

(No Model.)

P. ARMINGTON.
CUT-OFF PISTON VALVE.

No. 378,642.

Patented Feb. 28, 1888.

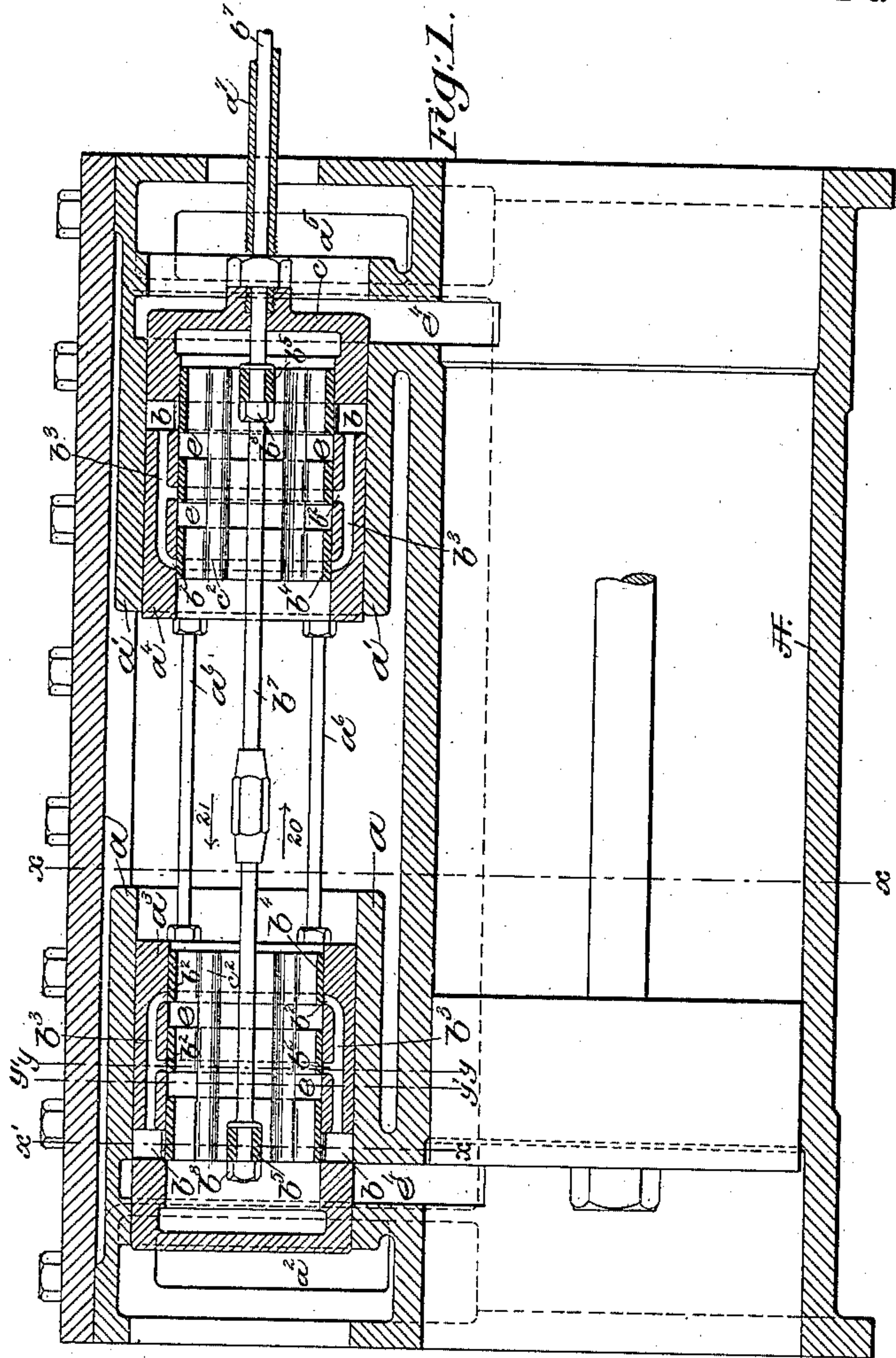


Fig. 1.

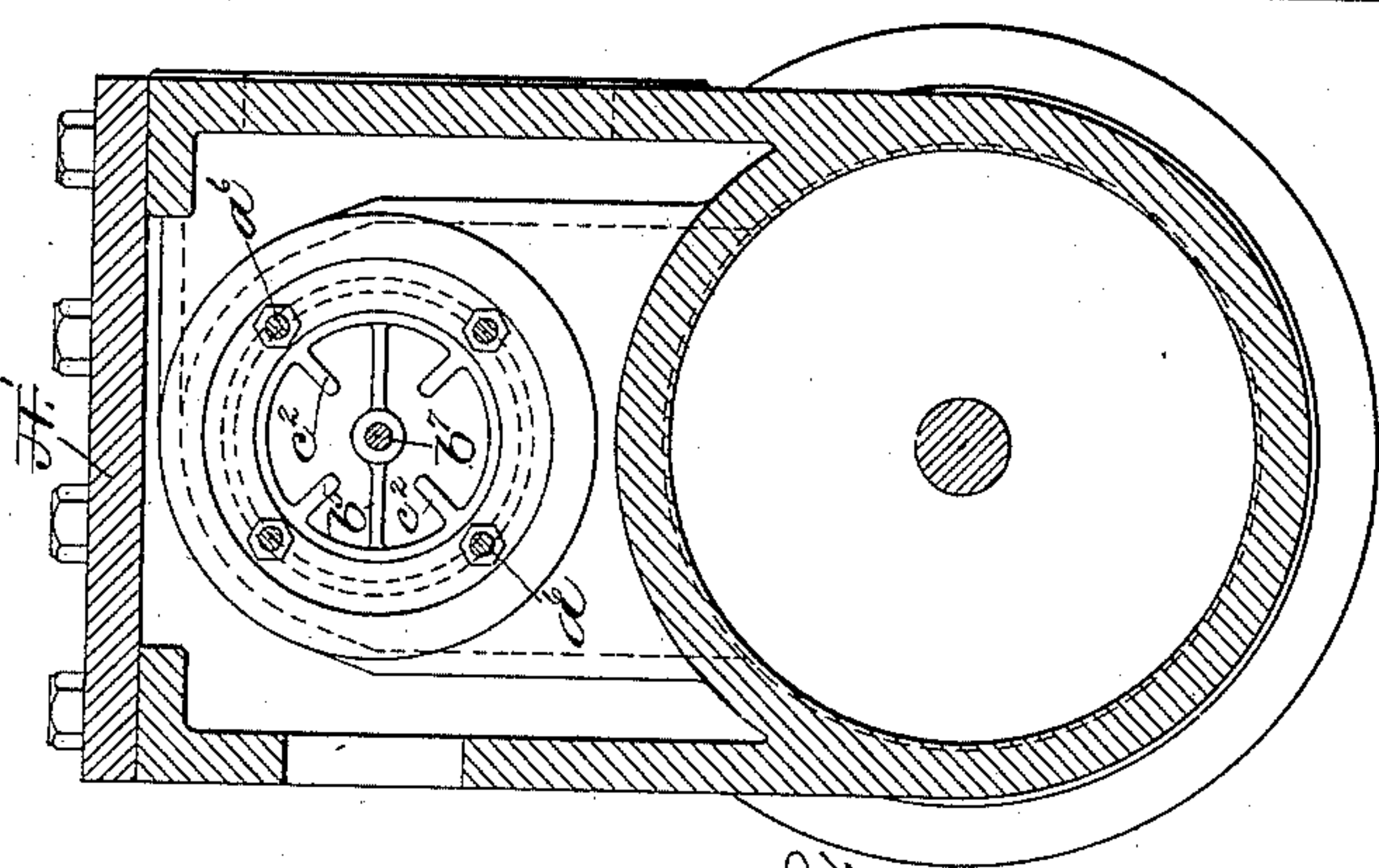
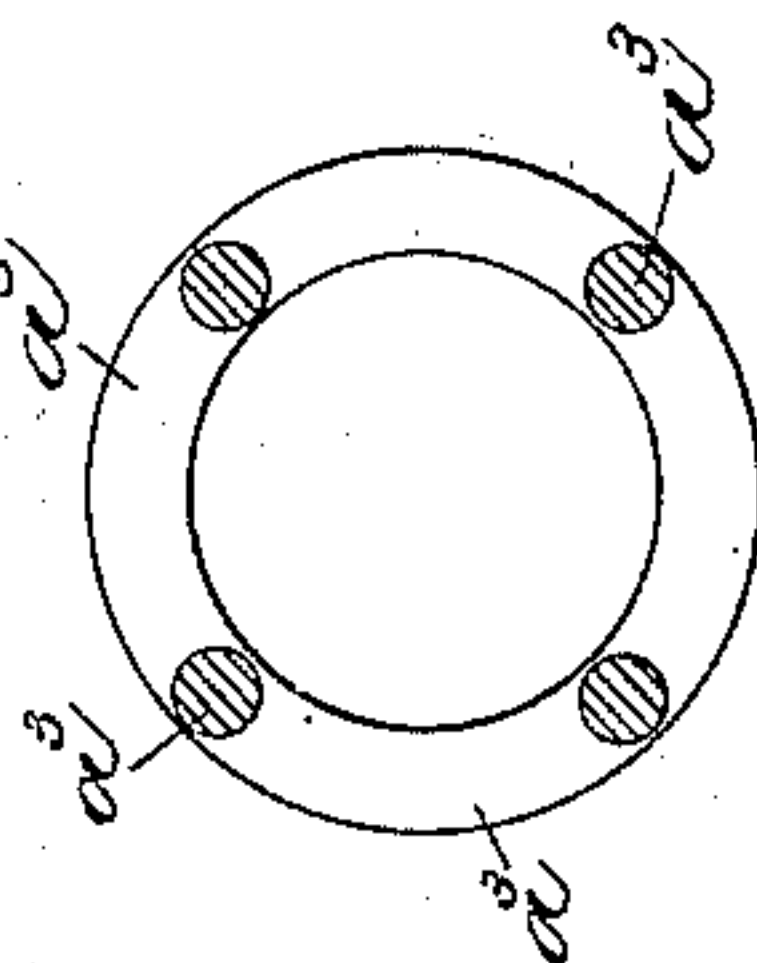
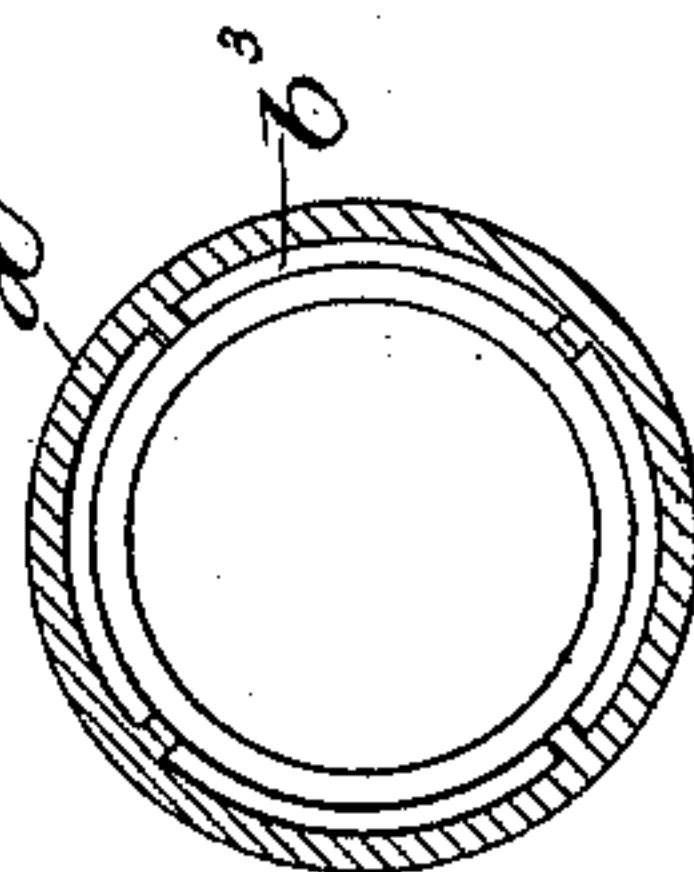
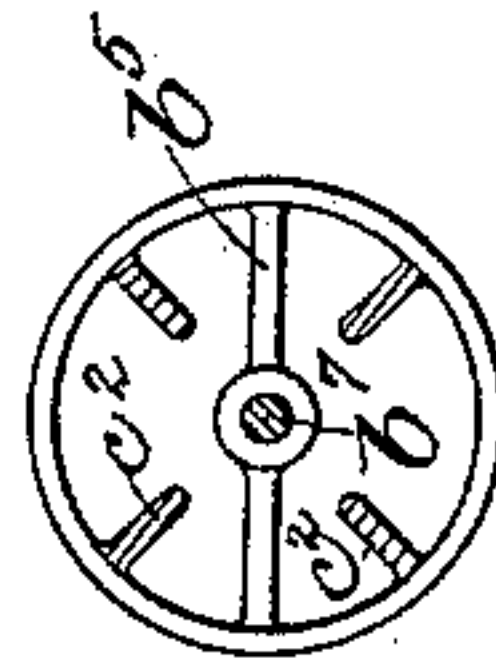


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.



Witnesses.
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UNITED STATES PATENT OFFICE.

PARDON ARMINGTON, OF PROVIDENCE, RHODE ISLAND.

CUT-OFF PISTON-VALVE.

SPECIFICATION forming part of Letters Patent No. 378,642, dated February 28, 1888.

Application filed May 3, 1887. Serial No. 236,907. (No model.)

To all whom it may concern:

Be it known that I, PARDON ARMINGTON, of Providence, county of Providence, and State of Rhode Island, have invented an Improvement in Cut-Off Piston-Valves, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to steam-valves, and is embodied in a piston-valve especially designed to be used in engines wherein a high speed is desired.

The object of my invention is to provide a steam-engine with piston-valves, whereby a maximum quantity of steam is admitted to the engine cylinder with a minimum stroke of the piston-valve, and I accomplish my object, as herein shown, by providing the main piston-valve with auxiliary ports and passages, which establish a communication between the steam-chest and the main port-opening of the main piston-valve, the said auxiliary ports being controlled by an auxiliary piston-valve fitted within and having a bearing upon the inner surface of the main piston-valve.

My invention therefore consists, essentially, in a steam-engine, of a main cylinder and a valve-cylinder, combined with a main piston-valve located in said valve-cylinder, and provided with a main port-opening and an auxiliary port-opening connected to the said main port-opening, and with an auxiliary piston-valve movable within the main piston-valve and provided with a port to register with the auxiliary port-opening of the main piston-valve, substantially as will be described.

Figure 1 is a longitudinal section of a sufficient portion of an engine provided with my improved valves to enable my invention to be understood, the piston in the engine-cylinder being in elevation; Fig. 2, a section of Fig. 1, on line $x x$, through the main valve; Fig. 3, a section of Fig. 1, on line $x' x'$, through the main piston-valve, looking toward the right; Fig. 4, a section of the main piston-valve on line $y y$, and Fig. 5 a section of the auxiliary piston-valve on line $y' y'$.

The main engine-cylinder, as shown, has cast integral within it two valve-cylinders, $a a'$, located within the steam-chest formed above the engine-cylinder by the cap A^2 .

The valve-cylinders $a a'$ are provided with piston-valves $a^3 a^4$, respectively open at their inner ends and closed at their outer ends, as herein shown, the said piston-valves, in the present instance, taking steam from the center of the steam-chest and exhausting it through ports $a^2 a^5$ at opposite ends of the steam-chest, the said piston-valves being connected by rods a^6 , so that they move in unison when operated by valve-gearing to which the valve-rod a^7 is connected, the said valve-rod being made hollow, for a purpose to be hereinafter described.

Each piston-valve $a a'$, as shown, has an annular channel, b , constituting the main port-opening to the engine-cylinder, and auxiliary channels b^2 , connected with the channel b by an annular passage, b^3 , the said auxiliary channels constituting auxiliary port-openings to the engine-cylinder.

The main and auxiliary port-openings $b b^2$ of the valve $a a'$ are controlled by auxiliary piston-valves $b^3 b^4$, respectively, the said auxiliary piston-valves being open at both ends, as shown.

Each auxiliary valve is provided with a cross-bar, b^5 , (see Fig. 5,) through which is extended a rod, b^7 , which is fastened or clamped to the said cross-bars, as shown, by nuts b^8 , the rod b^7 forming the valve-rod for the auxiliary piston-valves.

The valve-rod b^7 , as herein shown, is extended through the head c of the main piston-valve a' and through the hollow valve-rod a^7 , and is connected to the cut-off mechanism of the engine to operate the said auxiliary piston-valves and cut off the admission of steam to the engine-cylinder.

Each auxiliary piston-valve is preferably provided on its interior with strengthening-ribs c^2 . (See Fig. 5.)

I have herein shown two auxiliary port-openings, b^2 , and each of said port-openings is equal in cross-section or area to one-third the cross section or area of the main port-opening b , so that the auxiliary piston-valve, which is provided with annular channels c to co-operate with the port-openings b^2 , is required to be moved only sufficient distance to uncover or open the said auxiliary ports, the main port-opening being at such time only one-third opened or uncovered by the auxiliary piston-

valve, yet the maximum amount of steam is being admitted to the main port e^4 of the engine-cylinder.

I do not desire to limit my invention to any particular number of auxiliary port-openings, as the said number may be increased or diminished, as desired, the area or cross-section of each auxiliary port-opening being such part of the main port-opening as the number of auxiliary port-openings is of one.

As shown in Fig. 1, the auxiliary piston-valve b^3 is about to open the main and auxiliary ports in the main piston-valve a^3 , the said auxiliary valve moving in the direction of arrow 20, and at the same time the main valve a^3 is being moved in the direction of arrow 21.

When the auxiliary piston-valve b^3 has uncovered the auxiliary port-openings, the maximum amount of steam is admitted into the port-opening b , from which it passes into the engine-cylinder. As the auxiliary port-openings b^2 are being closed, it will be found that on the further movement of the auxiliary piston-valve, the port-openings e being wider than the auxiliary ports b^2 in the main valve, a sufficient area of the several openings is maintained until the closing of the port e^4 by the main valve, as a^3 , to maintain a constant or nearly constant pressure of steam in the engine-cylinder to the point of cut off.

The main and auxiliary piston-valves are shown as taking steam from the center of the valve-chest and exhausting it at the ends thereof; but instead of the arrangement shown I may reverse the position of the valves, so that the said valves will take steam at the end of the valve-chest and exhaust it at the center of the valve-chest.

I claim—

1. In a steam-engine, a main cylinder and a valve-cylinder, combined with a main piston-valve located in said valve-cylinder, and provided with a main port-opening, b , and an auxiliary port opening, b^2 , and passage b^3 , connecting the said port-openings, and with an auxiliary piston-valve movable within the main piston-valve and provided with a port to register with the auxiliary port-opening of the main piston-valve, substantially as described.

2. In a steam-engine, a main cylinder and a valve-cylinder, combined with a main piston-valve located in said valve-cylinder, and provided with a main port-opening, b , and an auxiliary port-opening, b^2 , and passage b^3 , connecting the said port-openings, and with an auxiliary valve movable within the main piston-valve to control the said main and auxiliary port-openings, substantially as described.

3. In a steam-engine, a main cylinder and a valve-cylinder connected to each end of the said main cylinder, combined with a main piston-valve located in each of said valve-cylinders, and provided with a main port-opening and an auxiliary port opening connected to the said main port-opening, and with an auxiliary piston-valve movable within each main piston-valve and provided with a port to register with the auxiliary port-opening of the main piston-valve, the said main auxiliary piston-valves being connected together, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PARDON ARMINGTON.

Witnesses:

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FRED L. EMERY.