

May 5, 1925.

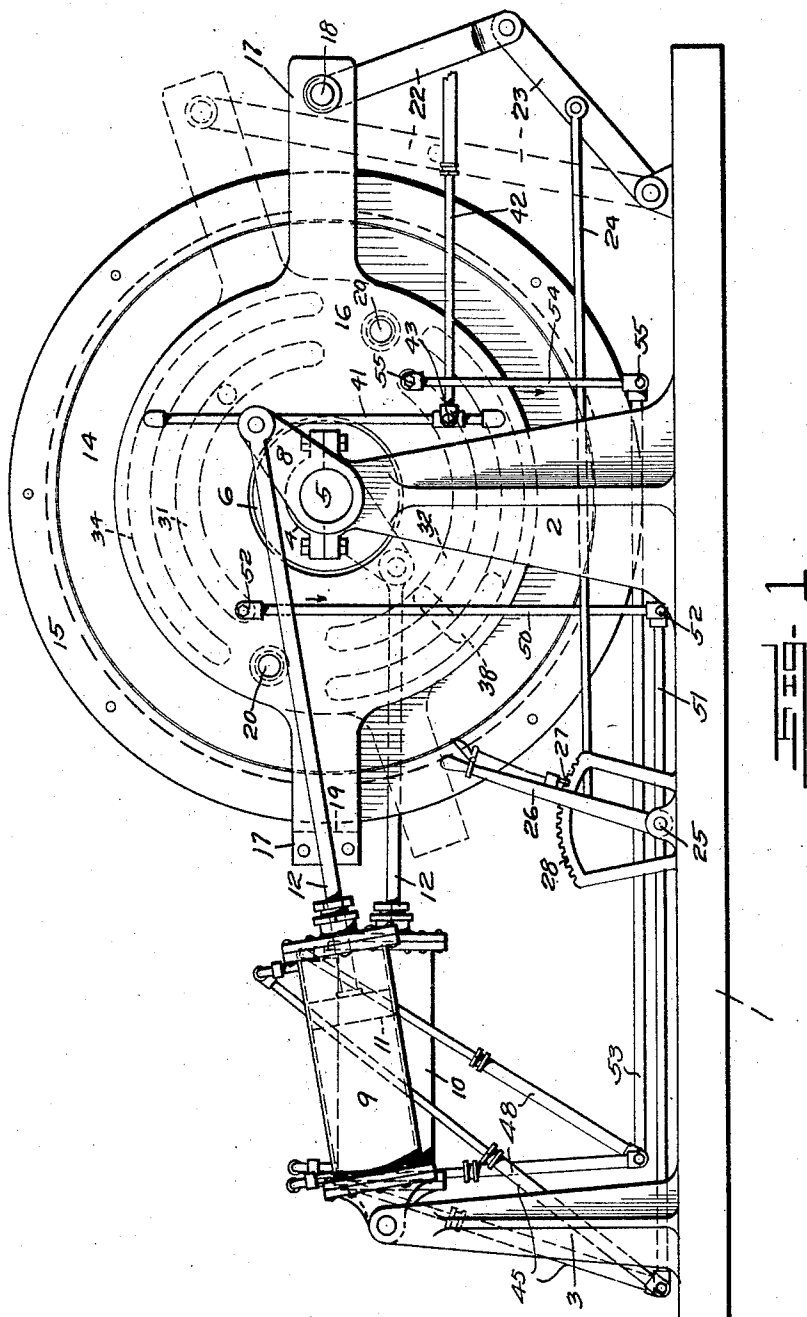
J. B. THOMAS

1,536,166

FLUID PRESSURE ENGINE STRUCTURE

Filed May 16, 1922

3 Sheets-Sheet 1



Inventor

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3 Sheets-Sheet 2

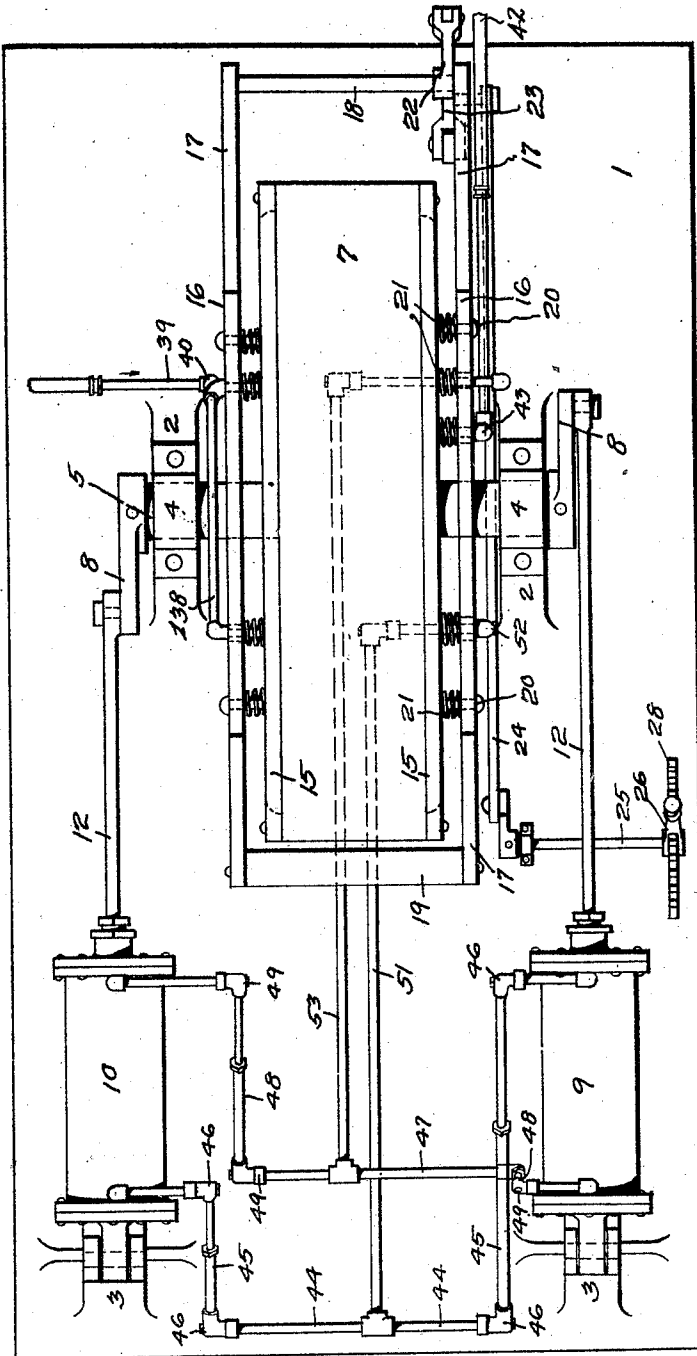
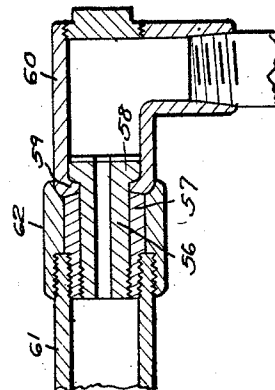


FIG. 1

FIG. 2



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3 Sheets-Sheet 3

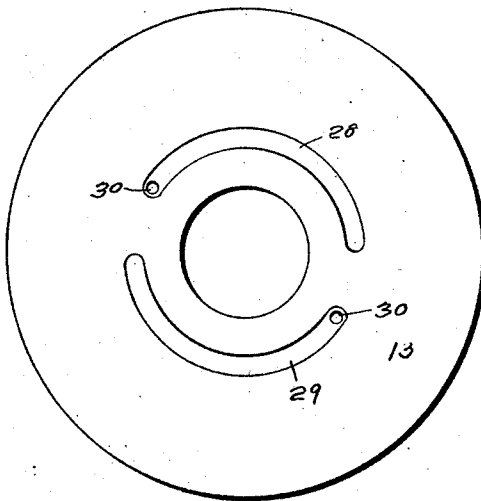
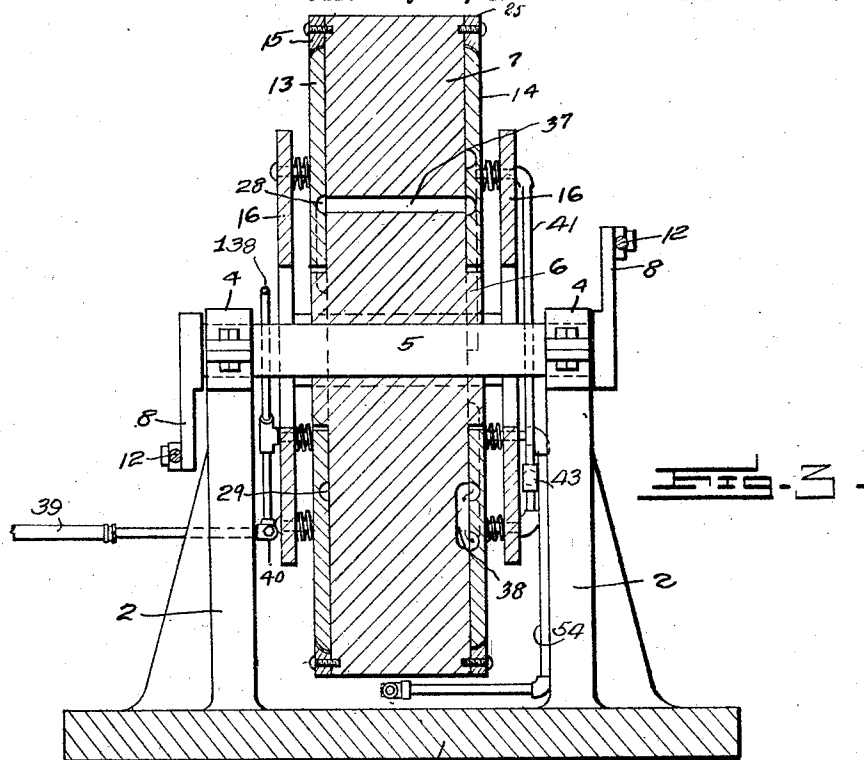


FIG. 4 -

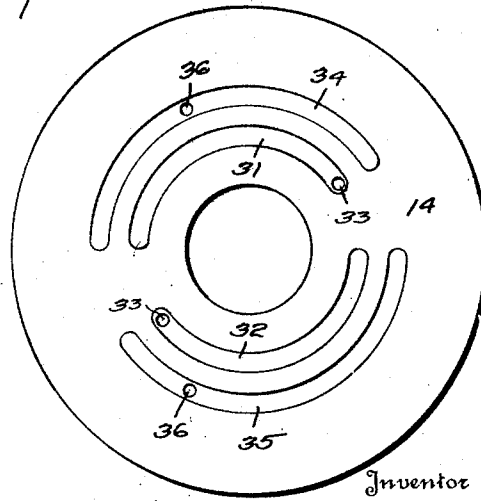


FIG. 5 -

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1,536,166

UNITED STATES PATENT OFFICE.

JOHN B. THOMAS, OF NASHVILLE, TENNESSEE, ASSIGNOR TO SAM GOLDBERG MANUFACTURING COMPANY, OF NASHVILLE, TENNESSEE.

FLUID-PRESSURE-ENGINE STRUCTURE.

Application filed May 16, 1922. Serial No. 561,388.

To all whom it may concern:

Be it known that I, JOHN B. THOMAS, a citizen of the United States, and a resident of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Fluid-Pressure-Engine Structures; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in fluid pressure engine structures, and more particularly to such as may be operated with compressed air but which might also be operated with the use of steam—one object of the invention being to so construct an engine that a wheel from which power may be taken and which is driven by engine members of the reciprocating type, shall constitute part of the valve means for controlling the passage of motive fluid to and its exhaust from the cylinders of the reciprocating engine members.

A further object is to provide simple and efficient means for reversing an engine of the type specified.

With these and other objects in view, the invention consists in certain novel features of construction and combinations of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings; Figure 1 is a view in elevation illustrating my improvements; Figure 2 is a plan view; Figure 3 is a transverse sectional view; Figures 4 and 5 are views of the valve plate, and Figure 6 is an enlarged sectional view illustrating the manner in which the swiveled pipe connections may be made.

In the drawings, 1 represents a base or bed plate on which pairs of standards 2, 2, and 3, 3 are located—the former being located on an intermediate portion of the bed 1 and the standards 3 being located near one end of the latter. Bearings 4 are provided at the upper ends of the standards 2 for a horizontal shaft 5, to which the hub portion 6 of a wheel 7 is secured and constitutes the driven wheel of the engine. as hereinafter explained, and from which power may be taken in any suitable manner for any desired purpose. The shaft 5 is provided at its respective ends with crank arms 8, 8 which project in opposite direc-

tions relatively to each other, and to the standards 3, cylinders 9, 10 are pivotally connected so as to be capable of oscillating—pistons 11 in said cylinders being connected, through the medium of rods or pitmen 12 60 with the respective crank arms 8, so that when the pistons are caused to reciprocate respectively in opposite directions, the wheel 7 will be rotated.

Valve plates 13 and 14 have machined 65 inner faces which bear against similar faces at respective sides of the wheel 7 and said plates are prevented from displacement by means of beveled rings 15 secured to the sides of the wheel near the periphery of the 70 latter. Spaced from the respective valve plates 13 and 14 are circular valve holding and shifting plates 16, 16, each having arms 17 at respective ends and the arms at respective ends are connected by cross bars 75 18, 19 and thus a valve holding and shifting frame is provided, the plates 16 of which are connected with the valve plates by means of pins 20 secured to the latter and passing freely through holes in the plates 80 16. Springs 21 encircle the pins 20 between the valve plates and the shifting plates 16 and serve to press said valve plates against the side faces of the wheel 7. A link 22 is loosely connected with the valve holding 85 and shifting frame (said link being connected with the cross bar 18 of said frame) and the lower end of said link is pivotally connected with the upper end of a link 23, the lower end of the latter being pivotally 90 connected with the bed plate 1. The links 22 and 23 thus form a toggle lever between one end of the valve holding and shifting frame and the bed plate, and the lower member 23 of this toggle lever is connected, 95 by a rod or pitman 24 with a crank shaft 25 to which a hand lever 26 is secured. The hand lever carries a detent 27 to cooperate with a toothed segment 28 rigid with the bed plate. It is evident that when the hand 100 lever is locked to the segment, the valve holding and shifting frame will be held stationary, and that when the hand lever is moved in one direction, the toggle lever will be operated to shift said frame as indicated 105 by dotted lines in Figure 1 to partly turn the valve plates and shift the ducts therein relatively to the inlet ports to effect reversal of the direction of rotation of the wheel 7.

The valve plate or disk 13 is provided in 110

its inner face with two oppositely disposed segmental grooves forming ducts 28 and 29 and at one end of each of these ducts, an inlet port 30 is provided. The valve plate or disk 14 is similarly provided with oppositely disposed segmental grooves forming ducts 31 and 32, a port 33 being provided at one end of each of these ducts. The valve plate or disk 14 is also provided with two oppositely disposed segmental grooves forming exhaust ducts 34 and 35 each of which is provided with an exhaust port 36. The duct 28 of the valve plate 13 is connected with the duct 31 of the valve plate 14 by means of a duct 37 extending transversely through the wheel 7, and said wheel is provided in one face with a duct 38 which connects the duct 32 of the valve plate 14 with the exhaust duct 35 in said plate. The two inlet ports 30, 30 in the valve plate 13 are connected by a pipe 138 and with this pipe, an inlet pipe 39 (comprising telescoping sections) is connected through the medium of a swivel coupling 40. A pipe 41 connects the ports 36 of the exhaust ducts 34, 35 and with this pipe, an exhaust pipe 42 (comprising telescoping sections) is connected, through the medium of a swivel coupling 43.

Flexible connections including intermediate pipe sections 44, telescoping pipe sections 45 and swivel coupling 46, connect the forward end of the cylinder 9 with the rear end of cylinder 10, and similar pipe connections including intermediate pipe sections 47, telescoping pipe sections 48 and swivel couplings 49 connect the rear end of the cylinder 9 with the forward end of the cylinder 10. Pipe connections including pipe sections 50 and 51 and swivel couplings 52, connect the port 33 of duct 31 in valve disk 14 with the pipe sections 44, and the pipe sections 47 are connected by pipe connections including pipe sections 53 and 54 and swivel couplings 55, with the port 33 of the duct 32 in valve plate 14.

I have above referred to various swivel couplings whereby the cylinders 9, 10 may be permitted to oscillate and whereby the valve holding frame may be shifted, and in Figure 6 of the drawing, I have shown a form of swivel coupling which may be employed. This may include a tube 56 passing through a sleeve 57 and having threaded connection therewith, and this tube is provided at its other end with a head 58 engaged by a flange 59 projecting into one end portion of a pipe member or elbow 60. The sleeve 57 may be threaded exteriorly to enter the internally threaded portion of a pipe member 61, and the latter is externally threaded to enter the internally threaded portion at one end portion of a sleeve 62, the other end of the latter being recessed to engage the flanged end portion of the pipe member 60.

When the parts are in the positions shown in the drawings, compressed air or other motive fluid entering by the pipe 39 will pass into the duct 28 of the valve plate 13 and from this duct, it will pass through the transverse duct 37 in the wheel 7 and enter the duct 31 in the valve plate 14. The motive fluid will leave the duct 31 at the port 33 at one end thereof and flow by way of the pipe connections 50, 51, 44 and 45 to the front end of the cylinder 9 and the rear end of cylinder 10, thus causing the piston in the cylinder 9 to move rearwardly and the piston in the cylinder 10 to move forwardly and cause transmission of power to the wheel 7 for rotating the same. During the movements of the pistons as above described, air or other fluid will exhaust from the cylinders through the pipe connections 47, 48, 53, 54 to the duct 32 in the valve plate 14 and from said duct it will pass through the duct 38 in the side of the wheel 7 to the duct 35, and from the latter, it will escape through the exhaust pipes 41, 42. During the partial rotation of the wheel 7 effected as above described, the relation of the transverse duct 37 to the inlet ducts in the valve plates and the relation of the duct 38 in said wheel to the exhaust ducts in the valve plate 14 will be so altered that motive fluid will be delivered through the pipe connections 53, 54, 47 and 48 to the forward end of cylinder 10 and the rear end of cylinder 9 causing movement of the pistons in directions reverse to those above described and a further half rotation of the wheel 7. It is evident that during the last-mentioned movements of the pistons motive fluid which had previously passed thereto will flow in the opposite direction and will finally escape through the pipes 41 and 42.

The operations above described will be repeated during the time that motive fluid is supplied to the engine to cause continuous rotation of the wheel 7—the reciprocating engine units operating effectually to positively propel said wheel and the wheel itself constituting an essential part of the valve mechanism which controls the operation of the reciprocating units. It is evident that by shifting the valve plates so as to change the relation of the ducts therein to the ducts in the wheel 7, the direction of rotation of said wheel may be reversed.

Slight changes might be made in details of construction of my invention without departing from the spirit thereof or limiting its scope and hence I do not restrict myself to the precise details herein set forth.

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In an engine, the combination of a driven power-delivering wheel, engine units of the reciprocating type, crank-and-pit-

man connections between said wheel and said engine units, and valve plates fitting against the sides of the wheel, there being cooperating ducts in the wheel and said plates to control the flow of motor fluid to and from the engine units.

2. In an engine structure, the combination of two pivotally-supported engine units of the reciprocating type, a driven power-delivering wheel having valve ducts, driving connections between said wheel and the reciprocatory members of said engine units, valve plates fitting against the sides of the wheel and having ducts in their faces presented to the wheel to cooperate with the ducts in the wheel and constituting valve mechanism, fluid pressure inlet means communicating with ducts in one of said valve plates, exhaust means communicating with ducts of the other valve plate, and pipe connections between the said valve mechanism and respective ends of the cylinders of the two engine units.

3. In an engine structure, the combination of two pivotally mounted engine units of the reciprocating type, a driven power-delivering wheel having valve ducts, driving connections between said wheel and the reciprocatory members of said engine units, valve plates fitted closely to the sides of the wheel and having ducts in their faces presented to the wheel to cooperate with the ducts in the latter and constituting valve mechanism, fluid pressure inlet means communicating with ducts in one of said valve plates, exhaust means communicating with ducts of the other valve plate, and pipe connections between the said valve mechanism and respective ends of the cylinders of the two engine units, and means for shifting said valve plates to reverse the direction of rotation of the driving wheel.

4. In an engine structure, the combination with a support, a crank shaft mounted on said support, and two pivotally mounted engine units of the reciprocating type connected with said crank shaft for driving the latter, of a driven power-delivering wheel on said crank shaft, valve plates fitting against the sides of the wheel, there being cooperating ports and ducts in said plates and the wheel whereby the wheel and plates constitute a valve mechanism, and connections between said valve mechanism and both ends of the cylinder of each engine unit.

5. In an engine structure, the combination with a support, a crank shaft mounted on said support, and two pivotally mounted engine units of the reciprocating type connected with said crank shaft for driving the latter, of a driven power-delivering wheel on said shaft between the cranks

thereof, valve plates fitting against the sides of the wheel, there being cooperating ports and ducts in the plates and the wheel whereby the wheel and the plates constitute a valve mechanism, means for pivotally supporting said valve plates, springs for pressing said plates toward the wheel, and connections between said valve mechanism and both ends of the cylinders of the engine units.

6. In an engine structure, the combination with a fixed support, a crank shaft mounted on the support, two engine units of the reciprocating type, means whereby the cylinders of said units are mounted to oscillate, and pitmen connecting the pistons of said units with the cranks of said shaft, of a driven power-delivering wheel on said crank shaft, said wheel having valve ducts, valve plates having ducts and ports cooperable with the valve ducts of the wheel, a frame connected with said valve plates, springs between said frame and valve plates for pressing the latter against the sides of said driven wheel, means for rocking said frame whereby to shift the valve plates and effect reversal of the direction of rotation of the wheel, and connections between said valve mechanism and the ends of the cylinders of both engine units.

7. In an engine structure, the combination with a fixed support, a crank shaft mounted on the support, two engine units of the reciprocating type, means whereby the cylinders of said units are mounted to oscillate, and pitmen connecting the pistons of said units with the cranks of said shaft, of a driven wheel on said crank shaft, said wheel having valve ducts, valve plates having valve ducts and ports cooperable with the valve ducts of the wheel, a frame connected with said valve plates, springs between said frame and valve plates for pressing the latter against the sides of said driven wheel, a toggle lever connecting one end of said frame and the support, a manually operable lever, connections between said manually operable lever and one member of the toggle lever whereby to straighten or collapse the latter and rock the frame to shift the valve plates and reverse the rotation of the wheel, means for locking said lever, and connections between said valve mechanism and the ends of the cylinders of both engine units.

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

JOHN B. THOMAS.

Witnesses:

W. S. HODGE,
G. F. DOWNING.