

No. 16,765.

PATENTED MAR. 3, 1857.

N. W. WHEELER.
VALVE GEAR FOR STEAM ENGINES.

2 SHEETS—SHEET 1.

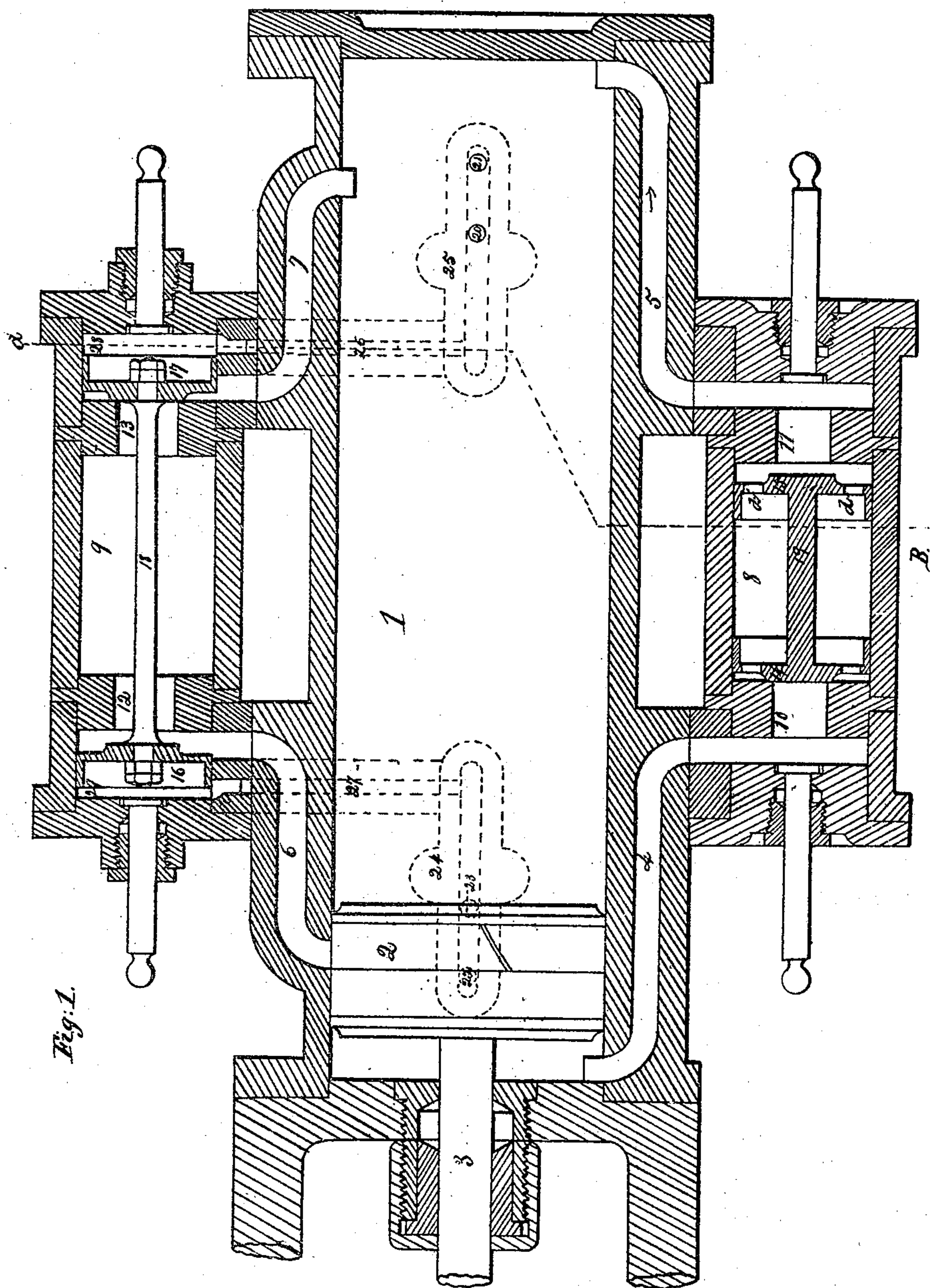


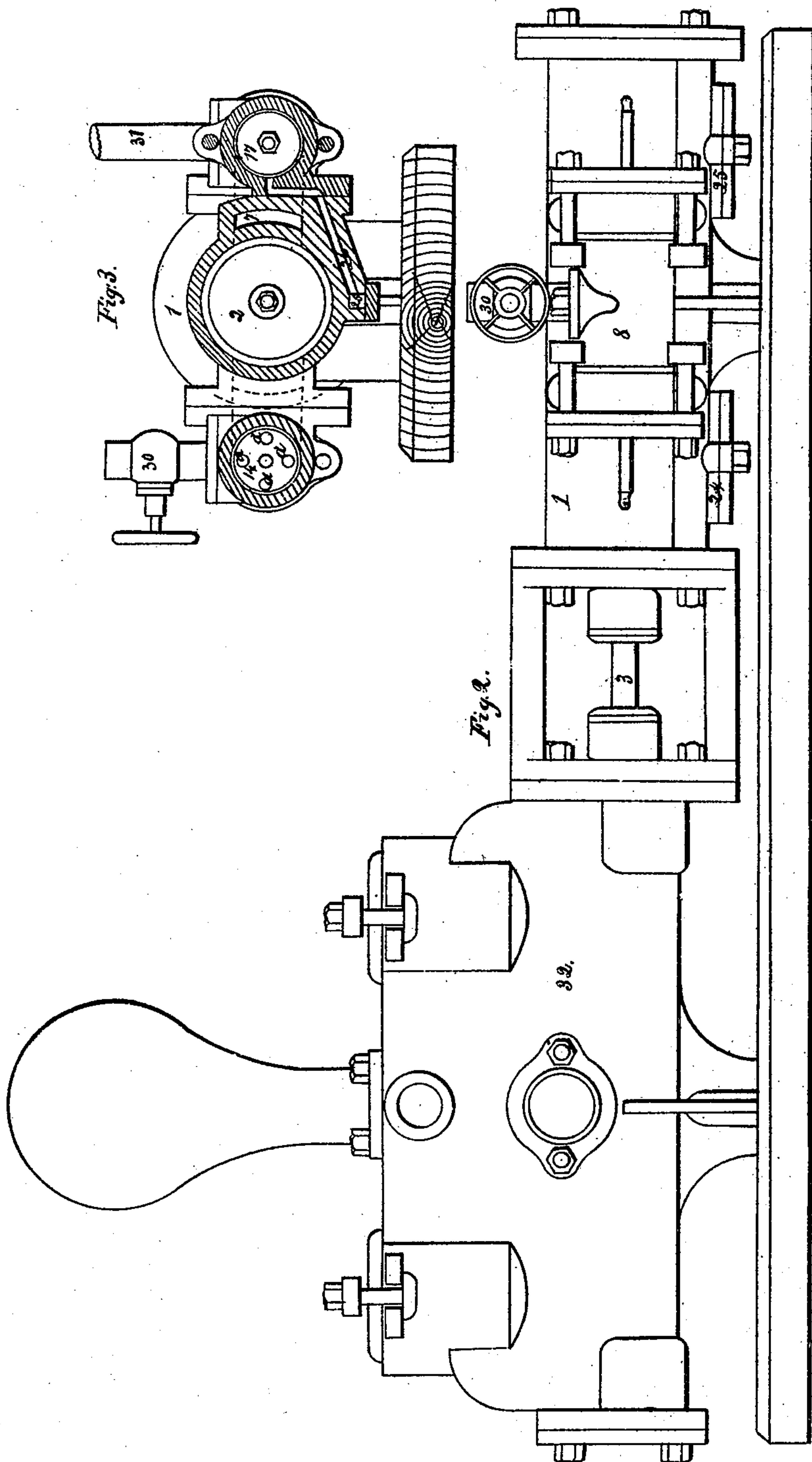
Fig. 1.

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UNITED STATES PATENT OFFICE.

NORMAN W. WHEELER, OF CINCINNATI, OHIO.

OPERATING-VALVE FOR STEAM-ENGINES.

Specification of Letters Patent No. 16,765, dated March 3, 1857.

To all whom it may concern:

Be it known that I, NORMAN W. WHEELER, of the city of Cincinnati and State of Ohio, have invented a new and Improved Valve-Gear for Steam-Engines and Method of Working the Same; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawing, making a part of this specification, in which—

Figure I is a sectional plan of the working cylinder and valve chambers; Fig. II an elevation of the engine, with a double acting pump attached; and Fig. III a section through A, B.

Like numbers and letters refer to like parts.

1 is the working cylinder; 2, the working piston; 3, the piston rod; 4 and 5, the receiving steam channels; 6 and 7, the exhaust steam channels; 8, the receiving valve chamber; 9, the exhaust valve chamber; 10 and 11, the receiving valve seats; 12 and 13, the exhaust valve seats; 14 and 15, the receiving valves (which are puppet valves, working freely but nearly steam tight in their chamber, and connected by the rod 19).

16 and 17 are the exhaust valves, connected by the rod 18; 20 and 23, passages opening into the working cylinder, and with the cavities in 24 and 25 and the passages 26 and 27 form communications between the steam cylinder and 28 and 29 at the backs of 16 and 17.

The movements and uses of the several parts may be described as follows: Steam of sufficient pressure being admitted through the throttle valve 30, it will pass through 8 the openings d, d, d, d , in 15, through 11 and 5 into 1, thence out through 23 and 27 into 29 and press upon 16; and the area of 16 being greater than the opposing area of the opening in the seat 13, and the working piston standing over and closing the opening of 6 into 1, so that no steam can pass into the space between 12 and 16, 16 will be forced to its seat and 17 opened, which being accomplished steam will pass through 30, 8, d, d, d, d , 11, 5, 1, 7, 13, 9 and 31. This escape of steam will immediately cause 15 to be closed and 14 to be opened, for the sum of the areas of d, d, d, d is less than any part of the passage beyond, and the area of 15 is greater than the opposing area of the

opening in 10, (hence the pressure in 8 will be greater than the pressure in 11 and 5. Let a equal the pressure in 8 and x that in 11 and 5. Let c equal the area of 15). $d+d+d+d$ and E the area of the opening in 10, then when $A-X \times C$ is greater than $A \times E$ 15 will be seated, the escape of steam arrested, 14 opened and steam introduced into 1 upon the opposite side of the working piston and move it toward the right hand. Soon after 23 is covered by the passage of the piston over it, 22 will be opened immediately before 6 is opened in like manner and a pressure will be obtained in 29 before steam can pass through 6 into the space between 12 and 16, thus causing 16 to remain closed until the piston shall have passed over and beyond 20, when steam will pass into 28, close 17, open 16, release through 6 and 12, and cause the differential pressure to act upon 14 in the same manner as described for 15, thus procuring a continuous reciprocating motion of the piston.

It will be observed that the working piston passes over and closes an exhaust port at the termination of each stroke. It is obvious that after the escape is thereby arrested, so much steam as is contained in the cylinder and the passages before the piston will be compressed by the further advance of the piston and form what may be called a cushion, which not only serves to arrest the motion of the piston but acts upon the closed receiving valve and materially aids the differential pressure in actuating the receiving valves; these are great benefits, but the primary and principal object in closing the exhaust passages as described is to prevent the introduction of steam pressure under the closed exhaust valve immediately after the commencement of a stroke or until the space behind the closed valve is filled to cylinder pressure, as before described.

I sometimes make the clearance so great that the working piston may pass entirely beyond the exhaust port at the end of its stroke, so that if the exhaust valves fail to act promptly, the piston may become the exhaust valve, thereby lessening the danger of breaking cylinder caps, etc.

I have discovered in working a number of engines constructed as described that when the area of the steam valves is six times that of the port through the seat and the sum of the areas of d, d, d, d about one-

half the area of the said opening, the receiving valves will be shifted before the release takes place if the velocity of the piston threatens to become dangerously high. I have also found that the valves shift over as soon as they become slightly overbalanced, hence the wear of valves and seats is very slight.

By the use of this valve gear I am enabled to construct engines for pumping and the like purposes without using the ponderous and undesirable fly-wheel, crank, &c., or the destructive tappet, and engines which have practically no dead point.

I do not claim in these letters actuating simultaneously the induction and eduction valves by means of steam derived from the working cylinders. I do not claim the passage of the piston over the exhaust port at the termination of a stroke, when the object is merely to cushion and arrest the motion of the piston; but

What I do claim as my invention and desire to secure by Letters Patent, is—

1. Actuating the release valves of a steam engine by means of steam pressure derived

from the working cylinder and released therefrom by the passage of the working piston over and beyond appropriate ports, when the receiving valves are actuated by other means, substantially as described or in any equivalent way.

2. Actuating the receiving valves of such engine by means of the differential pressure of steam flowing into the steam cylinder, when the resistance to be overcome arises in whole or in part from steam pressure upon one of a pair which are connected together, substantially as described, or in any equivalent way.

3. Opening the exhaust passages into the cylinder near each end thereof, but within the stroke of the piston, for the purposes set forth.

4. Connecting puppet valves together in pairs, so that steam pressure upon the one which is closed will hold its fellow open, as set forth.

NORMAN W. WHEELER.

Witnesses:

WM. R. MATTHEWS,
GRIFFITH REES.