

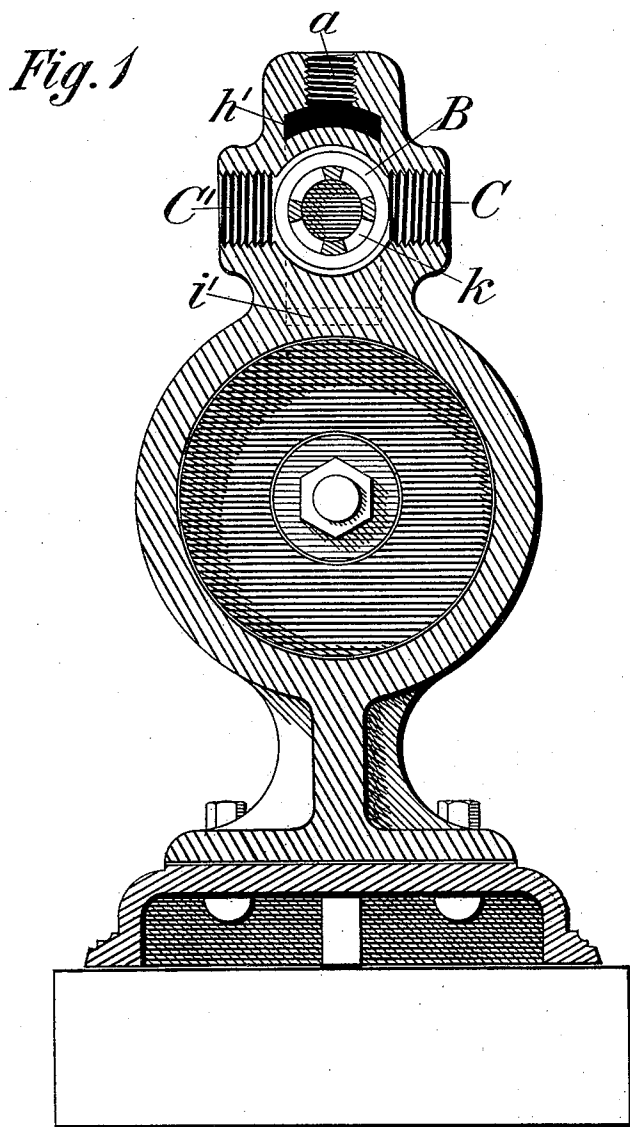
(No Model.)

2 Sheets—Sheet 1.

W. F. BROWNE.
BALANCED STEAM VALVE.

No. 461,214.

Patented Oct. 13, 1891.



WITNESSES:

R. Lybrand
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INVENTOR

William Frank Browne

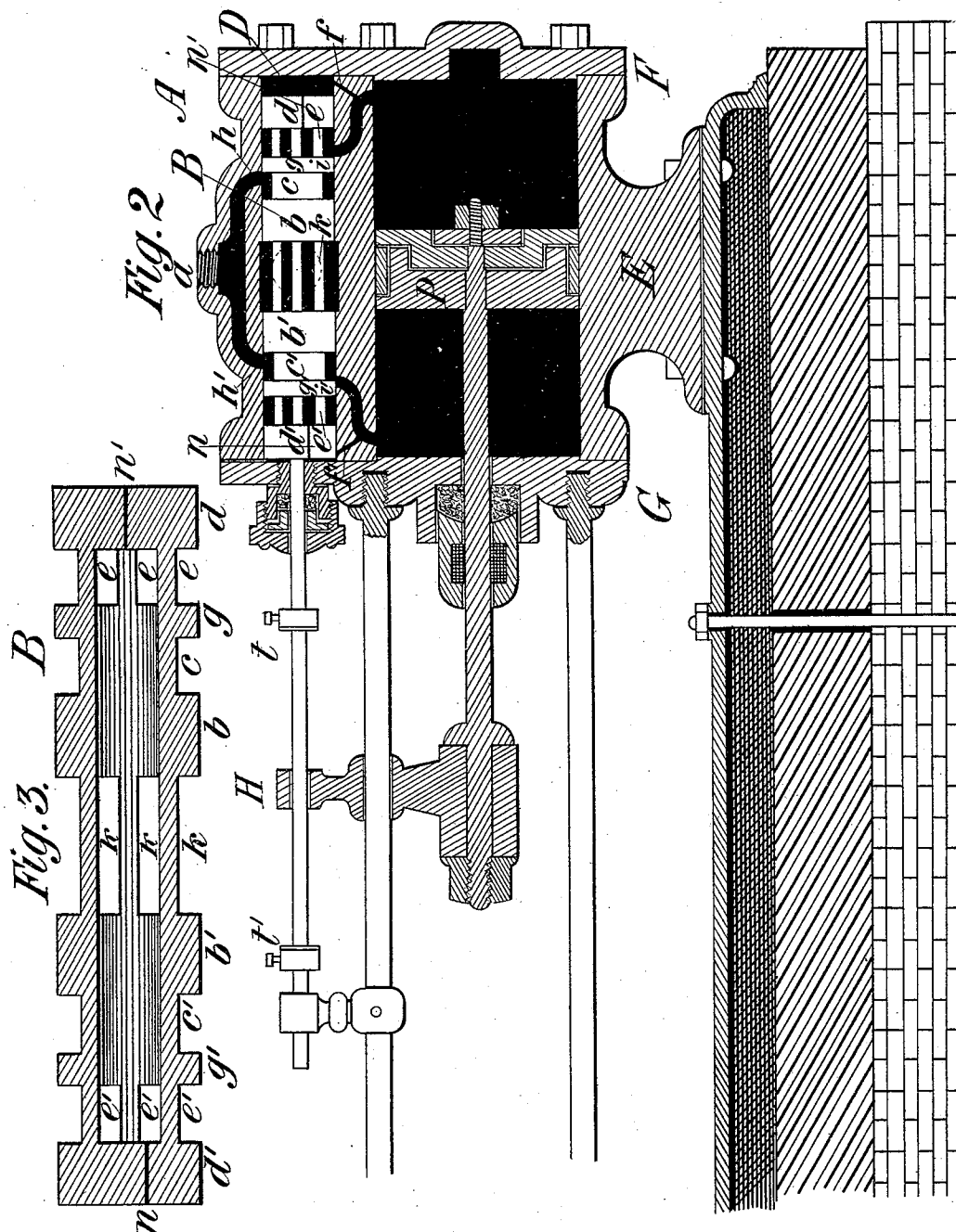
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UNITED STATES PATENT OFFICE.

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

BALANCED STEAM-VALVE.

SPECIFICATION forming part of Letters Patent No. 461,214, dated October 13, 1891.

Application filed April 18, 1891. Serial No. 389,536. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FRANK BROWNE, a citizen of the United States, and a resident of the city, county, and State of New York, have invented a certain new and useful Improved Balanced Steam-Valve for Reciprocating Engines; and I do declare that the following is a clear and full description thereof, reference being had to the accompanying drawings, which form a part of this specification.

The invention consists in the arrangement of the ports of a steam-cylinder and providing a single-balanced reciprocating valve with ports corresponding to the ports of said cylinder, which embodies the principle of the auxiliary and slide valves now commonly used in steam-pumps.

Figure 1 represents a vertical transverse section of a steam-cylinder. Fig. 2 represents a vertical longitudinal section of a steam-cylinder. Fig. 3 represents a longitudinal section of a balanced reciprocating piston-valve.

The steam-cylinder A, valve-chamber D, and base E are cast in one piece with the exception of the heads F and G. The valve B is cast in one piece, with the necessary ports for live and exhaust steam. The center of the valve is cored out for the purpose of conducting the exhaust-steam from each end of the cylinder through ports *i*, *i'*, *g*, and *g'* to and through ports *k*, and from thence through exhaust C. The steam is admitted to the valve-chamber at the induction *a*, thence through ports *h* *h'*, *c* *c'*, and *i* *i'* to the piston-chamber. The position of the valve shows that the piston-chamber is taking steam through ports *h'*, *c'*, and *i'*, while the exhaust-steam is being discharged through ports *e* *k*, thence through pipe connections C or C', as shown in Fig. 2.

Just before the piston P completes its stroke the hammer H strikes tappet *t* and throws the end of the valve *d'* past the small port *f'*, thus allowing steam to pass between the head G of the cylinder and the end of the valve. The pressure of the steam forces the valve so that its other end comes in contact with head F, thus changing the position of the ports in the valve in reference to those of the piston and valve chambers. Thus the live

steam will pass from port *h* through ports *c* and *i* to the piston-chamber, while the exhaust will escape through ports *i'*, *e'*, and *k*. On the return of the piston the hammer H strikes tappet *t'*, moving the end of the valve past small port *f*, thus admitting steam between the head and end of valve B, which is now thrown in contact with the opposite head and changing the valve-ports to their former position in relation to the stationary ports of the valve and piston chambers. The small ports *n* and *n'* in the ends of the piston-valve are for the purpose of permitting the steam between the ends of the valves and the head of the cylinder to escape, thus allowing the ends of the valves to close tightly over the small ports *f* and *f'*. By means of the annular ports *c* *c'*, *e* *e'*, and *k* the valve is kept in perfect balance at all times.

What I claim, and desire to secure by Letters Patent, is—

1. In a steam-motor, a single reciprocating balanced tubular valve provided with two small end ports *n* *n'* and having in connection with its chamber induction and exhaust ports therewith corresponding in its alternating movements with induction-ports in the piston-valve chamber, and ports for the induction and eduction of steam to and from the steam-cylinder, said steam-cylinder having auxiliary ports *f* *f'*, communicating with the piston-valve chamber near the ends thereof, whereby steam is derived to force and change the position of said piston-valve, so that its ports shall alternately correspond with the ports in the piston-valve chamber and steam-cylinder.

2. A reciprocating balanced tubular piston-valve cast in one piece, having two ports for the induction of live steam to the steam-cylinder, two ports near the ends of the piston-valve for the eduction of the exhaust-steam from the said steam-cylinder to the interior of said tubular piston-valve, a central port for the eduction of said exhaust-steam therefrom, and two auxiliary ports *n* *n'* in the ends of said tubular piston-valve for the escape of the cushioning steam between the ends of said piston-valve and the ends of the piston-valve chamber.

3. In a steam-motor, a single reciprocating balanced tubular piston-valve having ex-

haust-ports in the ends thereof and a tappet-rod connected therewith and tappets thereon, in combination with a steam-cylinder having two ports $f f'$, a piston and rod therewith, and a tappet-hammer thereon for actuating at each end of the stroke of said piston and rod the tubular piston-valve, whereby the ends of said piston-valves at each alternating stroke of the steam-piston and rod are forced past the small ports $f f'$, through which steam is admitted from the steam-cylinder into the small chambers formed by the ends of the piston-valve and the ends of the piston-valve chamber.

4. In a steam-motor, a single reciprocating balanced tubular piston-valve having exhaust-ports $n n'$ in the ends thereof and in connection with its chamber induction and exhaust ports therewith corresponding in its alternating movements with induction-ports in the piston-valve chamber, and ports for the induction and eduction of steam to and

from the steam-cylinder, in combination with said steam-cylinder and auxiliary ports $f f'$, terminating in the valve-chamber and near the heads thereof, thereby forming chambers in connection with the ends of the piston-valve in its alternating movement, when said ports $f f'$ are covered by the ends of said piston, the steam escaping through the small ports $n n'$ into the exhaust.

5. A single reciprocating balanced tubular piston-valve having in connection with its chamber induction and exhaust ports therewith and therein, the two end exhaust-ports connecting with the interior of said tubular piston-valve for the exit of exhaust-steam and the central port for the eduction thereof, in combination with a steam-motor.

WILLIAM FRANK BROWNE.

Witnesses:

E. B. CLARK,
S. BRASHEARS.