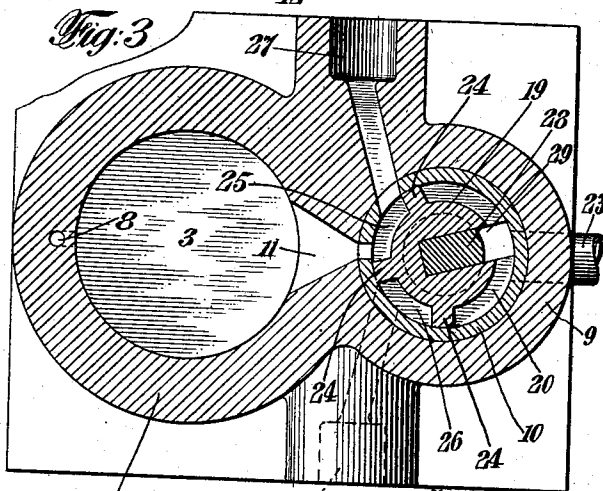


APPLICATION FILED FEB. 1, 1916.

2 SHEETS—SHEET 1.

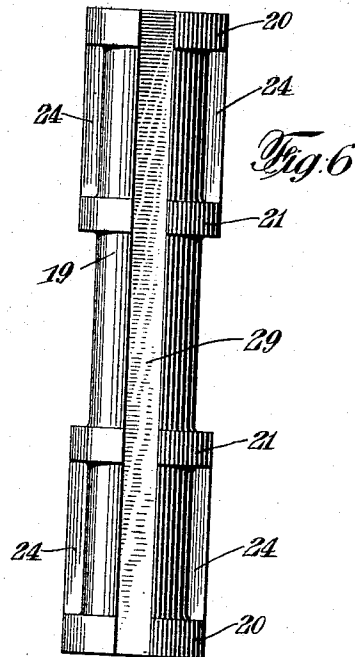
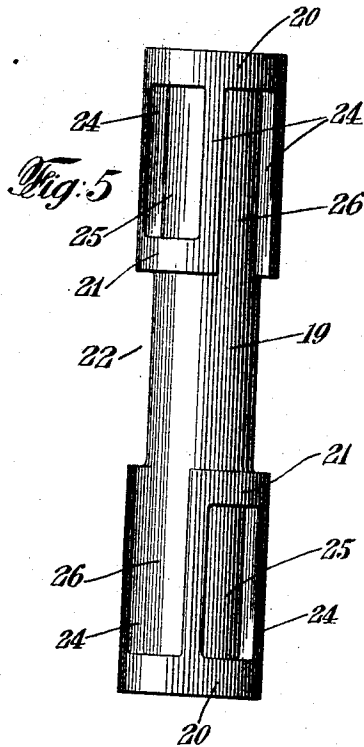
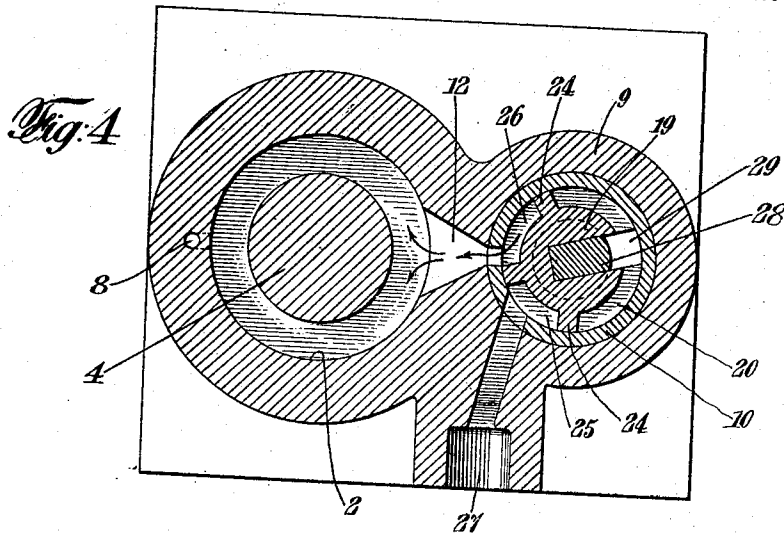


INVENTOR
27 James Hamilton,
BY
David Davis
his ATTORNEYS.

J. HAMILTON.
VALVE GEAR FOR POWER HAMMERS.
APPLICATION FILED FEB. 1, 1916.

1,220,331.

Patented Mar. 27, 1917.
2 SHEETS—SHEET 2.



INVENTOR
James Hamilton,
BY *Davis Davis*
his ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES HAMILTON, OF BROOKLYN, NEW YORK, ASSIGNOR TO HAMILTON HAMMER COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

VALVE-GEAR FOR POWER-HAMMERS.

1,220,331.

Specification of Letters Patent.

Patented Mar. 27, 1917.

Application filed February 1, 1916. Serial No. 75,487.

To all whom it may concern:

Be it known that I, JAMES HAMILTON, a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Valve-Gears for Power-Hammers, of which the following is a specification. (Case B.)

The main object of this invention is to provide a simple and efficient form of valve for use in power hammers, and particularly adapted for use in the form of power hammer shown and described in my Letters Patent No. 1,046,779, dated December 10, 1912.

In a valve gear constructed in accordance with this invention the valve is mounted on its stem in such manner that it is capable of a slight lateral movement independent of the valve stem. The purpose of this is to permit the valve to be held to its seat at all times during its oscillation, and to free the valve of any lateral movement due to the twist or torsion of the valve stem, or the lateral movement of the valve stem due to the rotation thereof through the cam actions, all of which will be fully described herein.

Another object of the invention is to provide a valve chamber cast in a single piece, and then loosely placed on the valve stem, said valve being held in place by the lining or bushing in the valve chamber, and by the plates at the end thereof. This simplifies the assembling of the parts and permits of the ready replacement of the valve, should that be necessary at any time.

In the drawing, Figure 1 is a side elevation of a power hammer provided with the improved valve gear, the cylinder and valve chamber being shown in sectional view;

Fig. 2 a longitudinal sectional view of the power cylinder;

Fig. 3 a horizontal sectional view on the line III—III of Fig. 1;

Fig. 4 a similar view on the line IV—IV of Fig. 1;

Fig. 5 a detail side elevation of the valve, showing the steam channels and ports therein; and

Fig. 6 an elevation of the opposite side of the valve from that shown in Fig. 5.

Referring to the various parts by numerals, 1 designates the hammer frame, which may be of any suitable construction and

form; 2 the power cylinder suitably mounted in the upper end of said frame. In the cylinder is mounted a piston 3, from which depends a piston rod 4. To the lower end of the piston rod is secured a hammer head 5 which carries the hammer or striking head 6. Below the striking head 6 an anvil plate 7 is mounted in the hammer frame. This anvil plate is adapted to rest upon the top of the piling, when the hammer is used for driving piles. The hammer head is suitably guided in the hammer frame, and the said frame is provided with suitable means at its upper end to receive the supporting chains or other tackle. The hammer frame may also be provided with suitable guiding means by which it may be guided in the usual tower frame in which these hammers are used, all of which is fully described and shown in my aforesaid patent.

The cylinder is provided at each of its ends with cushion ports 8, by means of which steam passes around the piston 3 when the said piston approaches the end of its movement in either direction, in order to cushion the stroke and prevent the piston striking the cylinder heads.

Formed on the side of the power cylinder is a valve chamber 9, said chamber being provided with a lining or bushing 10. Ports 11 and 12 connect the valve chamber with the ends of the cylinder, one of said ports being at each end of the cylinder. Extending through the valve chamber is a valve rod 13, the lower end of said rod being slotted at 14 to receive the cam plate 15, said plate being formed at its upper and lower ends with the cams 16. The hammer head is formed with an extension 17 through which the lower end of the piston rod freely extends. The extension 17 is slotted horizontally, or perpendicularly to the valve rod, and said slot is adapted to receive a valve rocking block 18. This block is apertured for the passage of the valve rod, and for the passage of the valve rocking cams 16. The operation of this part of the apparatus is precisely the same as the operation of the corresponding parts in my aforesaid patent, and need not be further described herein. By means of the cams 16 and the co-operating block or plate 18 the valve rod is given a rotary, oscillatory or rocking movement, and this movement is imparted to the

valve carried by said stem, as will be fully hereinafter set forth.

In the valve chamber is mounted a rotary, oscillatory valve 19. This valve is cylindrical in form and extends throughout the length of the valve chamber. Annular bearing flanges 20 are formed at the ends of the valve, said flanges fitting closely within the bushing at the ends thereof, at points beyond the ports 11 and 12, as clearly shown in Fig. 1. At suitable points from the ends of the valve, annular bearing flanges 21 are formed, these flanges corresponding with the end flanges and fitting closely within the bushing of the valve chamber. Between the annular bearing flanges 21 the valve is reduced in diameter, in order to form the steam supply chamber 22 with which communicates a supply pipe 23. The annular bearing flanges 20 and 21 are on each side of the ports 11 and 12, so that said ports open into the spaces between said flanges. The valve is provided with longitudinally extending bearing flanges 24, said flanges being connected at their ends to the annular bearing flanges 20 and 21. The longitudinally extending bearing flanges 24, together with the annular bearing flanges 20 and 21, form the exhaust passages 25 and the supply passages 26 at each end of the valve, the supply passages 26 being in open communication with the supply chamber 22, while the exhaust passages 25 are closed at their ends and are not in communication with said supply chamber at any time. The valve is placed in the valve chamber in such a position that the bearing flanges 24 are adjacent the ports 11 and 12 and bear on the bushing as the valve is oscillated. There are preferably three of the flanges 24, arranged equal distances apart at each end of the valve, and the middle one of each of said sets of flanges is adapted to pass over the adjacent port during the oscillation of the valve, in order to connect said port, first with the steam supply chamber 22 and then, upon the reverse movement of the valve, to connect said port, through the exhaust passage 25, with the adjacent exhaust port 27, shown clearly in Fig. 3. The exhaust passage 25 at one end of the valve is directly in longitudinal line with the supply port 26 at the opposite end of the valve, so that when the power cylinder is exhausting through port 11, as shown in Figs. 1 and 3, steam will pass from the supply chamber through passage 26 and port 12 at the other end of the cylinder. This position of the ports will be reversed when the piston reaches the upper end of the cylinder, as shown in Fig. 1, and the valve rod is rotated through the upper cam 16.

The valve rod, within the valve chamber, is made substantially rectangular in cross section as shown at 28, and the valve is lon-

gitudinally slotted, as shown at 29, to adapt it to fit over the flattened portion of the valve rod. The slot 29 extends to the outer circumference of the valve, as shown clearly in Fig. 3, so that said valve is free to have a lateral movement on the valve rod and independently of the valve rod, so that the said valve may bear on the bushing or valve seat and will not be twisted or moved from said seat by any twisting or lateral movement of the valve stem due to the oscillation thereof through the cams and the valve rocking block or plate 18. The slot 29 in the valve is directly opposite the middle one of the longitudinally extending bearing flanges 24, and said slot is adjacent the steam inlet 23. The purpose of this is to provide a steam chamber extending throughout the length of the valve directly opposite the bearing flanges 24 and the ports 11 and 12, so that the pressure of the steam therein will hold the bearing flanges against the bushing or seat precisely in the manner in which a slide valve is held to its seat by the steam pressure in the valve chamber.

The reduced end of the valve rod is provided with a central, cylindrical journal 30 which is adapted to fit in a socket 31 formed in the top plate 32, said plate forming the outer cylinder head and closing the outer end of the valve chamber. It is manifest that by removing this outer plate the valve may be longitudinally withdrawn from the valve chamber for the purposes of repair or inspection, and may be readily replaced in the chamber without disconnecting or dismantling any other part of the apparatus.

What I claim is:

1. A valve gear comprising a cylindrical valve chamber provided with ports, a cylindrical valve therein formed with supply and exhaust passages at one side thereof, a pressure chamber opposite said passages, means for supplying fluid under pressure to the pressure chamber and supply passages, a valve rod extending through a passage in said valve and having a loose driving connection with the valve whereby said valve rod is adapted to operate said valve and the valve is capable of lateral movement independently of the rod, and means for imparting a rotary oscillatory movement to the valve rod.

2. A valve gear comprising a cylindrical valve chamber provided with a port at each end, a cylindrical valve therein formed with a central annular supply chamber, an exhaust and a supply passage at each end of the valve at one side thereof, and a pressure chamber at each end of the valve opposite the supply and exhaust passages, the supply passages and pressure chambers being connected at their inner ends with the supply chamber, a valve rod extending through said valve, means for oscillating the valve rod,

and means for connecting the valve to oscillate with the valve rod and to have an independent lateral movement.

3. A valve gear comprising a cylindrical valve chamber provided with a port at each of its ends, a cylindrical valve therein formed with annular bearing flanges and with longitudinally extending bearing flanges between said annular flanges to form exhaust and supply passages at each end of the valve and a supply chamber midway the ends of the valve, the supply passages being in communication with said supply chamber, said valve being slotted longitudinally, a non-circular valve rod extending through said valve chamber and the slot in the valve whereby the valve may have a lateral movement on the valve rod, and means for giving to the valve rod a rotary oscillatory movement.

4. A valve gear comprising a cylindrical valve chamber provided with a port at each of its ends, a cylindrical valve therein formed with annular bearing flanges and with longitudinally extending bearing flanges between said annular flanges to form exhaust and supply passages at each end of the valve and a supply chamber midway the ends of the valve, the supply passages being in communication with said supply chamber, said valve being slotted longitudinally from end to end, said slot extending inwardly from a point directly opposite the longitudinally extending bearing flanges, a valve rod rectangular in cross section extending through the valve chamber and through the slot in the valve whereby the valve may have a lateral movement on the valve rod to maintain the bearing flanges seated, and means for giving to the valve rod a rotary, oscillatory movement.

5. A valve gear comprising a cylindrical valve chamber provided with a port at each

of its ends, a cylindrical one-piece valve therein formed with integral annular bearing flanges at its ends and with integral annular bearing flanges a suitable distance from each of its ends, said latter flanges forming a central annular supply chamber, three integral longitudinally extending bearing flanges at each end of the valve and forming with the annular flanges an exhaust passage and a supply passage at each end of the valve, the supply passages being connected at their inner ends to the supply chamber, said valve being slotted longitudinally from end to end, a valve rod non-circular in cross section fitting the slot in the valve and extending through the said valve chamber, whereby the valve may move laterally on the valve rod independently thereof, and means for giving to said rod a rotary oscillatory movement.

6. A valve gear comprising a cylindrical valve chamber provided with a port at each end, a cylindrical valve therein formed with annular bearing flanges at its ends and with annular bearing flanges a suitable distance from each of its ends, said latter flanges forming a central annular supply chamber, three longitudinally extending bearing flanges at each end of the valve, forming with the annular flanges an exhaust and a supply passage at each end of the valve at one side thereof, and a pressure chamber at each end of the valve opposite the supply and exhaust passages, the supply passages and pressure chambers being connected at their inner ends with the supply chamber, and means for oscillating the valve to place the supply and exhaust passages in communication with the valve chamber ports.

In testimony whereof I hereunto affix my signature.

JAMES HAMILTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."