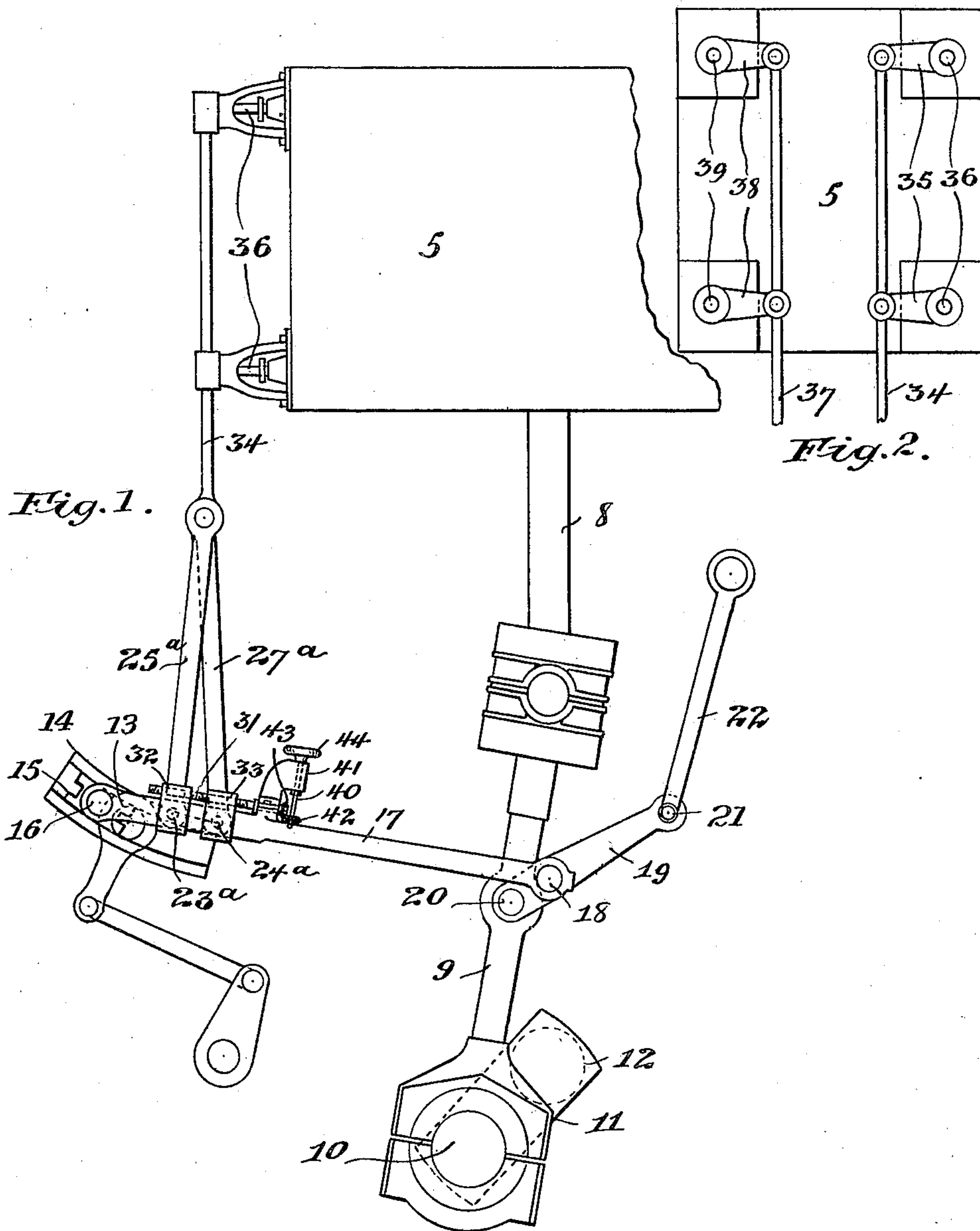


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VALVE GEAR FOR FLUID PRESSURE MOTORS.
APPLICATION FILED JAN. 11, 1906.

976,458.

Patented Nov. 22, 1910.



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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR FLUID-PRESSURE MOTORS.

976,458.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed January 11, 1905. Serial No. 240,618.

To all whom it may concern:

Be it known that I, CHARLES HAMMEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Valve-Gears for Fluid-Pressure Motors, of which the following is a specification.

This invention relates to valve gears for fluid pressure engines, having special application to engines of the marine and locomotive types, wherein the direction of motion of the engine is principally in one direction.

The invention has for its principal object to increase the efficiency of said engines, through a superior steam distribution; and this object it accomplishes through the provision of an apparatus controlling the valve members whereby an earlier cut-off is obtainable, without the usual accompanying disadvantages of premature release and compression resultant therefrom.

In Letters Patent No. 833,164, granted to me October 16, 1906, on an application filed concurrently herewith, I have shown a mechanism based upon the fundamental principle of my present invention as embodied in the Stephenson link valve gear in association with a pair of valves or groups of valves provided with differential lap.

In the present case the principle of the invention is shown as embodied in a radial reversing gear of the Joy type, adapted to the operation of engines equipped with independent inlet and exhaust valves.

Figure 1 is an elevation of a portion of the cylinder and valve chest and of so much of the valve mechanism and reversing gear of a vertical steam engine as is necessary to illustrate the principle and construction of my invention as applied to an engine having independent inlet and exhaust valves; and Fig. 2 is a face view of the valve chest in a plane at right-angles to the plane of Fig. 1.

Referring to the drawings, 5 designates the box or casing surrounding the usual cylinder and valve chest of a vertical steam engine, 8 the piston-rods, 9 the connecting rod, 10 the wrist-pin, 11 the crank-arm and 12 the driving-shaft of the engine.

13 designates the rock-shaft on which is mounted quadrant block guide 14, in which is mounted to travel a quadrant block 15, carrying a pin 16, to which latter is pivoted

the valve lever 17. The other end of lever 17 is pivotally connected by a pin 18 to a link 19, one end of which latter is pivoted about a pin 20 to the connecting rod 9, while its other end is pivotally suspended by a pin 21 from the lower end of a pivotally hung anchor-link 22.

32 and 33 designate link-blocks slidably mounted on the lever 17 and carrying pins 23^a and 24^a, to which are connected connecting rods 25^a and 27^a, respectively, the former being connected to a rod 34 actuating a pair of exhaust valves through arms 35 on the valve stems 36 (Fig. 2); and the latter being connected to a rod 37 actuating a pair of inlet valves through arms 38 on the valve stems 39.

From the foregoing it will be seen that the inlet valves are actuated from the pin 24^a on lever 17, while the outlet valves are driven from the pin 23 on the same lever. The pivot 18, as is well understood, has a motion coinciding in time with the piston motion when measured along the direction of motion of the piston rod but reduced in quantity. The pivot 18 also has a motion in a transverse direction measured along the horizontal line, which motion is imparted to the valve rods 34 and 37 by the sliding quadrant block 15 reciprocating over the guide 14. When the latter is inclined from the neutral position such motion is proportionate to the degree of inclination from such neutral position. This latter is not coincident with the piston motion, but is said to be at right-angles to it, its function being to provide port opening, while the function of the motion coinciding with the piston motion is to uncover the steam-lap of the valve. The two motions, when properly combined, give a motion of greater extent than either alone. The time of each would coincide with the motion of an eccentric with considerable angular advance, such advance depending on the proportion taken of each motion. If more of the piston motion were taken, the timing of the resultant motion would approach more toward the time of the piston motion, or with greater angular advance respecting the crank. Consequently, an earlier grade of expansion can be acquired by sliding the pivot 24^a toward the pivot 18, producing the same effect as is produced by "hooking up" the ordinary Stephenson link with the advantage of not reducing the

valve travel; and similarly a later exhaust can be acquired in the arrangement shown and described by sliding the pivot-pin 23^a toward the pivot 16. Such adjustability
 5 is particularly applicable and advantageous in connection with engines employing independent inlet and exhaust valves, such as that herein shown; and for effecting such adjustment I have herein shown a mechanism comprising a right and left-hand
 10 threaded rod 31 that is passed through the link-blocks 32 and 33 and may be operated by any convenient means, that herein shown comprising a shaft 40 mounted in a bracket
 15 41, carried by lever 17, said shaft having a bevel pinion 42 engaging a bevel pinion 43 on shaft 31, and on its outer end carrying a hand-wheel 44. The adjustment of the steam admission valves could only be effected
 20 to the extent that the increase in steam lead effected thereby would admit of. Any further adjustment in such direction would have to be effected by a reduction of inclination of the quadrant guide, the premature
 25 action of the exhaust valves resulting from the above described mechanism having been previously corrected by sliding the pivot pin 23^a on lever 17 toward pivot 16.

From the foregoing it will be seen that the
 30 action of the valves, whether they be independent inlet and exhaust valves, or a pair of valves or groups of valves each having steam admission and exhaust functions at separated points on the valve-actuating
 35 lever of the reversing gear, effects a variation in the time motions of said valves whereby a relatively earlier cut-off and later compression and release are obtainable than where the valves are actuated from a single
 40 point on the valve-actuating lever.

I claim:

1. In a fluid pressure motor, the combination with a cylinder and valve chest having

a pair of independently movable valves, of a reversing gear having as an element thereof 45 of a quadrant guide, a block mounted on said guide and movable relatively thereto, a lever connected to said block, valve-actuating rods, means connecting said valve-actuating rods to said lever at separate points 50 longitudinally thereon, and means for adjusting said connecting means longitudinally on said lever.

2. In a fluid pressure motor, the combination with a cylinder and valve chest having 55 independent inlet and exhaust valves, of a reversing gear having as an element thereof a quadrant guide, a block mounted on said guide and movable relatively thereto, a lever connected to said block, valve-actuating 60 rods, means connecting said valve-actuating rods to said lever at separated points longitudinally thereon, and means for adjusting said connecting means toward and from each other longitudinally of said lever, substantially as described. 65

3. In a fluid pressure motor, the combination with a cylinder and valve-chest having independent steam and exhaust valves, of a reversing gear having as an element thereof 70 a quadrant guide, a block mounted on said guide and movable relatively thereto, a lever connected to said block, valve-actuating rods, a pair of link blocks slidably mounted on said lever and pivotally connected to said 75 valve-actuating rods, and means for moving said link blocks toward and from each other comprising a right and left hand threaded rod engaging said link blocks, and means mounted on said lever for turning 80 said threaded rod, substantially as described.

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