

(No Model.)

J. H. ALLEN.  
PISTON VALVE.

No. 262,554.

Patented Aug. 15, 1882.

Fig. I.

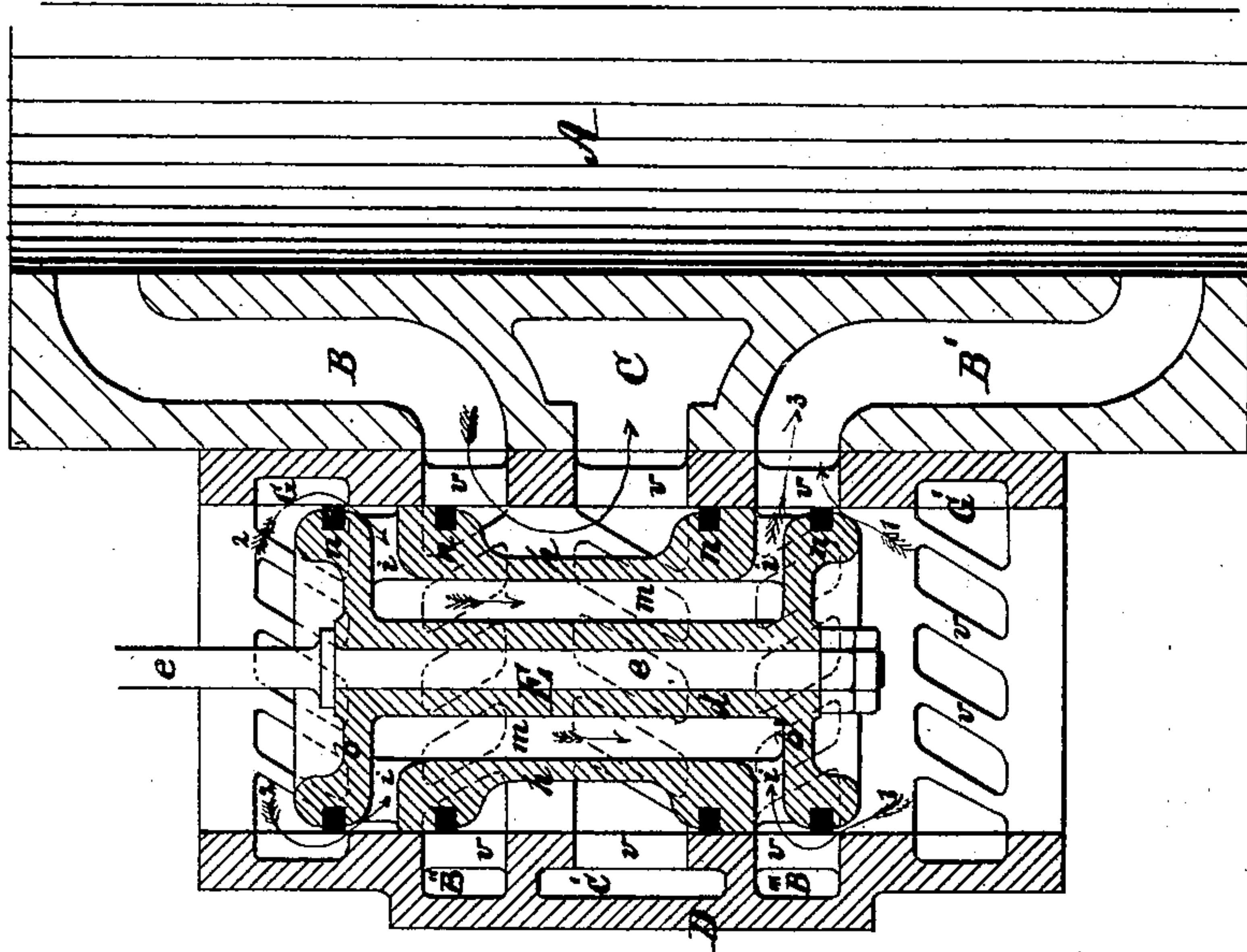


Fig. II.

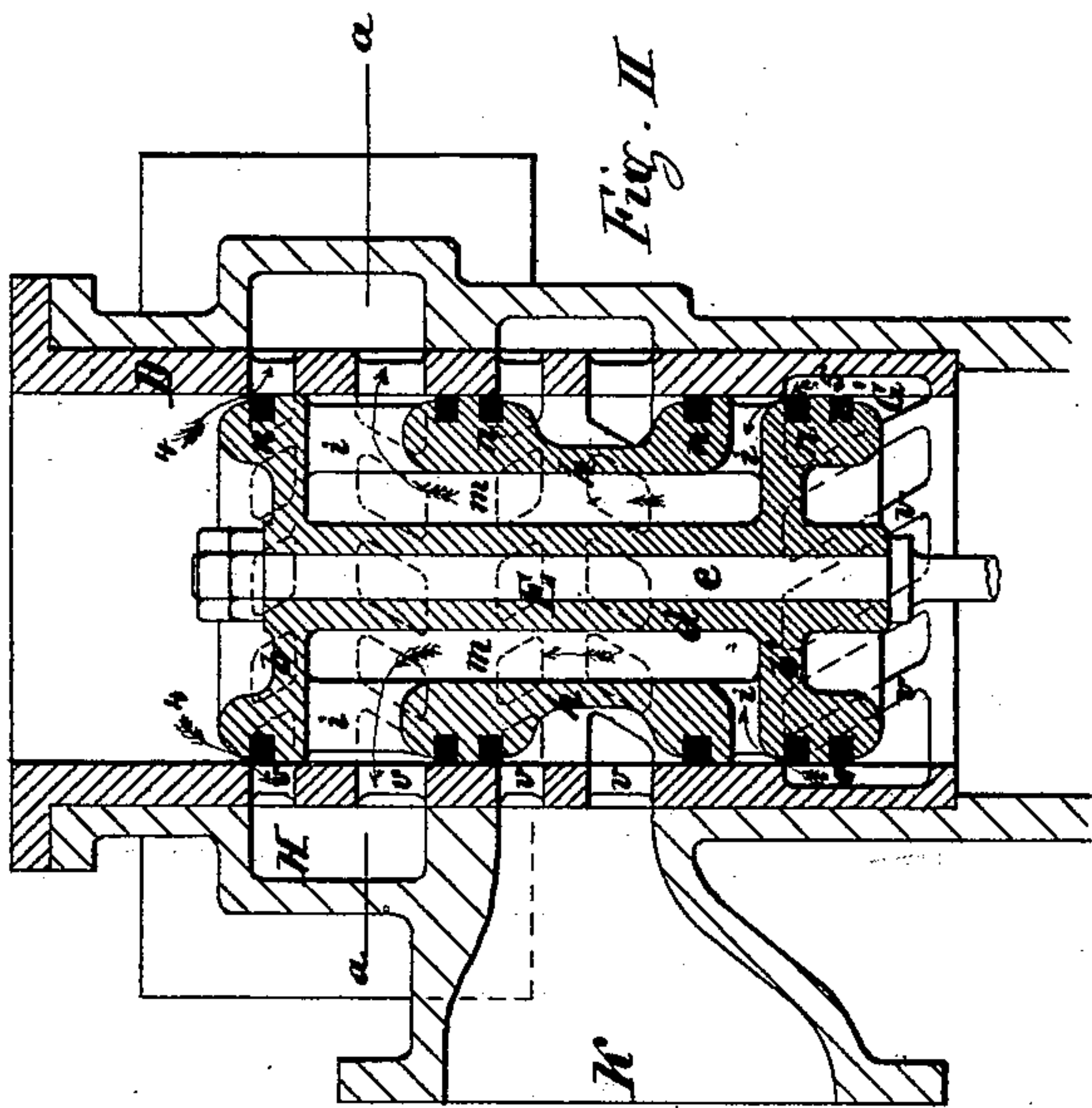
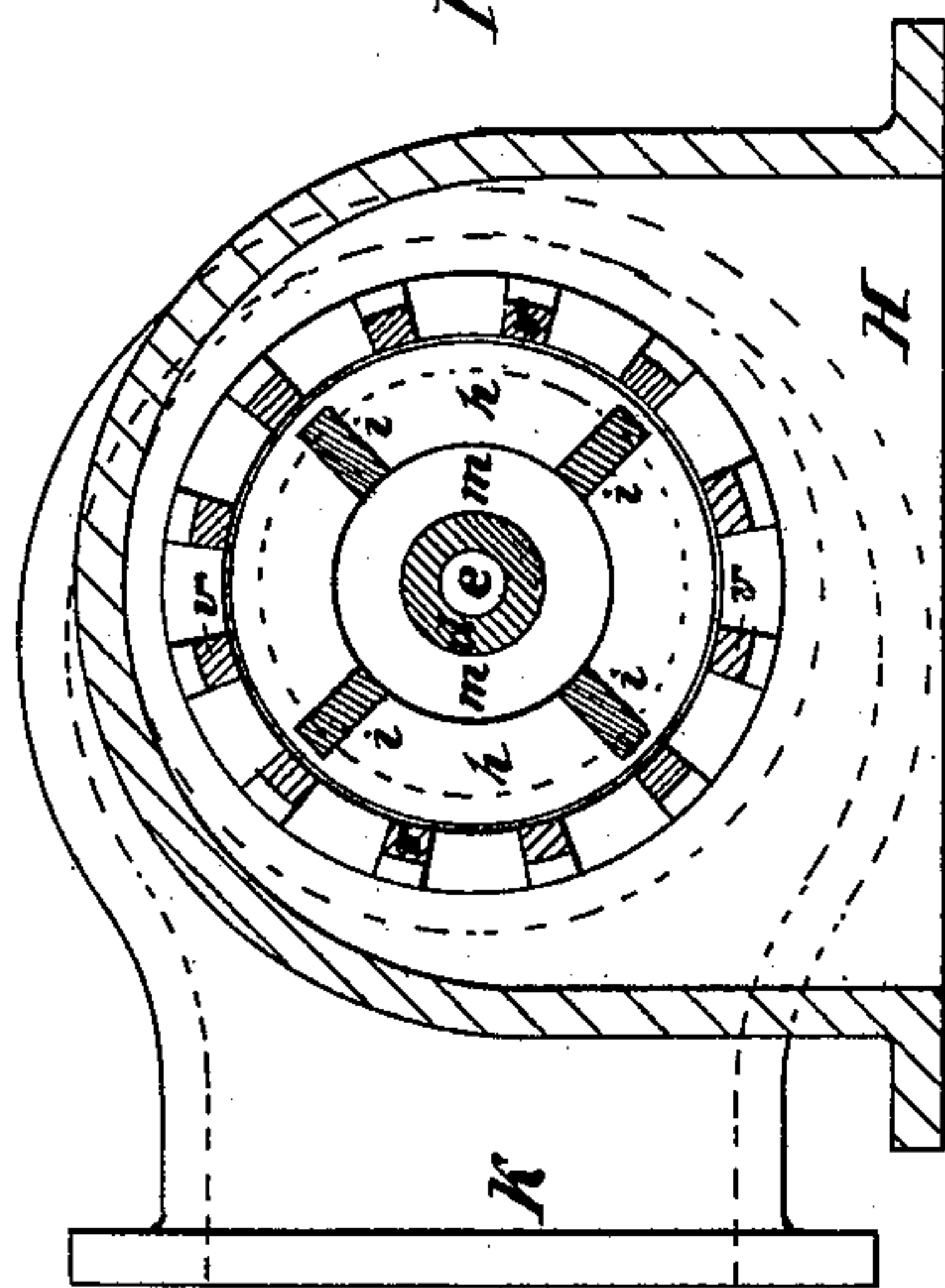


Fig. III.



Witnesses.

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# UNITED STATES PATENT OFFICE.

JOHN H. ALLEN, OF BROOKLYN, NEW YORK.

## PISTON-VALVE.

SPECIFICATION forming part of Letters Patent No. 262,554, dated August 15, 1882.

Application filed December 3, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. ALLEN, of Brooklyn, Kings county, State of New York, have invented a new and Improved Piston-Valve, of which the following is a specification.

The nature of my invention consists in the construction of a piston slide-valve for steam, air, or water cylinders, in combination with a suitable case or cylinder in which said valve moves, whereby at least twice the volume of steam, air, or water of the amount or area of the port opened by the edge of the valve will be admitted into the port of the cylinder.

In the accompanying drawings, Figure I represents a section of a piston slide-valve embodying my invention arranged on a three-port face of a cylinder. Fig. II represents a piston slide-valve as arranged when one valve is arranged at each end of the cylinder. Fig. III is a cross-section of the same at line *a a*, Fig. II.

Similar letters represent similar parts in all the figures.

In Fig. I, A represents part of the cylinder, B B' the steam-ports, and C the exhaust-port.

D is a cylindrical casing fitted against the face of the cylinder and inclosed in the slide-valve case, (not shown in the drawings,) in which said cylinder D the piston slide-valve E moves. The piston-valve E consists of a top and bottom disks, *b b'*, connected together by a central boss, *d*, to which the slide-valve rod *e* is attached. Between the top and bottom disks, *b b'*, a central hollow piston, *h*, is arranged, connected to the top and bottom disks, *b b'*, by three or more connecting-pieces, *i*. The central part of this hollow piston is recessed at the circumference to give the desired passage of steam, air, or water from either of the steam-ports into the exhaust-port. The central hollow part, *m*, of said piston *h* forms a passage around the central hub or boss, *d*. The upper and lower disks, *b b'*, as well as the upper and lower part of the hollow piston *h*, are provided with suitable packing-rings, *n n*, the edges of which form the ends of the valve-face. The cylinder D in which this piston-valve E works is made with annular recesses B'', C', and B''', corresponding with the ports B C B', whereby the piston-valve E will in all positions have an equal pressure all

around its surface, and will therefore be in equilibrium. The internal parts of the recesses of this cylinder are provided with diagonal distance-pieces *v*, to prevent the opening and expanding of the packing-rings *n* while passing these recesses. This cylinder D is arranged in the valve-case; or the inlets of the steam-pipe to the valve-case may be so arranged that the steam, air, or water pressure will be at both ends of the piston-valve E. Near each end of the cylinder D recesses G G' are arranged in such a position in relation to the ends or edges of the piston-valve E or to the end packing-rings, *n*, that as soon as the edge of one of the end packing-rings passes the edge of the steam-port for the purpose of admitting the pressure into the cylinder the inner edge of the packing-ring at the other end of the piston-valve will pass the edge of the corresponding recess, G or G', to allow the pressure to pass around the same. In Fig. I the piston-valve E is in such a position that the lower packing-ring, *n*, has just passed the edge of the port B' and admits the pressure into said port B', as shown by arrows 1 1. At the same time the lower edge of the upper packing-ring, *n*, has passed an equal distance the edge of the recess or cavity G, and allows thus the pressure to pass around the same, as indicated by arrows 2 2, through the hollow space *m*, formed by the hollow part of piston *h* and the hub *d*, and pass between the space formed by the end of the piston *h* and the lower disk, *b'*, of the piston-valve E into the port B', as shown by arrow 3, thus admitting double the volume or amount of pressure to pass into the steam-port than the amount of area uncovered by the edge of the valve or by the edge of the packing-ring forming the edge of the valve. Upon the return motion of the valve the packing-ring *n* in the upper disk, *b*, passes the edge of the port B, to admit the pressure into that port, and at the same time the packing-ring *n* in the lower disk, *b'*, passes the edge of the recess or cavity G' in the lower end of the cylinder D, and thus allows the pressure to pass around the same through the hollow space *m* and through the space formed between the upper end of the piston *h* and the upper disk, *b*, of the piston-valve E into the port B. In



Fig. II the piston-valve E is similarly constructed. The cylinder D, in which the piston-valve works, has only on one end a recess, G', and is fastened into the valve-chest. (Only  
 5 part of which is shown in drawings.) This valve - chest is provided with a branch, H, and a branch, K, the former attached to the steam-port and the main cylinder, and to the latter the exhaust-pipe is connected. As soon  
 10 as the edge of the packing-ring *n* in the upper disk, *b*, passes the edges of the openings in the cylinder D, connecting with the steam-passage branch H, the inner edge of the packing-ring in the lower disk, *b'*, of the piston-valve E  
 15 passes the edge of the recess or cavity G' in said cylinder D, and the steam or pressure will pass, as shown by arrows 4 4, into the steam-port H, and at the same time the pressure will pass through the cavity G' past the edge of  
 20 the packing - ring, as shown by arrows 5 5, through the hollow space *m* and between the space formed by the upper part of piston *h* and the upper disk, *b*, of the valve into the port H, as shown by arrows 6 6. A similar

valve is arranged at the other end of the main 25 cylinder and both valves connected together by the valve-rod *e*, the acting pressure in this case being arranged to be always at each end of the two valves, and between the valves, when said two valves are arranged in one 30 valve-case. If a separate valve - case is arranged for the upper valve and one for the lower valve, the pressure must be at each end upon the valves.

What I claim as my invention, and desire to 35 secure by Letters Patent, is—

A cylindrical case, D, with circumferential cavities G G', in combination with a sliding piston-valve, E, consisting of a central hollow cylinder or piston, *h*, and upper and lower 40 disks, *b b'*, connected together, arranged to operate in the manner and for the purpose substantially as described.

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Witnesses:

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