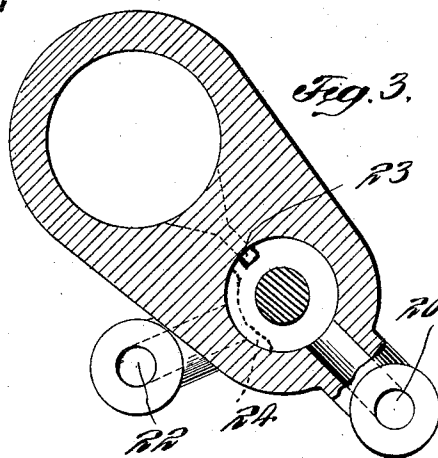
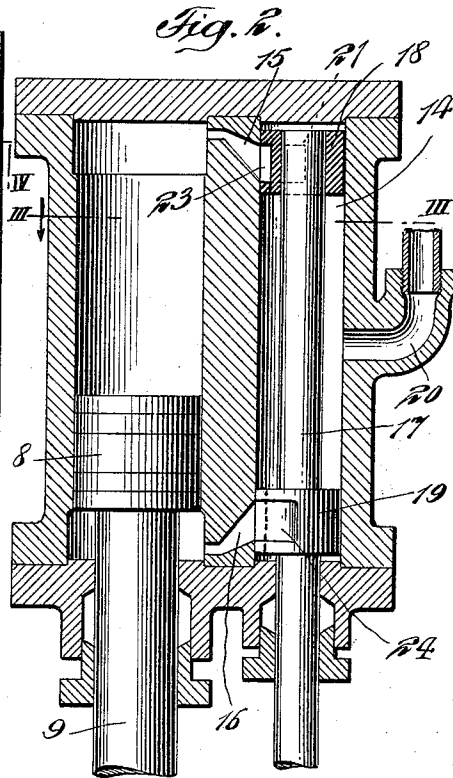
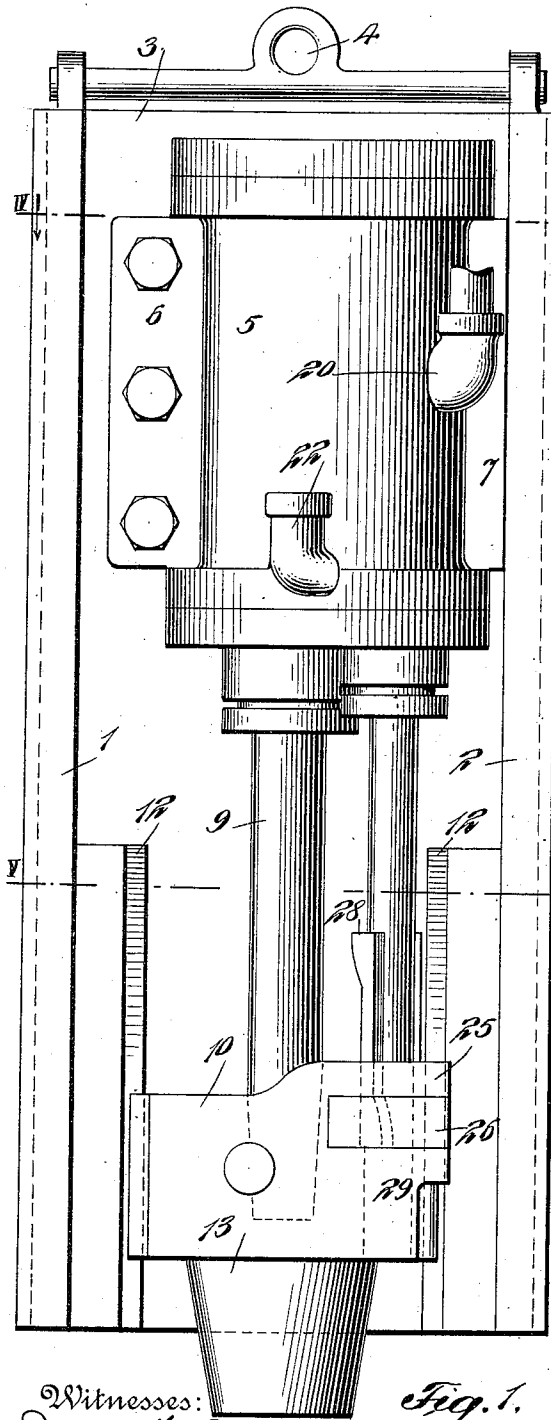


J. HAMILTON.
VALVE GEAR FOR POWER HAMMERS.
APPLICATION FILED JUNE 1, 1911.

1,046,779.

Patented Dec. 10, 1912.

2 SHEETS—SHEET 1.



Witnesses:
Julius H. Hart
E. Maguire

Fig. 1.

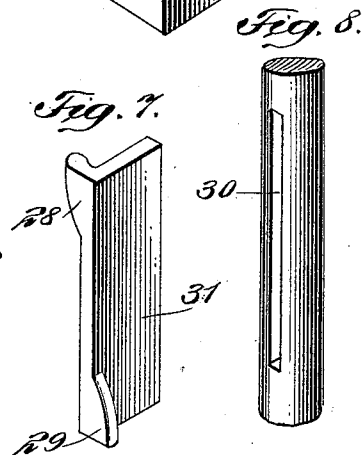
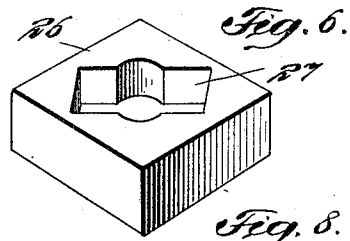
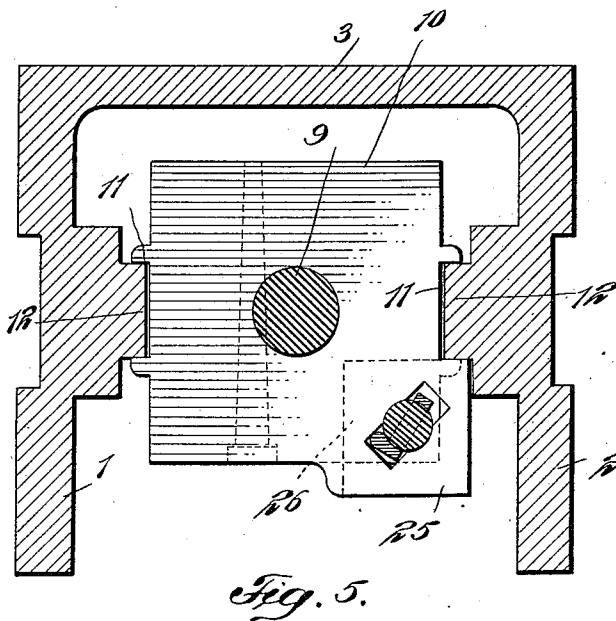
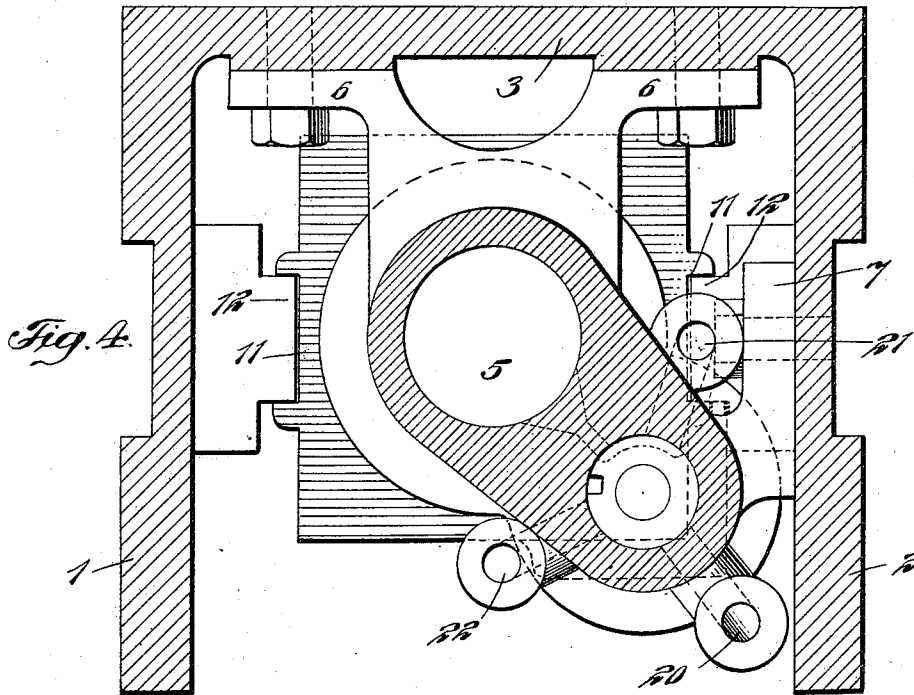
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JAMES HAMILTON, OF BROOKLYN, NEW YORK.

VALVE-GEAR FOR POWER-HAMMERS.

1,046,779.

Specification of Letters Patent.

Patented Dec. 10, 1912.

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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, 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.

The main object of this invention is to provide a simple form of valve gear for power hammers adapted to be operated by any fluid under pressure, preferably steam.

Another object of the invention is to form the parts of the valve gear which are designed to receive the greatest wear removable so that they may be readily detached when worn and new ones substituted therefor.

In the drawings: Figure 1 is a side elevation of the hammer; Fig. 2 a vertical sectional view of the power cylinder and the valve mechanism; Fig. 3 a horizontal sectional view on the line III—III of Fig. 2; Fig. 4 a horizontal sectional view on the line IV—IV of Fig. 1; Fig. 5 a similar view on the line V—V of Fig. 1; Fig. 6 a detail perspective view of the valve-rocking block; Fig. 7 a similar view of the valve-rocking cam; and Fig. 8 a detail perspective view of a part of the valve stem.

Referring to the various parts by numerals, 1 and 2 designate the side walls of the hammer frame and 3 the back wall thereof. To the upper end of this frame is secured a cross bar 4 to which the hoisting and lowering tackle may be secured. The side walls of the hammer frame are recessed on their outer sides to receive vertical guides, up and down which the hammer frame is moved during the operation of driving a pile, or for like purposes.

The power cylinder 5 is provided with rear flanges 6 by means of which it is bolted to the inner side of the back wall of the hammer frame. This cylinder is also formed with a side flange 7 by means of which it is bolted to the side wall 2 of the hammer frame. By this means the cylinder is rigidly supported in the hammer frame. Fitted to reciprocate in the power cylinder is the piston 8 carrying the depending pis-

ton rod 9 to the lower end of which is secured the hammer head 10. In the vertical side walls of this hammer head are formed channels 11 to receive guides 12 which are secured to the sides of the hammer frame at the lower end thereof, so that the hammer is guided in its reciprocating movement. The hammer head carries the hammer 13 which is designed to contact with the piles in the driving operation.

Formed on the side of the power cylinder is a valve chamber 14. The ports 15 and 16 connect this chamber with the ends of the power cylinder, one of these parts being arranged at each end of said cylinder. Extending through the valve chamber is a valve rod 17 which carries at its upper end a valve 18, in position to control port 15, a valve 19 being secured to said rod at the lower end of the valve chamber in position to control the port 16. An inlet port 20 is formed substantially midway between the ends of the valve chamber and between valves 18 and 19. The valve chamber is also formed with an exhaust port 21 near its upper end, said port being controlled by the valve 18, and with an exhaust port 22 at its lower end, this latter port being controlled by a valve 19. Each valve is provided with an inlet port 23 and with an exhaust port 24, the inlet port extending parallel with the valve stem and the exhaust port being a circumferential cavity, as shown clearly in Figs. 2 and 3. The valve stem in operation has a rotary reciprocating motion, or rocks, so that the valves are given a partial rotation during the movement of the valve stem. The ports, as shown, are so arranged that when the valve stem is rocked in one direction one exhaust port will connect the cylinder port with the exhaust port from the valve chamber, as shown clearly in Fig. 3, and at the same time the other valve will be brought into position to connect the steam space of the valve chamber with the inlet port of the power cylinder.

To secure the rocking movement of the valve stem and the valves, the valve stem is carried downwardly through the hammer head, and means are provided whereby as the hammer head reciprocates the cams car-

ried by the valve stem will be engaged and the valve stem rocked. The hammer head is formed with an extension 25 which is perforated for the free passage of the valve stem. This extension is also formed with an angular socket or slot arranged in a plane perpendicular to the valve stem, said socket being shown in the drawings as rectangular and adapted to receive a square valve-rocking block 26, as clearly indicated in Fig. 5 of the drawings. This valve rocking block is apertured at 27 for the passage of the valve stem and for the passage of the valve rocking cams 28 and 29 carried by said valve stem. These cams are arranged one above the other and extend in opposite directions and are tapered toward each other, as shown clearly in Figs. 1 and 7. Said cams, as the hammer head reciprocates, contact with the edges of the valve operating block and give the valve stem a rotary reciprocating movement first in one direction and then in the reverse direction. It will, of course, be understood that these valves are of such size and length as to secure the proper extent of rotation of the valve stem and the operation of the valve at the proper point in the travel of the hammer head. The piston rod is slotted as shown at 30 in Fig. 8, and the cams 28 and 29 are formed on a bar 31 which is adapted to be forced into the slot 30. When the parts are assembled the valve rocking block will be held in its socket by the valve stem and the cam carrying rod and the cam-rod will be held in its place in the valve stem by the hammer head. It is manifest, therefore, that by removing the valve stem from the valve chamber and consequently withdrawing said stem from the hammer head, the valve rocking block and the valve rocking cams may be readily detached and new ones substituted therefor. It is manifest that these two parts of the apparatus will receive the hardest usage, and it is therefore desirable that they shall be readily detachable in order that new and unworn parts may be substituted therefor.

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

1. A valve gear comprising a power cylinder, a piston in said cylinder, a downwardly extending piston rod connected to said piston, a head connected to the lower end of said piston rod, a valve chamber, ports connecting said chamber with the interior of the power cylinder said chamber being also provided with exhaust ports, oscillating valves controlling said ports, a valve stem connecting said valves and extending below the valve chamber, a valve rocking block carried by the head, oppositely disposed cams carried by the valve stem and extending through

the said valve operating block and adapted to be engaged thereby, whereby as the head reciprocates the valve stem will be rocked to operate the valves.

2. A valve gear comprising a power cylinder, a piston in said cylinder, a downwardly extending piston rod connected to said piston, a head connected to the lower end of said piston rod, a valve chamber, ports connecting said chamber with the interior of the power cylinder said chamber being also provided with exhaust ports, oscillating valves controlling said ports, a valve stem connecting said valves and extending below the valve chamber, said valve stem being transversely slotted near its lower end, a cam-carrying bar removably fitted in said slot, said bar being provided with a pair of cams arranged one above the other and tapered toward each other, a valve operating block carried by the head and apertured for the passage of the valve stem and the valve-operating cams carried by said stem, said cams being arranged to be engaged by the said block during the reciprocation of the head to rock the valve stem and thereby operate the valves.

3. A valve gear comprising a power cylinder, a piston therein, a piston rod connected thereto, a head connected to the lower end of said piston rod, a valve chamber, ports connecting said chamber with the interior of the power cylinder, said chamber being also provided with exhaust ports, oscillating valves controlling said ports, a valve stem connecting said valves and extending below the valve chamber, said stem being transversely slotted near its lower end, a removable cam carrying bar inserted in said slot and formed with two oppositely disposed cams, and means carried by the head to engage said cams as said head reciprocates to thereby rock the valve stem and operate the valves.

4. A valve gear for a power hammer comprising a frame, a power cylinder rigidly secured in the upper end of said frame, a piston in said cylinder, a downwardly extending piston rod connected to said piston, a head connected to the lower end of said piston rod and formed with a socket, a valve chamber, ports connecting said chamber with the interior of the power cylinder, said chamber being also provided with exhaust ports, oscillating valves controlling said ports, a valve stem connecting said valves and extending through the head, oppositely disposed cams carried by said valve stem, a valve operating block secured in the socket of the head, said block being apertured for the passage of the piston rod and the cams, the walls of said apertures being adapted to be engaged by the cams as

the head reciprocates, whereby the valve stem will be rocked to operate the valves.

5. A valve gear for a power hammer comprising a frame, a power cylinder rigidly secured in the upper end of said frame, a piston in said cylinder, a downwardly extending piston rod connected to said piston, a head connected to the lower end of said piston rod, a valve chamber parallel with the cylinder, ports connecting said chamber with the interior of the cylinder, oscillating valves controlling said ports, a valve stem connecting said valves together and extending below the valve chamber parallel with the piston rod, means to prevent the rotation of the head, a pair of oppositely disposed cams carried by the valve stem, said stem extending through the head and a cam block in the head and adapted to engage the cams on the valve stem during the reciprocation of the head and to thereby directly rock the valve stem.

6. A valve gear comprising a power cylinder, a piston in said cylinder, a piston rod connected to said piston, a head connected to said piston rod, a valve chamber parallel with the cylinder, ports connecting said chamber with the interior of the cylinder, oscillating valves controlling said ports, a valve stem connecting said valves together and extending parallel with the piston rod, means to prevent the rotation of the head, a pair of oppositely disposed cams carried by the valve stem, said stem extending through the head and a cam block removably secured in the head and adapted to engage the cams on the valve stem during the reciprocation of the head and to thereby directly rock the valve stem.

7. A valve gear comprising a power cylinder, a piston therein, a piston rod connected thereto, a head connected to the said piston rod, a valve chamber, ports connecting said chamber with the interior of the power cylinder, said chamber being also provided with exhaust ports, oscillating valves controlling said ports, a valve stem connecting said valves, oppositely disposed cams removably secured to the valve stem, a removable cam block secured to the head and apertured for the passage of the valve stem, the side walls of said aperture being arranged to engage the cams of the valve stem to directly rock said stem as the head reciprocates.

8. A valve gear for a power hammer comprising a power cylinder, a piston therein, a piston rod connected thereto, a head connected to the lower end of said piston rod, a valve chamber, ports connecting said chamber with the interior of the power cylinder, said chamber being also provided with exhaust ports, oscillating valves con-

trolling said ports, a valve stem connecting said valves and extending below the valve chamber, said stem being transversely slotted near its lower end, a removable cam carrying bar inserted in said slot and formed with two oppositely disposed cams, a rectangular cam block fitting a correspondingly shaped recess in the head, the head and said block being apertured for the passage of the piston rod and the cam bar, the walls of the aperture in the block being arranged to engage the cams on the piston rod as the head reciprocates to thereby rock the valve stem.

9. A valve gear comprising a cylinder, a piston therein, a piston rod connected thereto, a heavily weighted head connected to the projecting end of said rod to reciprocate therewith, means engaging said head to prevent its rotation, a valve chamber parallel with the cylinder and provided with ports at its ends connecting it with the interior of the cylinder at the ends thereof, and with exhaust ports at the ends thereof closely adjacent the cylinder inlet ports, two oscillating valves in said valve chamber, one near each end thereof and arranged to control the adjoining ports, a single valve stem connecting said valves and extending beyond the valve chamber and into the reciprocable head, a pair of oppositely disposed cams carried by said piston rod, said cams being a suitable distance from each other along said valve stem, said cams being arranged to secure the oscillation of the valve stem at or near the ends of the strokes of said head.

10. A valve gear comprising a cylinder, a piston therein, a piston rod connected thereto, a heavily weighted head connected to the projecting end of said rod to reciprocate therewith, means engaging said head to prevent its rotation, a valve chamber parallel with the cylinder and provided with ports at its ends connecting it with the interior of the cylinder at the ends thereof and with exhaust ports at the ends thereof adjoining the cylinder inlet ports, two oscillating valves in said valve chamber, one near each end thereof and arranged to control the adjoining ports, a valve stem connecting said valves and extending beyond the valve chamber, a pair of oppositely disposed cams carried by said piston rod, and means carried by the reciprocable head and inclosing the valve stem and the cams, whereby the reciprocation of the head will oscillate the valves.

11. A valve gear comprising a cylinder, a piston therein, a piston rod connected thereto, a head connected to the lower end of said piston rod, a valve chamber provided with ports connecting said chamber with the in-

terior of the power cylinder, said chamber
being also provided with exhaust ports, os-
cillating valves in said valve chamber and
controlling said ports, a valve stem connect-
5 ing said valves and extending into the re-
ciprocable head, a removable cam carrying
bar connected to said stem, a portion of said
cam carrying bar being at all times within
the reciprocable head, whereby said head
10 will prevent the detachment of said bar

from said stem, and means whereby the re-
ciprocation of the head will oscillate the
valve stem.

In testimony whereof I hereunto affix my
signature in the presence of two witnesses. 15

JAMES HAMILTON.

Witnesses:

CHRISTIAN B. CHRISTIANSON,
JOSEPH M. MILLER.

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