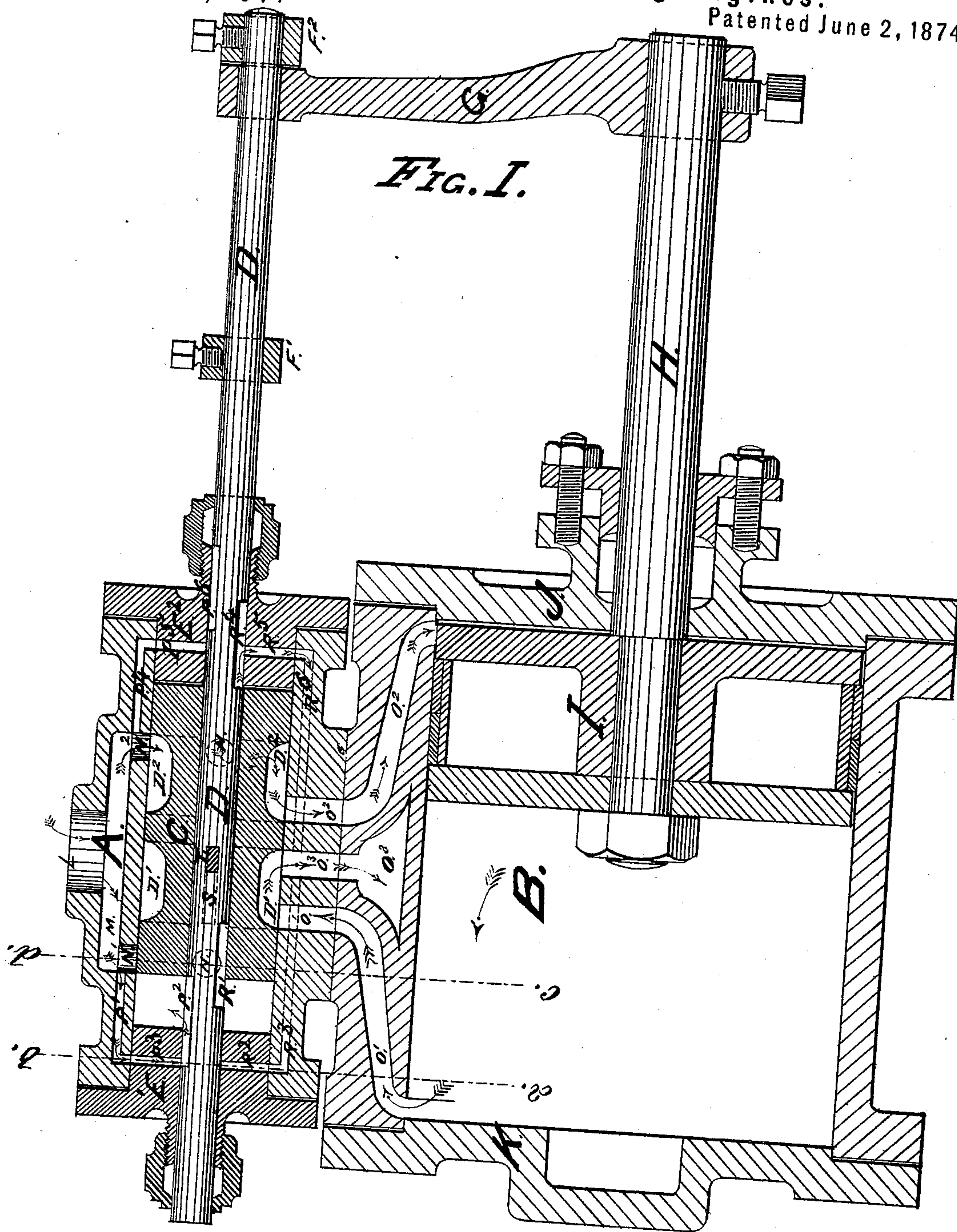


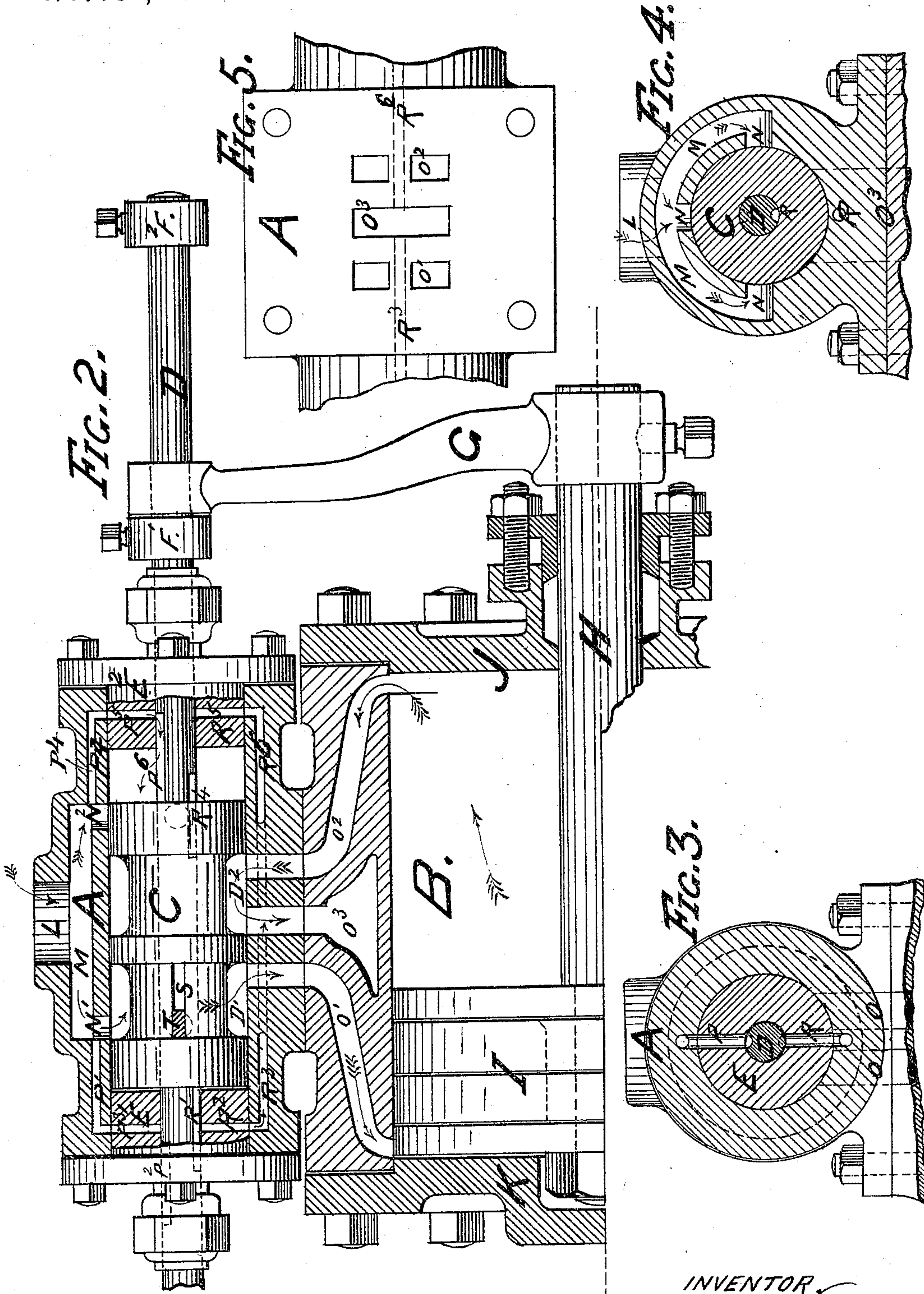
A. J. L. LORETZ.
Valves for Direct-Acting Engines.
No. 151,667.
2 Sheets--Sheet 1.
Patented June 2, 1874.



WITNESSES.
Norman Hubbard
A. Miller Sr

INVENTOR.
Arthur J. Loretz

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WITNESSES.
Norman Hubbard
S. Allen Dr.

INVENTOR
A. J. L. Loretz

UNITED STATES PATENT OFFICE.

ARTHUR J. L. LORETZ, OF NEW BRUNSWICK, NEW JERSEY, ASSIGNOR OF ONE-HALF HIS RIGHT TO NORMAN HUBBARD, OF BROOKLYN, N. Y.

IMPROVEMENT IN VALVES FOR DIRECT-ACTING ENGINES.

Specification forming part of Letters Patent No. **151,667**, dated June 2, 1874; application filed December 29, 1873.

To all whom it may concern:

Be it known that I, ARTHUR J. L. LORETZ, of New Brunswick, in the county of Middlesex and State of New Jersey, have invented a Valve for Direct-Acting Engines, of which the following is a specification:

My invention relates to valves used for the purpose of reciprocating the piston on a class of engines known as the direct-acting kind, being generally connected with pumps for lifting and forcing water, air, gases, or used on hydraulic engines where water is used instead of steam; and consists in the combination of devices more fully hereinafter described. The aim of my invention has been to simplify as much as possible the mechanism for admitting the steam alternately into the steam-cylinder or water into the water-cylinder without deriving the power for so doing from a momentum of the main piston. In most all of this class of engines the valve mechanism is nothing more than a separate engine, the office of which is to work a valve which admits the steam into the main cylinder. In my invention I do not propose to evade that theory, as it would be impossible to accomplish what I propose to do without adhering to the above, as any other contrivance without using an independent motor would not act or lend its power for the purpose of moving the valve at the time the operation in the main cylinder ceases to take place without there exists a momentum, and such not existing, or, rather, being very slight, when a small quantity of water is used as the existing pressure; but by certain simple contrivances I embody the same theory, thus: the main valve being the piston of the auxiliary motor, and the main valve-rod or piston-rod of the auxiliary acting as valve for admission and emission of the steam in the auxiliary motor, a tappet on the piston-rod acting upon this valve, it being also so arranged that in case the engine is running fast and there existed a momentum which would be quicker in action than the auxiliary motor, then the former will control the main valve.

Figure 1 is a side elevation representing the valve and steam-cylinder in section, showing the piston of the main cylinder at the end of

its forward stroke, with the valve in its proper position for the admission and emission of steam for the piston to perform the return stroke. Fig. 2 represents the same parts in position for the forward stroke, the main valve and part of the heads of the valve-chamber showing their exterior rotundity. Fig. 3 is a cross-section through *a b* of the side elevation of Fig. 1. Fig. 4 is another cross-section through *c d* of the same side elevation. Fig. 5 represents an inverted plan of the valve-chamber A, showing the corresponding ports of the cylinder and face where bolted to the cylinder.

Similar letters of reference indicate similar parts.

The construction and operation of the engine are as follows: The steam enters the valve-chest A through the nozzle L, to which the steam-pipe is attached, and enters the chamber M, Figs. 2 and 4, then passes through the openings N^1 around the groove D^1 of the valve C into the port O^1 , driving the piston I of cylinder B toward the head J; the groove D^2 of valve C also forming a communication between ports O^2 and O^3 , allowing the exhaust-steam to pass off through exhaust-port O^3 . There are also small ports $P^1 P^4$, Figs. 1 and 2, in the valve-chamber A, communicating with the ports $P^3 P^5$ in the heads $E^1 E^2$, in which there is always steam. There are also ports $R^2 R^5$ in the same heads $E^1 E^2$, communicating with $R^3 R^6$ in valve-chest A, which communicate with exhaust-port O^3 , Figs. 1, 2, 3, and 5. S is a slot cut in the valve C, Figs. 1 and 2, and T is a key fast in the valve-stem B, the valve-stem working loose in the valve C the length of the slot S. Now, before the piston I of the main cylinder B arrives at the end of the stroke toward the head J, the tappet-rod G, attached to the end of the piston-rod H, will strike the collar F^2 on the valve-stem D with its upper part, pulling the rod D with it without moving the valve C, the steam still entering the port O^1 , Fig. 2. The piston keeps on its forward course until the key T in the valve-rod D has arrived toward the forward part of the slot S, having taken up the lost motion caused by the length of the slot S, when then the valve C will begin to move

forward with the stem D, beginning to close the steam off at N¹ and port O³. At the same time the grooves P² and R⁴, Fig. 1, in the valve-rod D, opening communications between their respective cylinder ends and ports in the heads E¹ and E², the former admitting steam in between the space formed by valve C and head E¹, and the latter opening a communication with the exhaust between the space formed by piston C and head E². The steam entering the port P¹ from the chamber M, thence to port P³ in the head E¹ to groove P² in valve-rod D into the back end of the piston-valve C, throws it in its forward position, the exhaust passing through groove R⁴ in rod D, through port R⁵ in head E², from thence to port R⁶ in valve-chamber A, leading to the main exhaust-port O³, Figs. 1 and 5. The valve C, Fig. 1, being thrown forward toward head E² by the steam entering and escaping through the aforementioned ports, allows the steam to enter through port N², pass around groove D², enters port O², driving the piston I back toward head K, the valve C at the same time closing up the steam-port N¹ on the other side, and placing the grooves D¹ over port O¹ and O³, allowing the exhaust-steam to pass off from cylinder B. Before the piston has arrived at the end of its stroke the tappet-rod G will again have struck the collar F¹ with its upper part, moving the

rod D, thereby again changing the position of the grooves in the stem D; admitting and emitting the steam for the purpose of throwing the valve back toward head E¹, Fig. 2, when a like action will take place on piston I in cylinder B, and the reciprocation of the strokes so repeated. Now, should the movement of the piston be so fast as not to allow the action of the steam to take place on the valve C, the key T in slot S will carry the valve C over, giving a full port of steam before the piston will strike on either of the heads J or K.

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

1. The valve-rod provided with auxiliary ports P² R¹ P⁶ R⁴, in combination with the heads E¹ E², having ports P³ R² P⁵ R⁵, and valve-chest A, with ports P¹ R³ P⁴ R⁶ and valve C, substantially as described.

2. The valve-rod D, with steam and exhaust grooves and key T, heads and chest provided with auxiliary ports, in combination with the piston-valve provided with slot S, substantially as and for the purpose specified.

ARTHUR J. L. LORETZ.

Witnesses:

A. ALLER, Jr.,

THOS. D. CARPENTER, Jr.