

(No Model.)

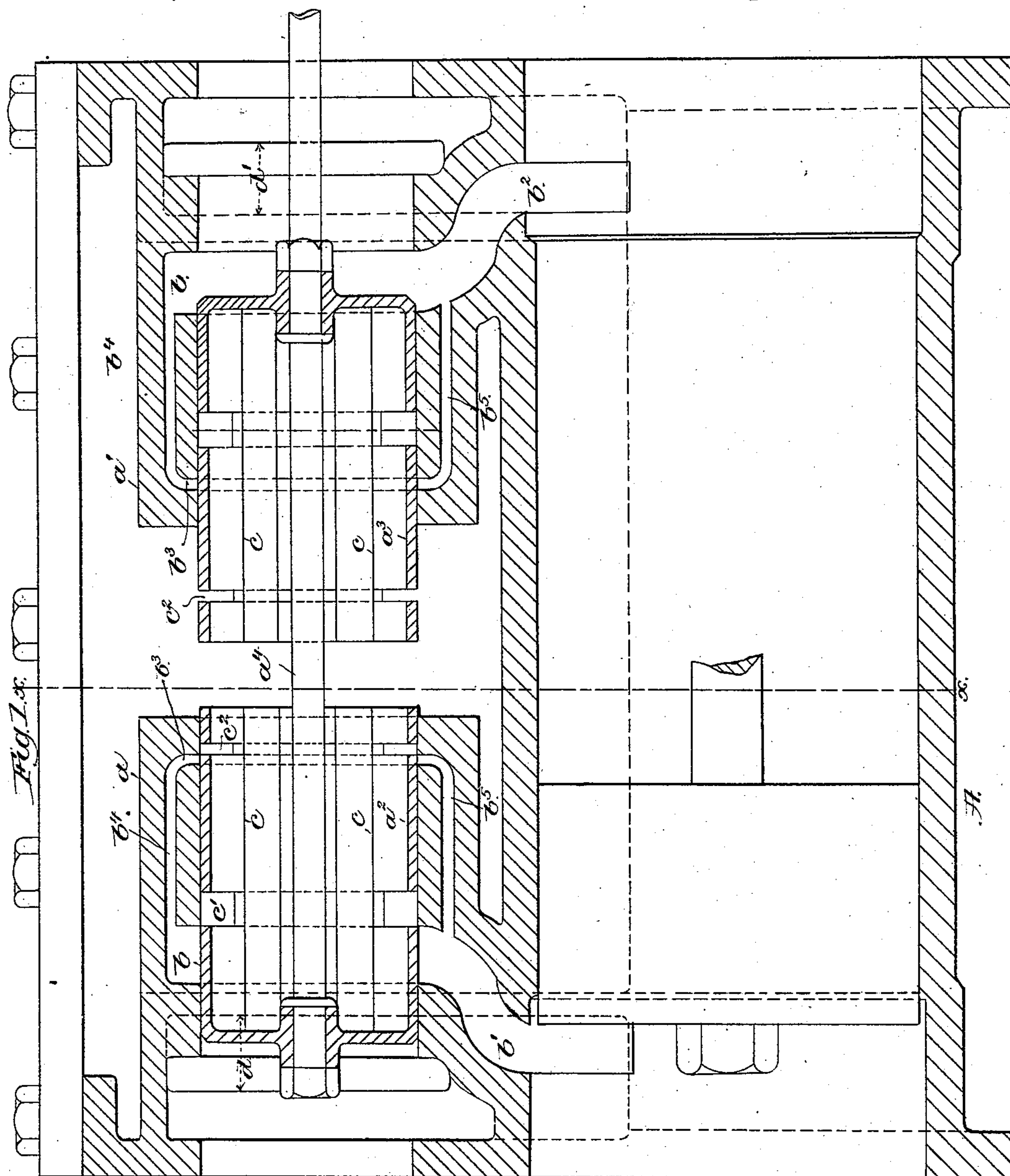
3 Sheets—Sheet 1.

P. ARMINGTON.

PISTON VALVE.

No. 370,443.

Patented Sept. 27, 1887.



Witnesses.

Fred. S. Greenleaf
John F. C. Prime-Lot

Inventor,

Pardon Armington.
by Crosby & Gregory
Attys.

(No Model.)

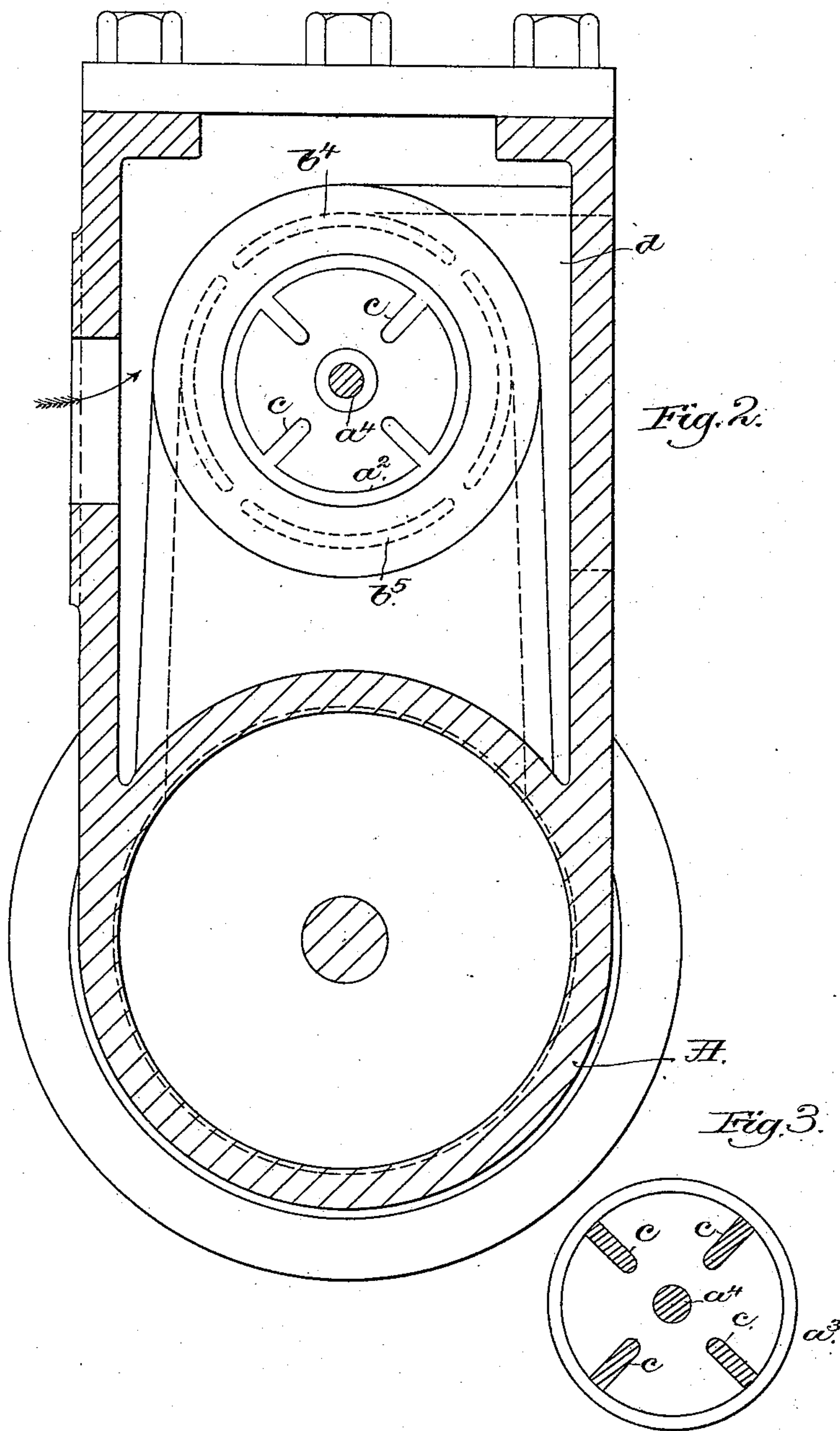
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John F. Co. Printer

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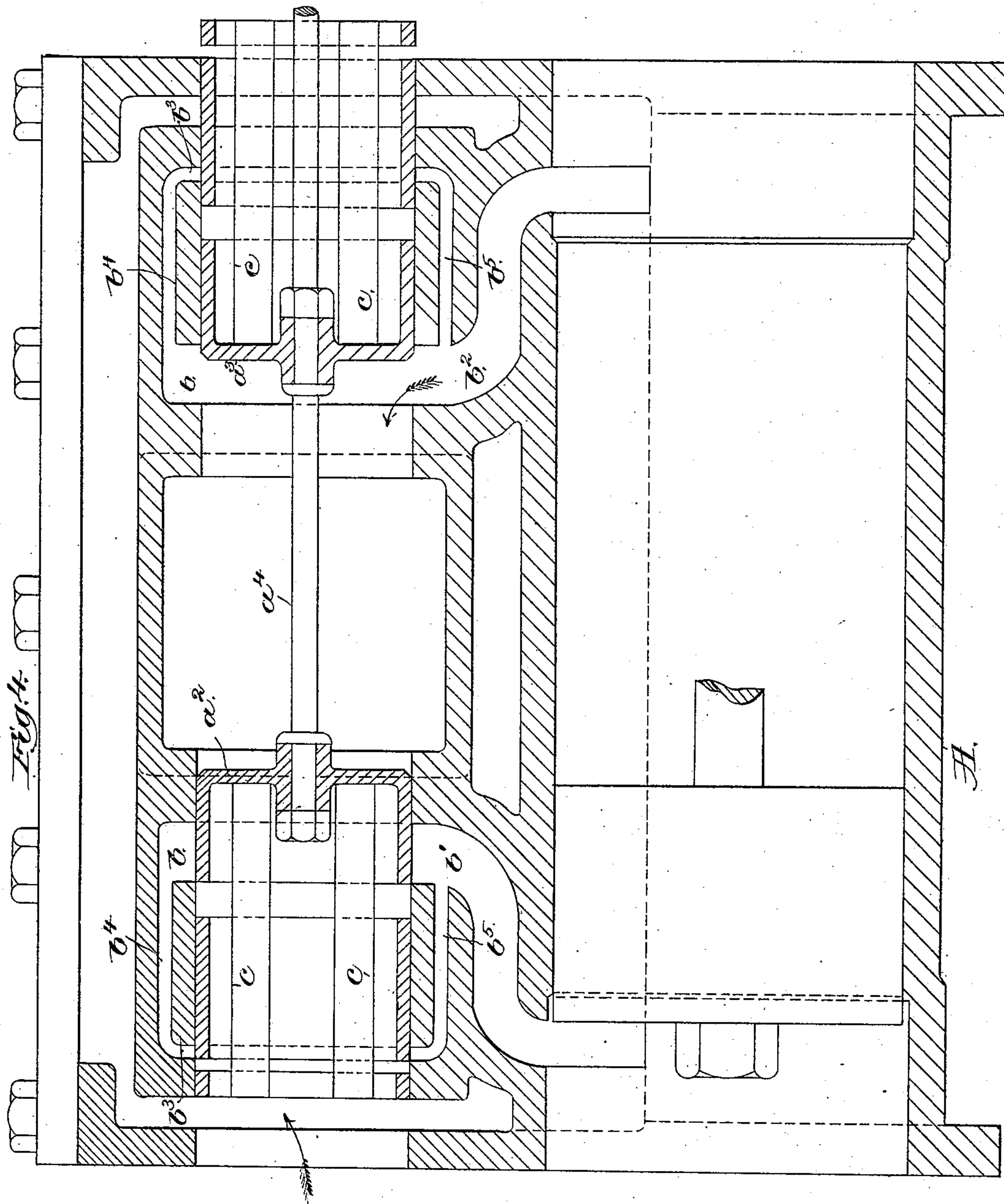
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John F. C. Prentiss

Inventor.

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Attys.

UNITED STATES PATENT OFFICE.

PARDON ARMINGTON, OF PROVIDENCE, RHODE ISLAND.

PISTON-VALVE.

SPECIFICATION forming part of Letters Patent No. 370,443, dated September 27, 1887.

Application filed March 1, 1887. Serial No. 229,309. (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 Piston-Valves, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to piston-valves for steam-engines, especially of that class wherein a high speed is desired, and has for one of its objects to construct the valve cylinder so as to provide an increased bearing-surface for the piston-valve.

The valve-cylinder referred to is provided with port-openings extended about it, and which communicate with the main cylinder, the said port-openings registering with a main and auxiliary port in the piston-valve, thereby admitting the maximum quantity of steam to the engine-cylinder with a minimum travel of the piston-valve, the waste room in the said piston-valve being reduced to a minimum.

Prior to my invention I am aware that a piston-valve has been constructed of a single casting closed at its ends and provided with steam-ports at its center and ends, the said valve having a bearing-surface substantially its entire length.

My invention therefore consists, essentially, in a steam-engine, of the engine-cylinder, an independent valve-cylinder provided with port-openings communicating with the engine-cylinder, combined with a piston-valve for the said valve-cylinder, having a bearing-surface of substantially the length of the said cylinder and provided with openings to register with the port-openings in the said valve-cylinder, substantially as will be described.

Other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1 is a longitudinal section of a portion of a steam-engine provided with my improved piston-valve; Fig. 2, a transverse section of Fig. 1 on line *xx*; Fig. 3, a section of one of the piston-valves on line *yy* of Fig. 1, and Fig. 4 a modification to be referred to.

The engine-cylinder A, as herein shown, has cast integral with it two independent valve-cylinders, *a a'*, which co-operate to form a sin-

gle-piston valve-cylinder. Each cylinder *a a'* receives within it an independent piston-valve, *a² a³*, respectively, which are joined together to form a single piston-valve by a valve-stem, *a⁴*, connected to any suitable or well-known valve-gearing, to operate the said piston-valves in unison. Each piston-valve is closed at one end and open at its other end to receive live steam.

Each cylinder *a a'*, near one end, is provided with an annular channel, *b*, which forms in the respective cylinders the main port-opening of cylinder-ports *b' b²*, and near its opposite end each cylinder has an annular channel, *b³*, of smaller area in cross-section than the channel *b*, the channel *b³* forming an auxiliary port-opening to the cylinder-ports and being connected with the main port *b*, near the top of the respective cylinders, by the passage *b⁴*, and with the cylinder-ports below the bottom of the said cylinder by the passage *b⁵*. Each cylinder *a a'* is made hollow and has on its inner side, as herein shown, longitudinal ribs *c*, and each cylinder also has annular openings or grooves *c' c²* to register with the port-openings *b b'*, respectively.

It will be noticed that the interior surface of each cylinder *a a'* constitutes the seat for its piston-valve, and that the said piston-valve is substantially equal in length to the length of the said cylinder on its inner surface, consequently obtaining for the said piston-valve a bearing substantially its entire length. The piston-valve having a bearing-surface substantially equal to its length, and being balanced, may be run very quickly and smoothly.

Referring to Figs. 1 and 4, it will be seen that steam is about to be admitted to the engine-cylinder through the main port *b'*, and the auxiliary port *b³*, communicating therewith, of the piston-valve *a²*. The auxiliary port-opening *c²* is of such area in cross-section, as compared with the main port-opening *c'* of the piston-valve, that when the auxiliary port-opening *c²* is fully opened, the said opening *c²*, plus the amount to which the main port-opening *c'* has been opened, equals substantially the total area in cross-section of the main port-openings, thereby admitting the maximum amount of steam to the engine-cylinder with the minimum travel of the piston-valve.

In Fig. 1 I have shown the cylinders *a a'* as

connected at their ends with the exhaust-ports $d d'$, the steam in the engine-cylinder being quickly exhausted therefrom; but instead of having an exhaust-port located at the end of each cylinder, a common exhaust for both the ports $b' b^2$ may be located between the two cylinders $a a'$, and in this case the position of the piston-valves will be reversed, as shown in Fig. 4, as will also the arrangement of the main and auxiliary ports, the said piston-valves taking steam at the outer ends of their respective cylinders.

I claim—

1. In a steam-engine, the engine-cylinder and an independent valve-cylinder provided with port-openings $b b^3$, connected together and communicating with the engine-cylinder, combined with a piston-valve for said cylinder having a bearing-surface of substantially the length of the said cylinder, and provided with port-openings to register with the port-openings in the said valve-cylinder, substantially as and for the purpose specified.

2. In a steam-engine, the engine-cylinder and an independent valve-cylinder provided with port-openings $b b^3$, connected together and communicating with each end of the engine-cylinder, combined with a piston-valve for each cylinder having a bearing-surface of substantially the length of the said cylinder, and provided with openings to register with the port-openings in the said valve-cylinder, and with a valve-stem to connect both piston-valves, substantially as described.

3. In a steam-engine, the engine-cylinder and independent valve-cylinders provided with port-openings $b b^3$, connected together and communicating with each end of the engine-cylinder, combined with a piston-valve for each cylinder having a bearing-surface of substantially the length of the said cylinder and provided with port-openings to register with the port-openings in said valve-cylinder, the said piston-valve having one end open to receive steam between said valve-cylinders and closed near the exhaust, and with a valve-stem to connect both piston-valves, substantially as described.

4. In a steam-engine, the engine-cylinder and independent valve-cylinders provided with port-openings $b b^3$, connected together and communicating with each end of the engine-cylinder, combined with a piston-valve for each cylinder, having a bearing-surface of substantially the length of the said valve-cylinder and provided with strengthening-ribs on its inner side and with port-openings to register with the port-openings in the said valve-cylinder, the said piston-valves being connected by a single valve-stem, substantially as and for the purpose specified.

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

PARDON ARMINGTON.

Witnesses:

G. W. GREGORY,
J. H. CHURCHILL.