

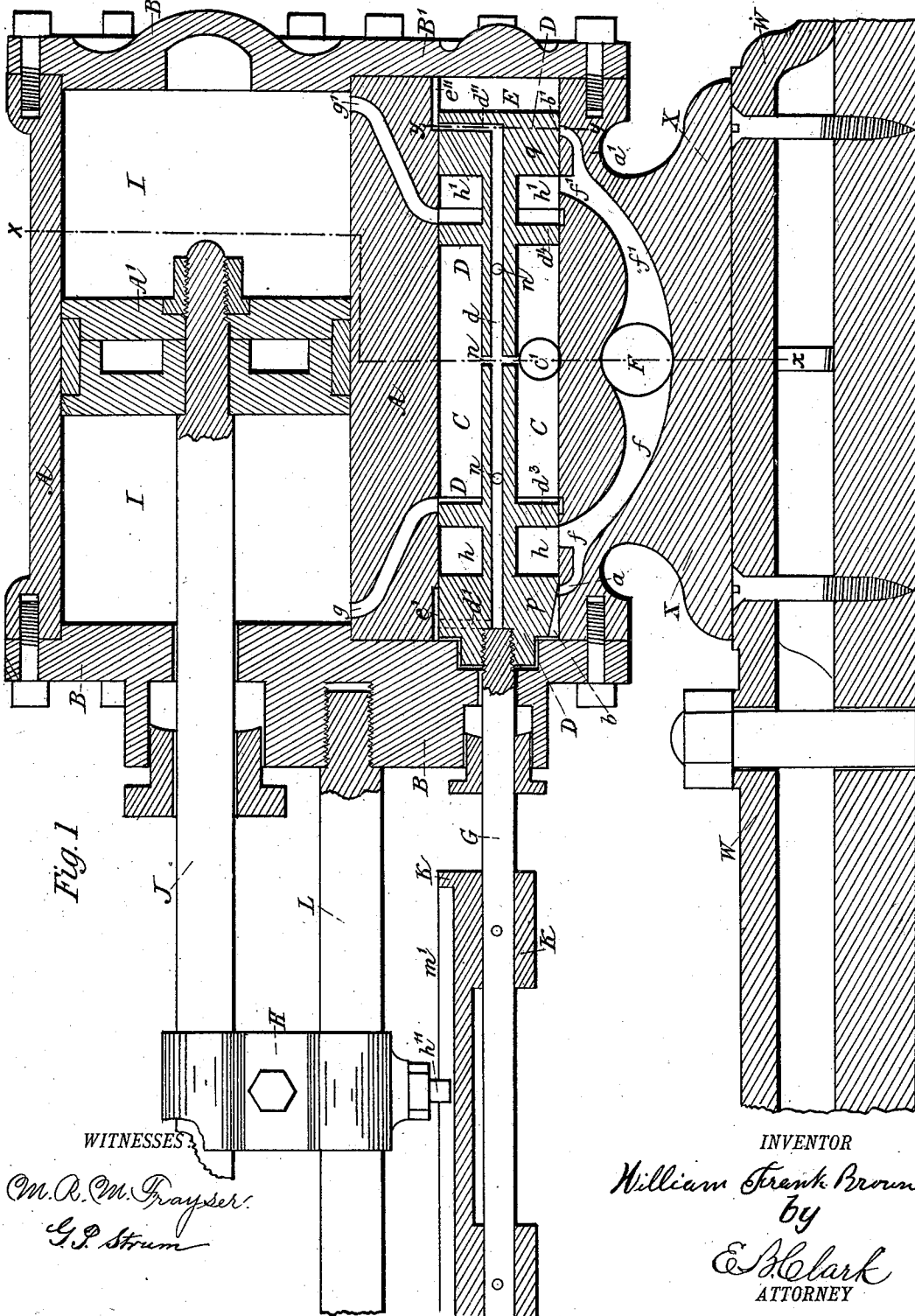
(No Model.)

2 Sheets—Sheet 1.

W. F. BROWNE.
BALANCED STEAM ACTUATED VALVE.

No. 531,434.

Patented Dec. 25, 1894.



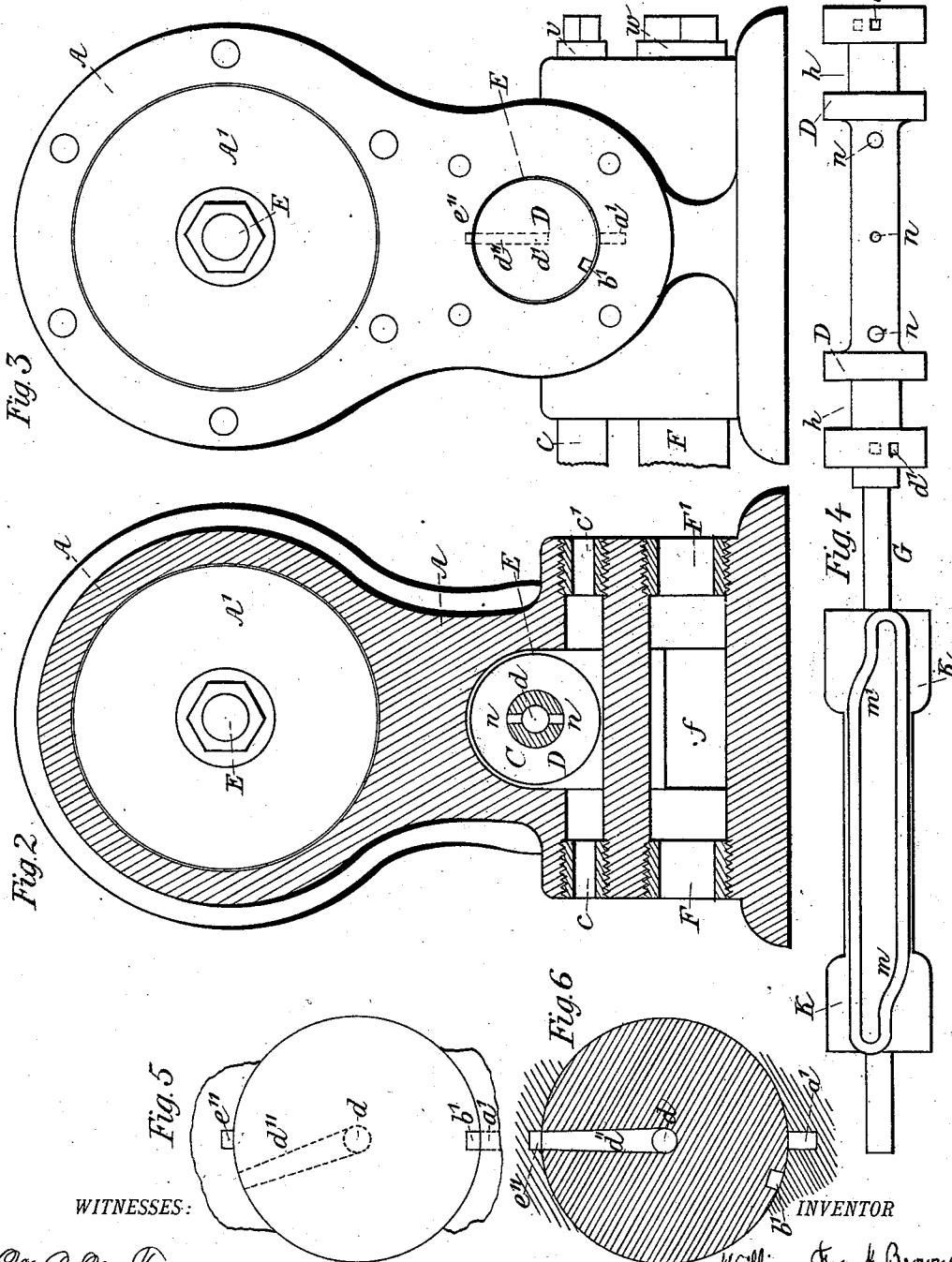
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WITNESSES:

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INVENTOR

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WILLIAM F. BROWNE, OF NEW YORK, N. Y.

BALANCED STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 531,434, dated December 25, 1894.

Application filed March 24, 1894. Serial No. 504,971. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FRANK BROWNE, a citizen of the United States, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Balanced Steam-Actuated Valves for Steam-Engines; 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 a reciprocating, and rotatable, or oscillating, balanced steam actuated valve for steam pumping engines, and the object of my invention is to provide a valve which is simple and compact in construction and is effective in operation.

My valve is centrally recessed and arranged in a chamber, so as to form the main steam supply or induction chamber, and is also provided with annular channels at each end for the escape of exhaust steam, and such chamber and channels during the alternating movement of the valve, are made to register with the ports of the steam cylinder and with the exhaust passages and port. The valve is also provided with a longitudinal central passage and with small induction ports in its opposite ends, registering with induction ports in the wall of the chamber and with eduction ports in its opposite ends, which are made to register with the main exhaust passages, all for the purpose of passing live steam alternately to the opposite ends of the valve for giving it reciprocating motion. Rotary or oscillating motion is imparted to the valve by means of the tappet pin bearing upon inclined or cam faces secured to the valve rod.

The features of construction constituting my invention will be pointed out in the claims.

I will now describe the details of construction and arrangement of my valve in connection with an engine by reference to the accompanying drawings, in which—

Figure 1 represents a vertical longitudinal section of a steam cylinder, valve chamber and valve. Fig. 2 represents a vertical transverse section on line $x-x$, Fig. 1. Fig. 3 represents a back end elevation with the head removed. Fig. 4 represents a top plan view of the valve, its rod and cams for partly ro-

tating or oscillating the valve. Fig. 5 represents an end elevation of the valve on enlarged scale. Fig. 6 represents a vertical transverse section on the line $y-y$ also on enlarged scale.

The body of the engine, A, embracing the cylinder, I, the combined steam and valve chamber, E, and the base X, containing the steam induction and exhaust ports, is cast in one piece, except the heads, B, B', which are separately cast and secured to the body A, by means of screws or bolts. The combined steam and valve chamber C, E, and the induction and eduction passages and ports, are arranged below the cylinder for convenience in draining and conducting off water of condensation, by means of which arrangement much improved results are secured in the operation of the engine. The cylinder chamber, I, is provided with the usual piston A', and piston rod, J, to which is secured the tappet hammer H, which slides upon the stay rod, L. The steam ports, g, g' , leading from the cylinder chamber, I to the valve chamber E, are adapted to register with the steam induction chamber C, and the annular eduction channels, h and h' .

The valve D is formed with solid ends p and q and with a central longitudinal stem, and contains the central longitudinal passage d , and the end passages or ports d' and d'' , which are adapted to register with the ports e', e'' , in the wall of the cylinder I, and communicate with the interior of the valve chamber E, at each end thereof. In the solid ends p and q of valve D, and at the periphery thereof, are formed the eduction ports, b and b' , which are adapted to connect the valve chamber with the passages a, a' , leading to the exhaust or eduction passages f and f' , which connect with the exhaust port F. The large recess at the middle portion of valve D, around its longitudinal stem, forms the steam chest or induction port C, of the valve, which chest or port is made to register with the steam ports, g, g' , during the reciprocating movement of the valve. The stem of the valve is provided near its opposite ends with the circular or disk-like abutments, d^3, d^4 , for working over the steam ports, g, g' . Between the abutments d^3, d^4 , and the solid ends of the valve, there are formed the annular channels

or exhaust ports, h, h' , which are so placed as to register with the induction ports g, g' , and with the exhaust passages f, f' , during the reciprocating movements of the valve. The longitudinal stem of the valve is provided with lateral openings, n , connecting chamber C, with the longitudinal passage d .

In the base of the engine (Figs. 2 and 3) are formed the two steam induction ports, c, c' , and the eduction ports, F, F' . Two of the ports, as c', F' , are closed by plugs v, w , and two of them are connected by pipes in the usual manner.

The valve rod, G , has secured to it an oscillating bar, K , provided with the two opposite inclines or cam faces m and m' , for engaging with the tappet pin h'' , by means of which the valve D is given a rotary or oscillating motion for alternately connecting the eduction ports b and b' , in its solid ends with the exhaust passages a and a' , for permitting the escape of steam from the valve chamber between the opposite ends of the valve and the heads B, B' , during the reciprocating movement of the valve.

The operation is as follows: Steam is admitted through the induction port, c' , into the large central chest or induction port C , in valve D , and in the position of parts shown in Fig. 1, passes through port g , into the end B , of the steam cylinder I , moving piston A' , from left to right, as indicated by the arrows. The valve D , having been previously thrown to the left, as shown, steam escapes from cylinder I , through port, g' , exhaust port, h' , and passage f' , and at the same time live steam is passing from chamber C by openings n , through the central passage d , induction ports, d'' and e'' , in the end of chamber E , adjacent to head B' , thereby holding valve D to the left against the head B . As the piston A' , moves to the right hand end of cylinder I , the tappet pin, h'' , bears against the cam surface, m' on the oscillating bar K , thereby oscillating valve D , so as to close communication between the ports d'' and e'' , at end q and at the same time connect exhaust port b' , in the valve with exhaust passage, a' , leading to exhaust passage f' ; also at the same time causing induction port, d' , in the end p of the valve to register with the induction port, e' , and close communication between eduction port b and exhaust passage a , whereby steam is admitted between end p , of the valve and cylinder head B , so as to throw valve D , to the opposite end of its chamber. This movement of valve D , causes the large induction port C , to register with port, g' , admitting live steam into the end B , of piston chamber or cylinder, I , and at the same time causes the exhaust port, h , in the valve to register with the port g , and with the exhaust passage f , leading to exhaust port F . The movement of the piston from right to left now causes the tappet pin, h' , to bear against cam face, m , and again oscillate valve D , so as to close communication between the in-

duction ports, d' , and e' and open communication between the eduction ports b , and exhaust passage, a , at end p , of the valve, and also open communication between induction ports d'' and e'' , and close communication between the eduction port b' , and exhaust passage, a' , at the end p , of the valve, so that live steam again flows through passage d and ports d'' and e'' , into chamber E , between end q , of the valve and cylinder head B' , again throwing the valve to the left hand end of its chamber E , so that steam is again admitted through port, g , and exhausted through port, g' , as at first above described.

The operation is very simple and the movements are effected in rapid succession, so as to operate the piston at the desired speed.

The single large central steam chest or induction port, C , adapted to register with both of the ports, g and g' , of the steam cylinder is an advantageous feature of my invention. The longitudinal passages and the induction ports in the opposite ends of the valves and the exhaust ports and passages at opposite ends of the valve for the passage of steam to reciprocate the valve are also important features of my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a steam engine, a single reciprocating and rotatable or oscillating balanced valve, having a central steam chest or induction port and two eduction channels or ports, one in each of its solid ends, separated from said induction port by circular abutments, said ports being adapted to register with the cylinder ports and the exhaust passages and port and said solid ends of the valve being also provided with eduction ports registering with exhaust ports, in combination with steam inlets at the ends of the valve chamber, and means for oscillating the valve for controlling the steam inlets and eduction ports at the ends of the valve chamber, substantially as described.

2. In a steam engine, a reciprocating balanced steam valve, having a central induction port and exhaust ports at each end thereof for supplying steam to and exhausting it from the piston cylinder and also having interior steam passages and ports for conducting live steam to the ends of the valve chamber for reciprocating the valve, substantially as described.

3. In a steam engine, the combination with a valve chamber of the reciprocating and rotatable or oscillating balanced valve, having a central induction port, an abutment and exhaust port at each end thereof, a central longitudinal steam passage and a small induction port in each end registering with an induction port in the wall of the chamber, also a small eduction port in each end adapted to register with an exhaust passage, and means for rotating or oscillating the valve, substantially, as described.

4. In a steam engine, the reciprocating and rotatable or oscillating balanced valve D, having solid ends, a longitudinal stem and circular abutments near such ends forming the
5 central steam chest or induction port, C, and the eduction channels or ports, *h* and *h'*; also having a central longitudinal steam passage and a small induction port leading therefrom
10 in each of the solid ends, said ends also having small eduction ports, in combination with the valve chamber, having in its wall at each end a small induction port arranged to register
15 with said induction port in the valve; suitable exhaust passages and a port in the base of the engine and means for oscillating the valve.

5. In a steam engine a single reciprocating

and oscillating balanced valve having a central steam chest or induction port and two eduction ports, one in each of its solid ends, in combination with the valve chamber hav- 20
ing steam inlets and exhaust ports for reciprocating the valve, the valve rod having an oscillating bar provided with cam surfaces, and a tappet pin connecting with the piston
25 rod and bearing on said cam surfaces for oscillating the valve, substantially as described.

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

WILLIAM F. BROWNE.

Witnesses:

J. ROSS COLHOUN,
E. B. CLARK.