUID PRESSURE PUMP, ENGINE,  
VARIABLE SPEED POWER TRANSMITTER,  
OR BRAKEReginald Warren, Whitton, England, assignor to  
The Pulsometer Engineering Company Limited,  
Reading, England, a British companyApplication July 27, 1932, Serial No. 625,020  
In Great Britain August 21, 1931

5 Claims. (Cl. 103—174)

This invention relates to rotary fluid pressure pumps or engines, also adaptable for use as variable speed power transmitters or as brakes, the apparatus being of the kind in which by means of a crank or eccentric radial movements are imparted to one or more plungers controlling the passage of fluid, each radially moving plunger working in a cylinder adapted to reciprocate in a direction transverse to that of the axis of said plunger in order to compensate for the eccentricity of the movements of the plunger.

According to the invention, the cylinder moves in a recess formed in a stationary casing, receiving fluid during one half of the revolution of the rotor and discharging it during the other half. A plate on the driving shaft and an end plate at the other side of the cylinders may be made with spigots, which in a construction with three plungers are of triangular form, these spigots fitting under the movable cylinders with sufficient clearance to allow the cylinders to slide transversely. Hollow plungers may be carried on a yoke in operative relationship with a crank or eccentric.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawing, in which:—

Figures 1 and 2 represent vertical sections taken at right angles to each other through the pump.

A indicates the body or casing of the pump, C the driving shaft, D, D<sup>1</sup>, D<sup>2</sup> the plunger, E, E<sup>1</sup>, and E<sup>2</sup> the movable cylinders. On the driving shaft C is a plate C<sup>1</sup> on which is formed a triangular spigot S fitting under the cylinders. At the other side of the rotor is an end plate or boss T having a similarly shaped spigot T<sup>1</sup> in which is an opening for the passage of the eccentric pin on the driving shaft.

In the example illustrated the cylinders are transversely movable in recesses in the stationary casing A; the plungers are hollow and are formed with a yoke G carried on the eccentric M on an eccentric shaft C. The end plate C<sup>1</sup> is made separately from the shaft C and in one piece with the pump inlet or outlet opening A<sup>1</sup>. The end plate T is combined with the other pump opening A<sup>2</sup>. The covers B and B<sup>1</sup> may be omitted. The plunger unit is in effect a sheave riding on the eccentric. Fluid passes from the curved channel H into the hollow part of a piston, then owing to the movement of the piston and eccentric flows into the channel J and thence to the outlet A<sup>2</sup> at certain phases of the rotary movement which correspond with the suction and de-

livery strokes of that plunger, and at another phase of the movement the fluid passes through the hollow portions of two plungers, passing from the said hollow portions into the respective cylinders, from which it is discharged through a similar series of ports, on the other side of the eccentric. The web F separating the two series of ports is provided with shoes F<sup>1</sup>, F<sup>2</sup> adapted to open and close in succession the hollow portions of the plungers at the ends of the respective suction and delivery strokes, thus placing each cylinder in alternate communication through its hollow plunger with the suction and delivery ports in the eccentric during the respective suction and delivery strokes of the plunger in the said cylinder. The parts of the yoke G intermediate of the plungers may have openings N communicating between the interior of the casing A and the holes in the shaft C, whereby the displacement of fluid from the spaces between the cylinders is utilized and the total quantity of fluid moved by the pump is greatly increased.

The pump is primarily intended for use on oil and arranged for lubrication by the liquid pumped, which for lubrication purposes is fed from the pump casing, so that the lubrication is at constant pressure, regardless of reversal of rotation or suction and delivery. If it is desired to lubricate the pump from outside, it is only necessary to remove the plugs on the main bearings and substitute any suitable greasers, although it is advisable to fit a cock or ball valve to the greaser to prevent leakage back from the pump.

An important point is that although the rotary speed may be as high as 1000 R. P. M. making the pump very suitable for direct coupling to electric motors, the actual plunger speed in feet per minute is remarkably low, due to the short stroke of the plungers, the highest plunger speed at 1000 R. P. M. being only 80 ft. per minute which is less than the average so called "slow speed" gear driven ram pumps, although this pump being valveless could be permitted a much higher plunger speed than usual. Many cases will be met where a standard pump is required for a reduced capacity without reduction in speed and this is very simply and effectively accomplished in pumps according to this invention by varying the size of the plunger ports, since the capacity is proportionate to the effective area of the plungers. Thus any pump can be taken from stock and quickly adapted for any particular capacity below its standard.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a rotary fluid pressure pump, adaptable as an engine, as a variable speed power transmitter, and as a brake, a stationary casing having inlet and outlet ports, a shaft rotatable in said casing and having an eccentric portion, said shaft having independent ducts therein for the passage of fluid, a yoke mounted on said eccentric portion of the shaft and carrying a plurality of plungers which are each open at both ends to communicate with the ducts in said shaft, and a hollow open ended cylinder slidably carried on the exterior of each of said plungers and both transversely reciprocable in individual recesses in said casing so that one end of each cylinder slides against an outer wall of one of said recesses so as to be constantly and completely closed by said outer wall in all positions, and which wall in each case is also effective together with the cylinder sliding against the same to form permanent closures for the open ends of said plungers.
2. A rotary machine according to claim 1 wherein the yoke is formed with openings immediately between the plungers to provide communication between the interior of the casing and the ducts in the eccentric shaft.
3. A rotary engine or the like, comprising a rotatable shaft having independent ducts for the passage of fluid, a stationary casing support-

ing said shaft and having inlet and outlet ports, a plurality of transversely movable cylinders which are open at both ends and slidably supported with one open end of each cylinder sliding individually against a wall within said casing which forms in each case a complete closure for said open end of the cylinder, a hollow member having a plurality of pistons rigid therewith and individually projecting into and reciprocable in said cylinders, which pistons are open at both ends to communicate both with the interior of said cylinders and with the interior of said hollow member and thereby with said ducts, and an eccentric partition member rigid with said shaft serving both to reciprocate said pistons and to successively control the communication between each cylinder and said ducts.

4. A rotary engine or the like according to claim 3 wherein the casing is completely enclosed except for the projection of at least one end of the shaft therefrom, as well as the inlet and outlet ports.

5. A rotary engine or the like according to claim 3 wherein the casing is formed with a pair of independent and spaced annular interior channels which are coaxially disposed and connected individually to the inlet and outlet ports and also individually adapted to maintain a connection between said ports and the ducts in the rotatable shaft of the engine.

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