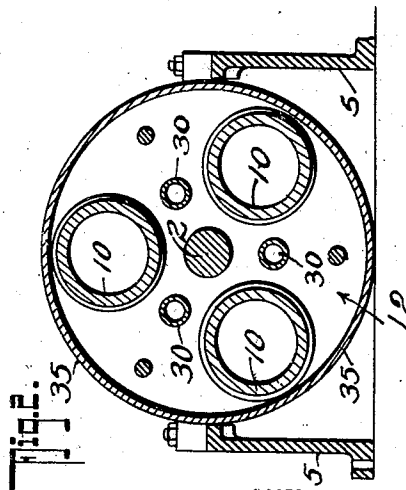
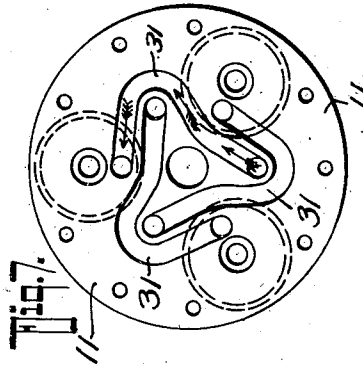
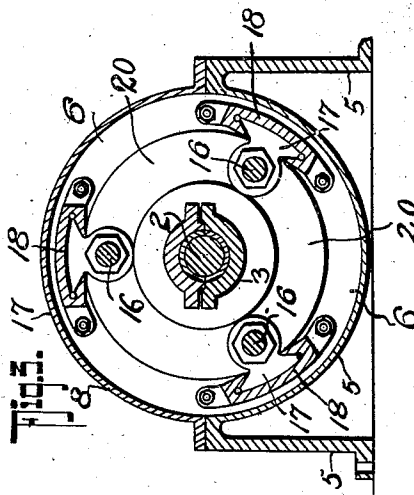
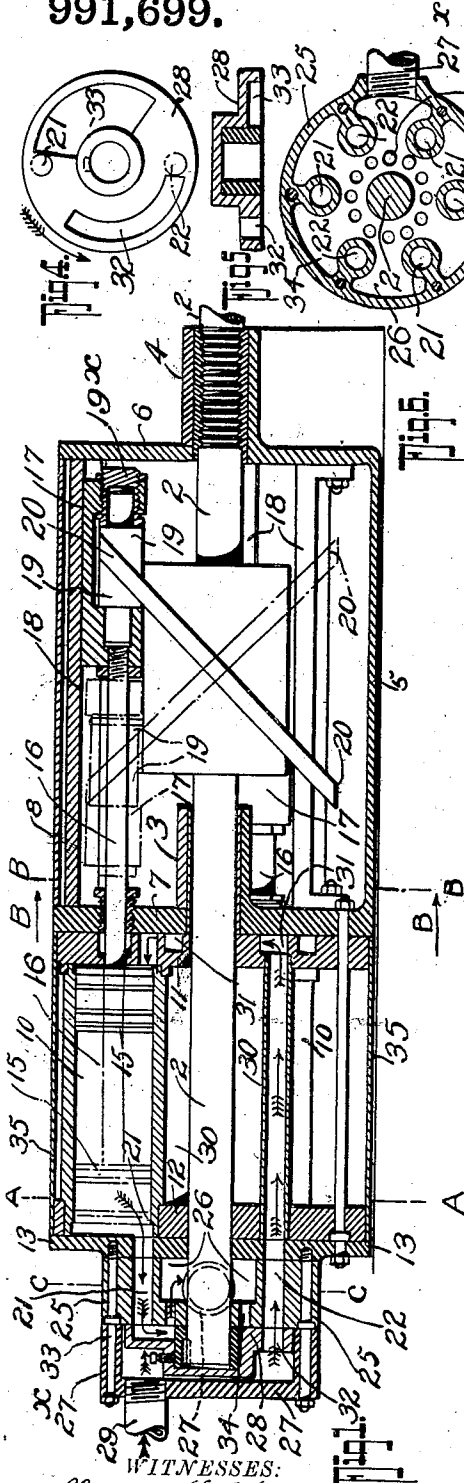


G. CASSADY.
FLUID-PRESSURE ENGINE.
APPLICATION FILED JUNE 23, 1910.

991,699.

Patented May 9, 1911.



WITNESSES:

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GEORGE CASSADY, OF NEW WESTMINSTER, BRITISH COLUMBIA, CANADA.

FLUID-PRESSURE ENGINE.

991,699.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed June 23, 1910. Serial No. 568,536.

To all whom it may concern:

Be it known that I, GEORGE CASSADY, citizen of the Dominion of Canada, residing at New Westminster, in the Province of British Columbia, Canada, have invented a new and useful Fluid-Pressure Engine, of which the following is a specification.

This invention relates to a fluid pressure engine wherein the pressure acts upon the pistons within cylinders arranged circumferentially around the axis of rotation and parallel thereto and these pistons have slidable contact with an oblique rotatable plane, by which means the fluid pressure being admitted successively to the cylinders the oblique plane and the shaft to which it is attached are rotated.

The invention is particularly described in the following specification, reference being made to the drawings by which it is accompanied, in which:

Figure 1 is a vertical longitudinal section through the engine, Fig. 2, a cross section on the line A A in Fig. 1, Fig. 3, a vertical section on the line B B in Fig. 1 looking in the direction of the arrow B, Fig. 4 is a face view of the valve by which admission and exhaust of the fluid under pressure to the cylinders is controlled, Fig. 5 is a cross section of the same, Fig. 6 is a section on the line C C in Fig. 1 showing the steam and exhaust ports of the port face member, and Fig. 7 is a face view of the disk which closes the end of the cylinders showing the passages which connect the steam ports to the cylinders.

In these drawings 2 represents the driving shaft of the engine which is rotatable in bearings 3 and 4 of the base 5, the bearing 4 being provided with annular V grooves by which end movement is prevented and wear in that direction is taken up.

Between the bearings 3 and 4 the base frame of the engine is formed semi-cylindrical concentric with the axis of the shaft 2 the circular ends 6 and 7 being part of the base 5 and a casing 8 forming the upper half of the cylindrical transmission casing. Within this casing is inclosed the connection of the reciprocating to the rotatable parts of the engine which connection will be described later.

On the outer side of the circular end 7 is secured a connected group of cylinders 10. These cylinders, preferably three in num-

ber, have their axes parallel to that of the shaft 2 which is produced through the center of the group to operate the admission and exhaust valve and are radially equidistant from it and from one another.

The several cylinders 10 are secured between circular disks 11 and 12 around which an inclosing casing 35 may be carried, and the outer ends of the cylinders are closed by a cover flange 13 on which is secured the port face member 25 and the valve casing 27 to be described later.

Within each cylinder 10 is a piston 15 the rod 16 of which passes through a gland in 11 and 7 and has secured to its outer end a head 17 which is endwise movable in a dove-tailed slide 18 secured between the ends 6 and 7 of this portion of the base. In axial alinement with the piston rod 16 the head 17 carries rotatable bearers 19 the bearing surfaces of which are obliquely cut to engage the faces of an oblique flange 20 carried by and rotatable with the shaft 2.

Steam or other fluid under pressure being admitted to one side of the pistons 15 as hereinafter set forth on one side of the engine and to the other side of the pistons on the diametrically opposite side of the engine, and exhausted from the opposite side of the pistons in each case, the pressure of the pistons acting on the oblique planes of the flange 20 causes that flange to rotate and with it the shaft 2 to which it is secured. The piston rod heads 17 in their slides 18 support the free ends of the rods 11 and receive the lateral pressure of the oblique thrust, and the pivotal mounting of the bearers 19 permit them to adjust themselves to the changing angle of the flange 20 as it rotates. The outer bearing of the member 19 in the head 17 is fitted into a threaded bearing member 19* which threads into the member 17 and may be turned to take up wear as will be clear to those skilled in the art.

On the outer face of the cover flange 13 which closes the outer ends of the cylinders 10 is secured a port face member 25 in which is an exhaust chamber 26 to which is connected the exhaust pipe 27* of the engine. This member 25 is also provided with through ports 21 and 22 which are continued through the cover flange 13 and form a connection from the steam chest 27 in which is the valve 28 and to which steam chest the

steam or other fluid under pressure is delivered by a pipe 29. The steam ports 21 deliver direct to the adjacent ends of the cylinders 10 and those 22 are connected by pipes or ducts 30 and by passages 31 in the end flange 11, to the other end of each cylinder on the side diametrically opposite to the port 22; so that the applied force of the steam acting through the pistons and piston rods, will press on one side of the flange 20 in moving in one direction, and act on the other side of the flange 20 when the piston is moving in the opposite direction.

The valve 28 which controls the admission of steam to, and its exhaust from, the cylinders 10 is secured on the end of the shaft 2 so as to be rotatable with it; the attachment being such as to afford the valve an opportunity of endwise moving to take up its bearing on the face of 25. The valve 28 is preferably fitted on a sleeve which is endwise movable on a feather in the end of the shaft to which sleeve the valve is secured by a set screw so that the ports of the valve may be adjusted in relation to those of the port face.

The valve 28 is provided with a through admission port 32 which through port is carried around a concentric arc of the valve, at a radial distance equal to that of the ports 21, 22 of the port face member. On the diametrically opposite side of the valve is a chambered exhaust port 33 which when brought opposite to them connects the ports 21, 22 of the port face member, shown in dash and double dot lines in Fig. 4, with a ring of exhaust apertures 34 in the same port face and which connect with the exhaust chamber 26.

In operation steam or other fluid under pressure is admitted by the pipe 29 to the steam chamber 27 and as they are successively uncovered by the through port 32 of the valve 28 will pass to the adjacent ends of the cylinders 10 through the ports 21 and through the ports 22 to the farther end of the diametrically opposite cylinder, through a pipe 30 and its passage 31 in the end plate 11. Simultaneously the opposite ends of these cylinders are respectively open to the exhaust through the same passages as far as the valve 28 where they are connected to the ring of exhaust apertures 34 by the chambered port 33 of the valve. As the shaft 2 is rotated under this application of pressure the valve 28 is carried with it and the admission and exhaust of the several cylinders are successively controlled by the rotation.

The engine is compact and self-contained, its rotatable parts are balanced and it is

simple in construction and is most efficient in the development of power.

The steam cylinders and passages may be conveniently jacketed, if necessary, with superheated steam and the inclosure of practically all the moving parts within a small cylindrical chamber renders the lubrication of those parts easy of accomplishment.

The valve is susceptible of easy adjustment to work the steam expansively in the cylinders so that the engine may be rendered economical in the use of steam.

Having now particularly described my invention and the manner of its operation, I hereby declare that what I claim as new and desire to be protected in by Letters Patent, is:

In a fluid pressure engine, a pair of end disks, open ended cylinders supported by and between said disks, one of said disks forming a cylinder head for one end of said cylinders, said cylinder head disk having ports leading into said cylinders, a cover flange over the other disk, said cover flange having ports leading into said cylinders and having a second set of ports, ducts between said second set of ports and said cylinder head forming disk ports, a port face member secured to said cover flange and having ports registering with the ports of said cover flange, said port face member having an exhaust chamber opening through one side, said open side being closed by said cover flange, said port face member having an exhaust port leading to atmosphere, said port face member having ports leading into said exhaust chamber, a rotatable shaft projecting through apertures in said disks and in said cover flange and in said port face member, a rotary valve mounted on the end of said shaft adjacent to said port face member and having distributing ports to effect communication between the exhaust ports of said port face member and the ports that communicate with the cylinder ends, said rotary valve having a working agent inlet port to register with the ports of said port face member at times, and a valve casing having a working agent inlet port fitted over said valve and the end of said shaft that carries the valve, pistons operating in said cylinders, piston rods carried by said pistons and power translating connections between said piston rods and said shaft.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE CASSADY.

Witnesses:

ROWLAND BRITAIN,
ALEXANDER SMITH.