

(No Model.)

P. ARMINGTON.

VALVE FOR STEAM ENGINES.

No. 357,113.

Patented Feb. 1, 1887.

Fig. 2.

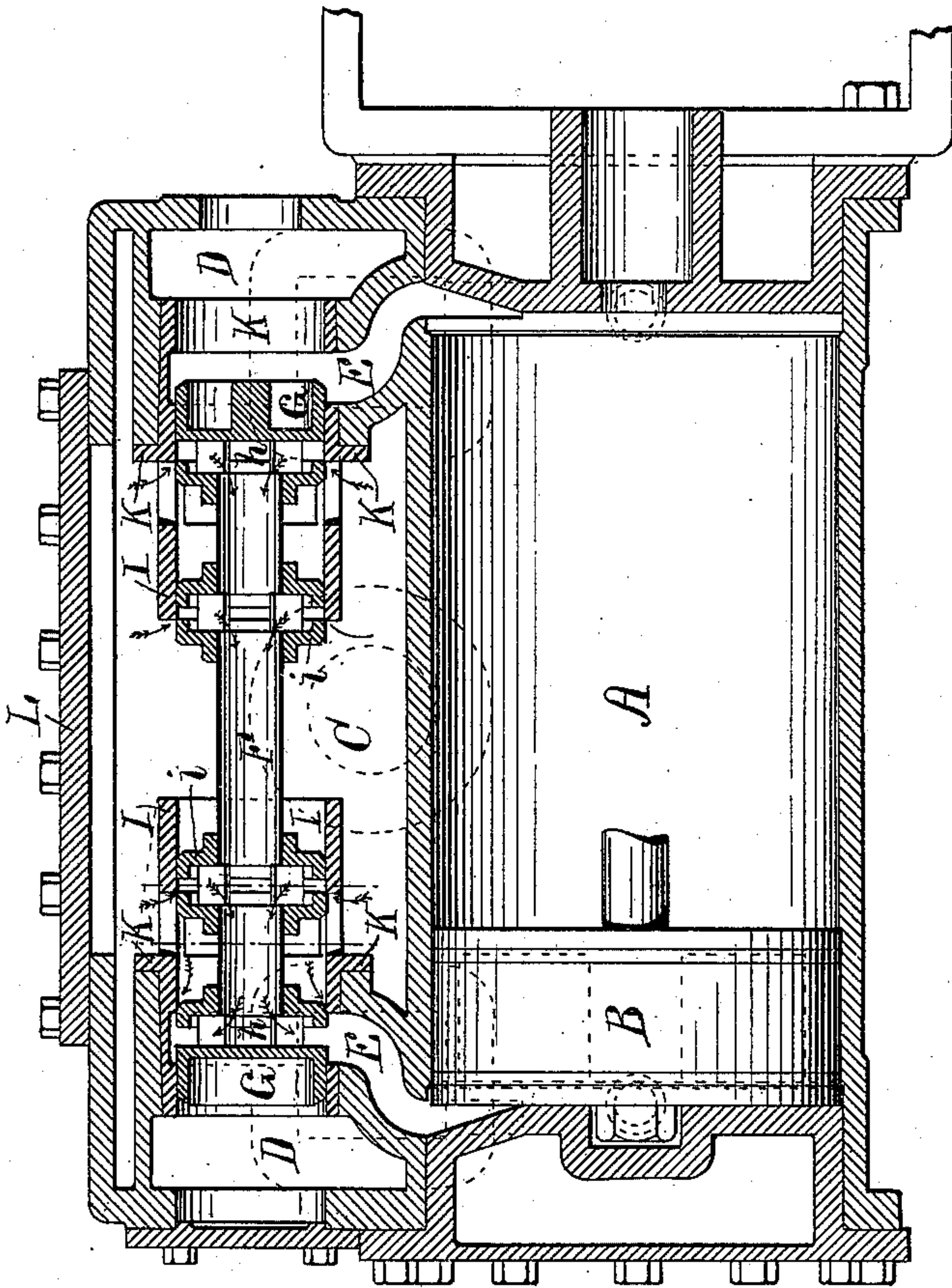


Fig. 1.

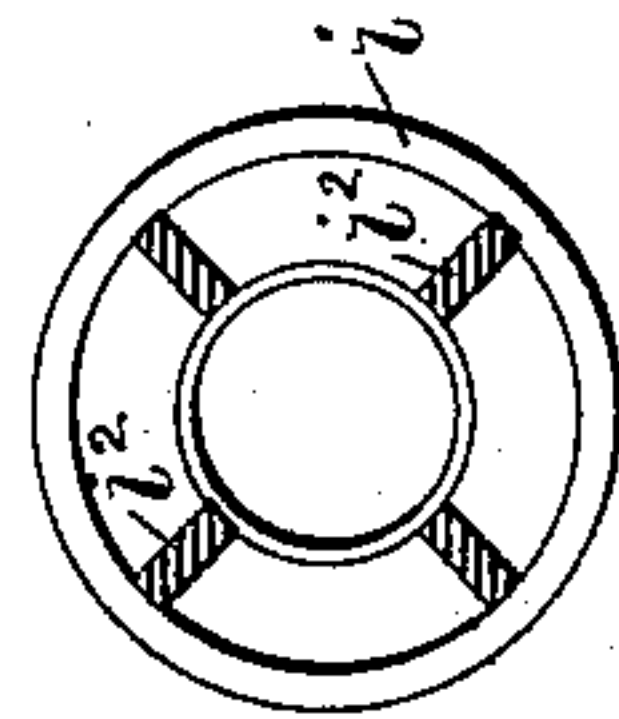
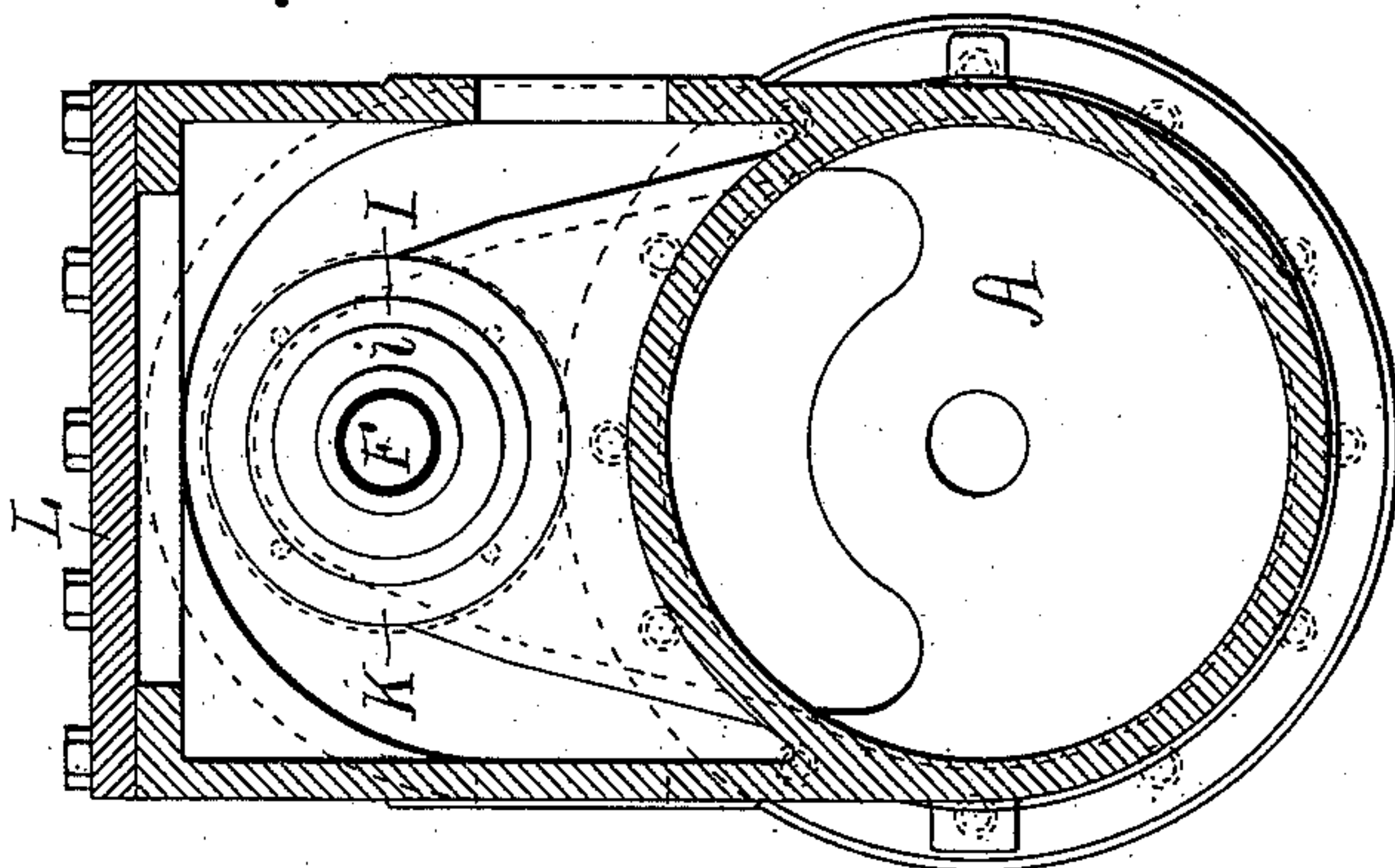


Fig. 4.

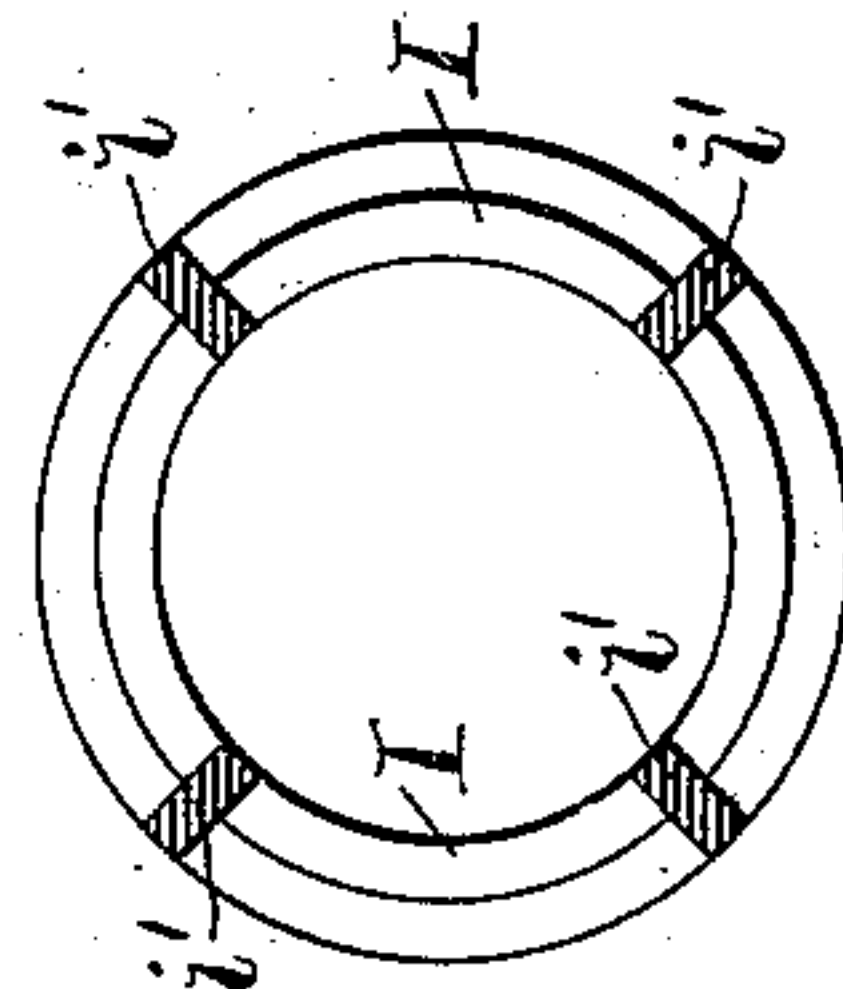


Fig. 3.

WITNESSES:

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INVENTOR:

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# UNITED STATES PATENT OFFICE.

PARDON ARMINGTON, OF PROVIDENCE, RHODE ISLAND.

## VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 357,113, dated February 1, 1887.

Application filed August 21, 1885. Serial No. 174,937. (No model.)

*To all whom it may concern:*

Be it known that I, PARDON ARMINGTON, of the city and county of Providence, and State of Rhode Island, have invented a new and useful  
5 Improvement in Valves for Steam-Engines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

10 This invention has reference to an improvement in the construction of the valve of a steam-engine by which the admission and the exhaust of the steam is regulated; and it consists in the peculiar and novel construction of the valve and  
15 valve-chamber, as will be more fully set forth hereinafter.

The efficiency of a steam-engine depends largely on the facility with which the steam is supplied to and exhausted from the cylinder.  
20 When the piston has reached either end of its reciprocation, steam must be supplied as quickly and in as large quantity as possible, to exert force and move it in the opposite direction.

25 The object of this invention is to increase the number of the steam-inlets to the valve, so as to allow a larger quantity of steam to enter the cylinder at the first opening of the steam-ports, and also to facilitate the boring, fitting, and renew-  
30 ing of the valve-cylinder.

Figure 1 is a sectional view of the steam-cylinder and steam-chest at right angle to the axis of the cylinder. Fig. 2 is a longitudinal sectional view of the steam-cylinder, the steam-  
35 chest, and valve. Fig. 3 is a sectional view of the bushing in which the valve slides, taken through the port-opening. Fig. 4 is a sectional view of the valve through the port or inlet.

In the drawings, A is the engine-cylinder, in  
40 which the piston B reciprocates.

C is the steam-chest, from which the live steam is supplied to the cylinder.

D D are the exhaust-ports.

E E are the ports connecting with the ends of  
45 the engine-cylinder, by which the steam is alternately admitted to and exhausted from the cylinder.

F is the tubular stem or steam-valve, and G G  
50 are the closed ends of the steam-valve, by which the exhaust-ports are opened and closed.

h h are the steam-ports, located on the ends of the tubular valve, by which the live steam from the steam-chest is admitted to one end of the engine-cylinder from both ends of the valve simultaneously. This construction is the sub- 55  
ject-matter of a prior application for a patent, which was filed by me January 2, 1883.

i i are the additional steam-ports connecting with the tubular valve, by which, on the first opening of the valve, an increased quantity of 60  
steam is permitted to enter the engine-cylinder through the tubular valve, which forms part of the present invention.

In place of the two auxiliary steam-ports i i, four or more of such auxiliary ports may 65  
be used to increase the supply of steam at the first opening of the valve; and as these ports supply steam through the tubular valve to both ends of the engine-cylinder, it is evident that one such auxiliary port will materially 70  
increase the quantity of steam supplied. By thus increasing the number of the inlet-ports the steam is not only supplied to the piston of the engine-cylinder more promptly, but the steam-supply can be cut off more quickly, with 75  
less motion of the valve, and the benefits of the expansion of steam are more fully secured.

The auxiliary steam-ports i i slide in short sections or ring-like bodies I I, forming the inner ends or parts of the internal cylinders 80  
or sleeves, K, to which they are connected by means of the ribs i' i', so as to give free access to the auxiliary ports, as shown in Fig. 3. The auxiliary ports consist of a hollow piston or casing having a circumferential slit, so as 85  
to form a large inlet area, the two parts of the piston being connected by the ribs i'' i'' as shown in Fig. 4, so as to form one casting.

The internal cylinder, in which the steam-valve reciprocates, has heretofore been formed 90  
in one piece with the steam-chest, and usually cast in one casting with the engine-cylinder, which was bored out and finished to receive the steam-valve. With the greatest care such castings are always more or less imperfect, the 95  
accurate boring and finishing of the valve-cylinder required the handling of the large mass of metal. To remedy this defect, permit the use of metal especially adapted to the sliding of the valve with the least friction and wear, 100



and also to provide the rings or short sections of cylinders for the auxiliary valve or valves, I construct the internal or valve cylinders separately and secure the same in the steam-chest, as is shown in Fig. 2.

K is a sleeve or bushing provided with a flange by which it is secured with bolts to the casting of the steam-chest. This sleeve is provided with the ribs *i i*, tapering from the outer edge of the flange to the ring or rings I. The portion of the sleeve K which enters the casting surrounding the ports E is made slightly tapering, and the casting is bored out so as to fit the sleeve. The interior of the internal cylinder or sleeve, K, is turned and finished, by grinding or otherwise, to fit the valve accurately. It may be made of any metal best suited to withstand the wear of the valve and the heat from the steam. The sleeve can be readily put in position through the chest-cover L. As it is slightly tapering it will easily enter the bore until the flange bears against the face, when it is readily secured by bolts, and when any repairs are required it can be as readily removed.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a hollow valve stem or body provided with lateral openings or ports at one or more points therein, a chambered casing fixed upon said stem and about said ports and provided with side openings or ports, and the internal or valve cylinders fixed within the steam-chest and communicating with the steam and exhaust ports, said cylinders having openings into the steam-chest, said casings sliding in said cylinders and across said openings therein, whereby the live steam may pass from the steam-chest through the casings into the interior of the valve-stem.

2. The combination of a tubular valve-stem closed at the ends, circumferential openings at two or more points near each end in said stem,

a chambered casing provided with an annular port and fixed on said stem and about each opening therein, and an internal valve-cylinder for each end of said stem and fixed within the steam-chest, said cylinder communicating with the steam and exhaust ports and provided with circumferential openings letting into the steam-chest, the casings on the stem sliding in said cylinders and over said openings therein, substantially as and for the purpose described.

3. The combination, with ports E E of a steam-engine and the steam-ports *h h*, of one or more auxiliary ports, *i*, communicating with the tubular stem of the steam-valve, and one or more valve-cylinders, as described.

4. The combination, with the ports of a steam-engine and the tubular valve F, provided at each end with the ports *h h* and with one or more auxiliary ports communicating with the tubular valve, of the ring or rings I, forming the cylinder for the auxiliary port or ports, as described.

5. The combination, with the tubular valve F, provided with the auxiliary ports *i i*, of the internal cylinder, K, and the section I, secured within the valve-chest and constructed to form the cylinder for the valve, as described.

6. The combination, with the ports E, of the internal cylinder, K, made slightly tapering and provided with a flange and having the section I, both constructed to form the cylinder for the valve, as described.

7. The combination, with the steam-chest and the steam and exhaust ports, of the valve-cylinders K, provided with the sections I and mounted within the steam-chest, the hollow valve-stem F, having closed ends and provided with the ports *h*, and the auxiliary ports *i*, substantially as described.

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Witnesses:

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