

No. 891,290.

PATENTED JUNE 23, 1908.

G. B. PETSCHÉ.  
BLOWING ENGINE OR PUMP.

APPLICATION FILED SEPT. 21, 1907.

2 SHEETS—SHEET 1.

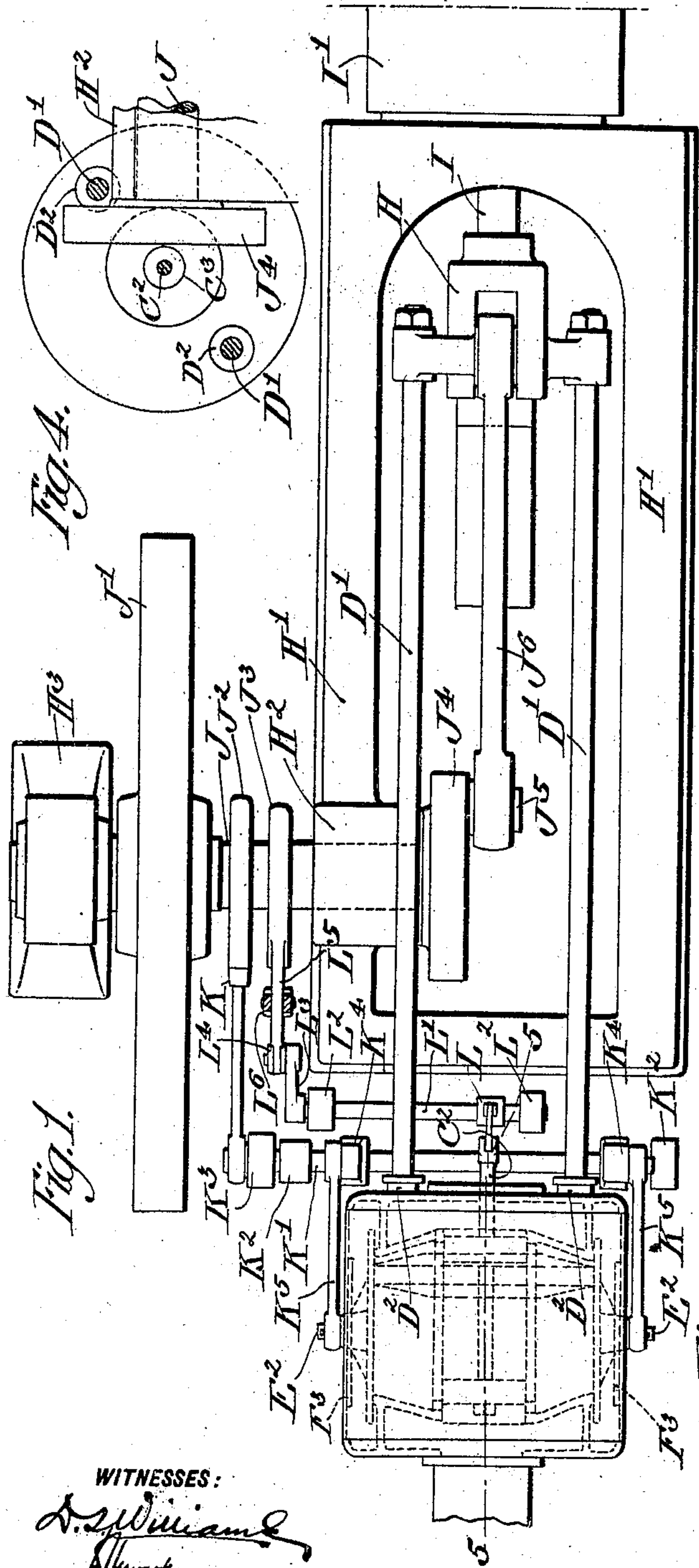


Fig. 1.

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WITNESSES:  
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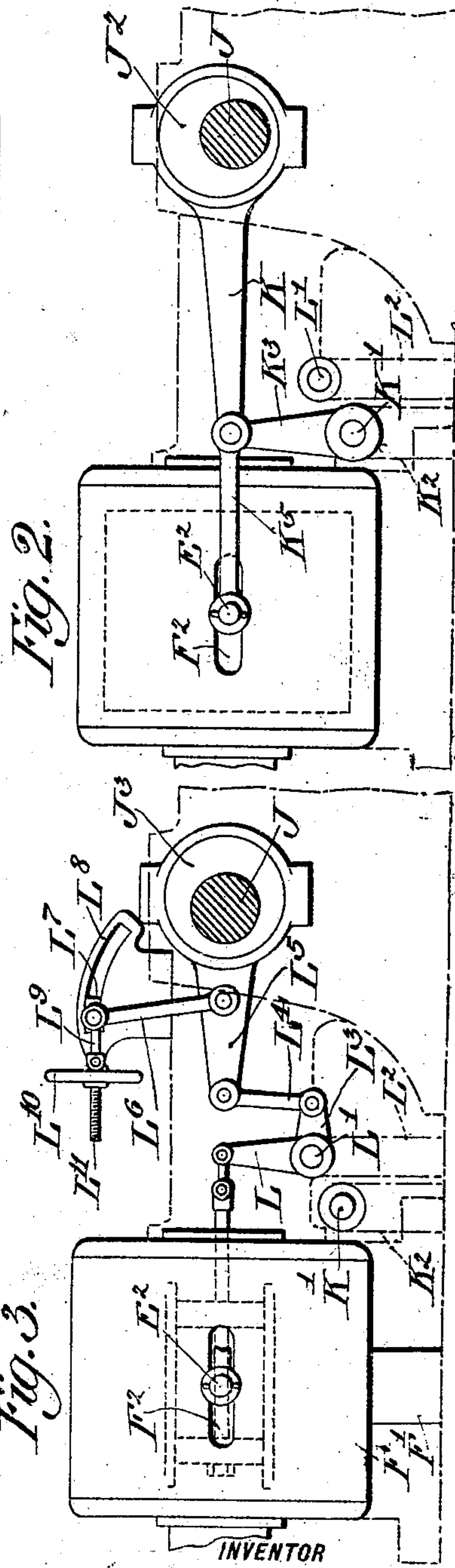


Fig. 2.

Fig. 3.

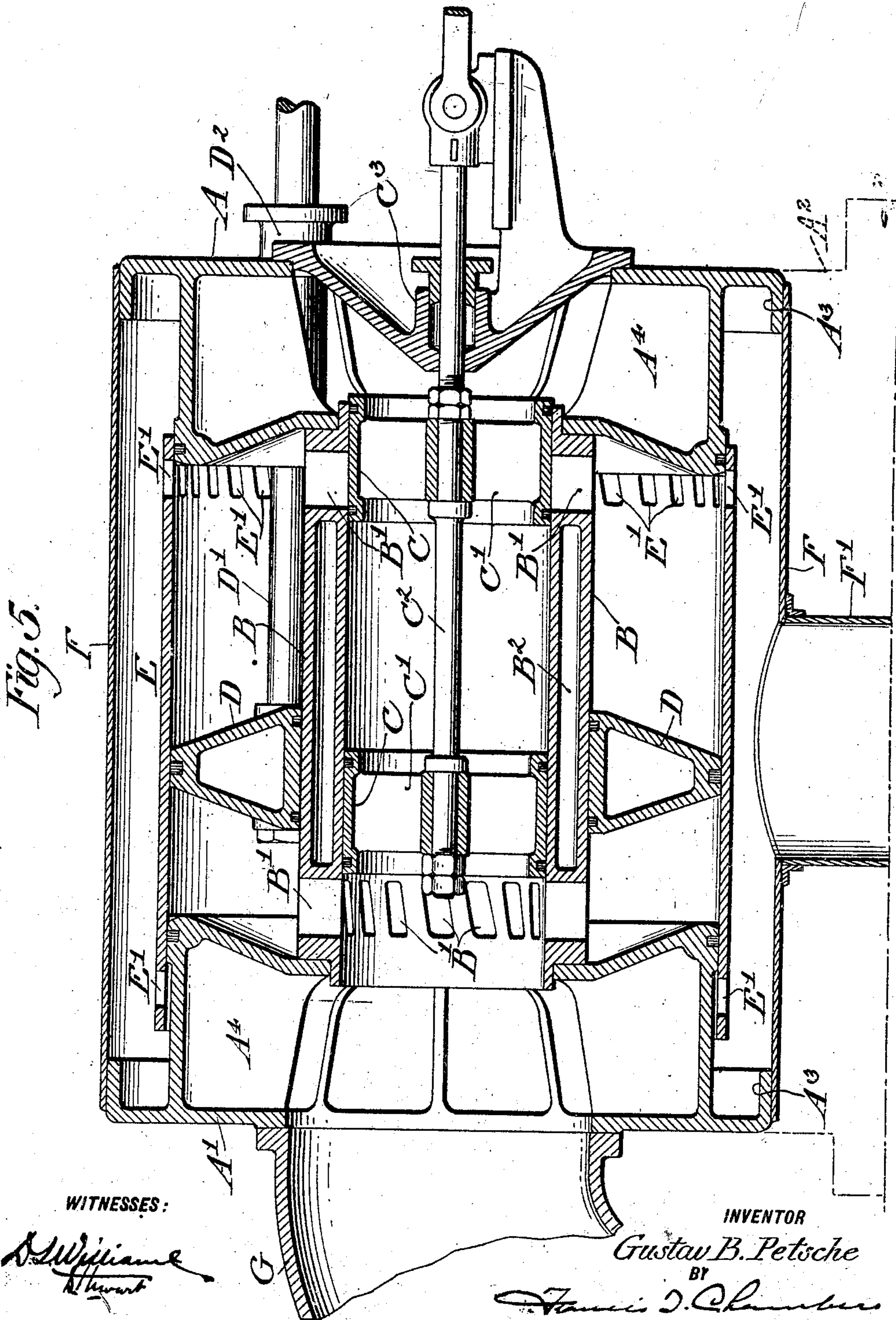
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# UNITED STATES PATENT OFFICE.

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## BLOWING ENGINE OR PUMP.

No. 891,290.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed September 21, 1907. Serial No. 393,921.

*To all whom it may concern:*

Be it known that I, GUSTAV B. PETSCHÉ, a subject of the Emperor of Germany, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Blowing Engines or Pumps, of which the following is a true and exact description, reference being had to the accompanying drawing, which forms a part thereof.

The present invention relates to blowing engines or pumps, and particularly to blowing engines or pumps of relatively large size and of that type in which the cylinder proper and piston are both movable and the movements of the cylinder is relied upon to open and close ports leading into the cylinder.

The object of the present invention is to improve the mechanical construction of such engines or pumps, and in particular to provide an efficient and effectively disposed outlet valve mechanism controlling the escape of the fluid pumped or compressed by the engine.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of my invention, however, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated and described one of the forms in which my invention may be embodied.

Of the drawings, Figure 1 is a plan view of the blowing engine and a portion of the driving engine directly connected to it. Fig. 2 is a somewhat diagrammatic elevation illustrating the connections for operating the movable cylinder. Fig. 3 is a view similar to Fig. 2 illustrating the connection for operating the outlet valve. Fig. 4 is a somewhat diagrammatic end elevation of the blowing engine, showing the relation between compressor piston rods and the engine shaft, and Fig. 5 is a sectional elevation of the blowing engine on the line 5—5 of Fig. 1.

In the drawings, referring at first particularly to Fig. 5, A and A' represent the stationary cylinder ends which are supported by the base A<sup>2</sup> and are connected by a hollow central member B, which may be formed with an annular chamber B<sup>2</sup> to limit the heat transfer through it, and is provided adjacent each end with a set of ports B'. The inte-

rior of the hollow member B is open to the chambers A' formed in the end members A, A'. The ports B' are controlled by the outlet valve which comprises two hollow cylindrical members C, each of which is connected by arms C' to the valve stem C<sup>2</sup>, which passes through a stuffing box C<sup>3</sup> formed in the front cylinder end A. The central member B is surrounded by the annular compressing piston D. Piston rods D' run from the piston D through the front cylinder end A, suitable stuffing boxes D<sup>2</sup> being provided to prevent leakage along the piston rods. The outer wall of the cylinder is formed by the movable cylindrical member E surrounding the piston D and having its ends fitted to slide on the stationary ends A and A'. In the form shown, the admission ports E' are formed in the ends of the member E, and these ports are so arranged that as the member E is moved back and forth in a manner hereinafter described, the ports at each end of the member are alternately opened and closed.

While I have shown the ports E' as formed in the member E, it is to be understood of course that they may be formed in the cylinder ends A, A', in which case they would be alternately opened and closed by the movement of the cylinder. In the form shown, also, the cylinder is shown as surrounded by a casing F which surrounds the flanges A<sup>3</sup> formed at the outer ends of the cylinder head, so that a space is formed between the casing F and the cylinder E. The air or other fluid to be compressed is admitted into this annular space through the pipe F'. The outlet pipe G from the compressor is connected to the rear cylinder head A', and is open to the receiving space formed by the chambers A<sup>4</sup> in the end members A and A' and the interior of the hollow central member B.

The member E is reciprocated by means of trunnions E<sup>2</sup>, which project from the cylinder at opposite sides and pass through slotted openings F<sup>2</sup> formed in the casing F. Where necessary or desirable, leakage through the slots F<sup>2</sup> may be prevented by plates F<sup>3</sup> (Fig. 1) carried by the trunnions.

The piston rods D' are preferably connected at their outer ends to a crosshead H, which is connected to the driving engine. In the particular engine illustrated, the crosshead H is intended to be connected to the piston rod I of a gas engine having tandem



cylinders I' (a portion of one of which only is shown) with their axes in line with the axis of the blowing engine. The crosshead H may be guided in the usual manner on the bed H'.

5 In a pillow block H<sup>2</sup>, rising from the bed H', and an outboard bearing H<sup>3</sup>, is mounted a shaft J carrying the balance wheel J' and the eccentrics J<sup>2</sup> and J<sup>3</sup>. The inner end of the shaft J carries the crank disk J<sup>4</sup> having a wrist pin J<sup>5</sup> connected to the crosshead H by the connecting rod J<sup>6</sup>. By preference, the shaft J is arranged in the same horizontal plane as the common outer line of the blowing engine and driving engine, and for this reason the connecting rods D' are arranged, as shown in Fig. 4, in a plane which is inclined to the horizontal. The connecting rod or arm K, mounted on the eccentric J<sup>2</sup>, is connected to the trunnions E<sup>2</sup> through the rock shaft K' mounted in the pillow blocks K<sup>2</sup> rising from the base A<sup>2</sup> and through the arms K<sup>3</sup> and K<sup>4</sup>, having a wrist pin connected to the arm K, and arm K<sup>4</sup> having wrist pins connected by links K<sup>5</sup> to the trunnion E<sup>2</sup>.

25 The outer end of the valve stem C<sup>2</sup> is connected to the arm L of a rock shaft L' journaled in pillow blocks L<sup>2</sup> extending from the base A<sup>2</sup>. The shaft L' has an arm L<sup>3</sup> connected by a link L<sup>4</sup> to the end of an arm L<sup>5</sup>, which is mounted on the eccentric J<sup>3</sup>. The arm L<sup>5</sup> is pivotally connected to a link L<sup>6</sup>, and the other end of the link L<sup>6</sup> is pivoted to a block L<sup>7</sup> mounted in the curved guideway L<sup>8</sup>. The block L<sup>7</sup> may be moved in the guide way L<sup>8</sup> to vary the movement of the arm L<sup>5</sup> by means of the rotatable nut L<sup>10</sup>, threaded rod L<sup>11</sup>, and connecting rod L<sup>9</sup>. The purpose of this adjustment of the motion of the arms L<sup>5</sup>, and consequently of the valve C, is to vary the time of opening and closing the ports B' relative to the reciprocating movements of the compressing piston D.

40 In blowing engines it is highly essential for efficient operation that the outlet valve from the compressing cylinder should be opened at the instant at which the pressure in the compressing cylinder approximates that of the receiver. The point in the compressing stroke at which the pressure in the compressing cylinder equals that of the receiver varies with different conditions of operation. By operating the simple adjusting means formed by the nut L<sup>10</sup> and screw L<sup>11</sup>, the valve C is caused to open the ports B' at different points in the stroke of the compressing piston. The operation of this adjusting device may be effected either manually or automatically.

The construction illustrated and described possesses numerous advantageous features. Among these may be mentioned the ease with which the parts may be constructed and assembled, and the compactness and simplicity of the engine as a whole. In engines of this type it is desirable that the somewhat

massive compressing piston be connected to two or more separated piston rods. In the present invention this is taken advantage of to provide the outlet valve mechanism in line with the axis of the compressing piston.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a blowing engine or pump the combination of a cylinder having its end members connected by a hollow central member, said central member having cylinder ports through it, an annular reciprocating piston in the cylinder and surrounding said hollow member, and the valve mechanism for controlling said ports located in said hollow member.

2. In a blowing engine or compressor the combination with the cylinder having the chambered end members connected by a hollow central member, said central member having ports formed in it which serve to pass the fluid pumped or compressed from the cylinder into the receiving space formed by the chambers in said end members and the interior of said hollow central member, of the annular reciprocating piston in said cylinder and surrounding said central member, and the outlet valve mechanism controlling said ports located in said hollow member.

3. In a blowing engine or pump, a working cylinder formed by stationary end members, a central member connecting the end members, and a movable member surrounding the central member and extending between the end members and serving as a valve member to open and close communication with the interior of the cylinder as said member is moved, a reciprocating piston in said cylinder and surrounding said central member, said central member being provided with ports communicating with the interior of the cylinder, a valve controlling said ports and located within said central member, and means for moving said movable member and said valves in definite relation to the movement of the piston.

4. In a blowing engine or pump, a working cylinder formed by stationary end members, a central member connecting the end members, and a movable member surrounding the central member and extending between the end members and serving as a valve member to intermittently admit the fluid pumped or compressed into the interior of the cylinder as said member is moved, a reciprocating annular piston in said cylinder and surrounding said central member, said central member being provided with outlet ports leading from the interior of the cylinder, a valve controlling said ports and located within said central member, a rotating shaft, crank and piston rod connections between it and said annular piston, and connections from said shaft for moving said movable



member and said valve in definite relation to the movement of the piston.

5. In a blowing engine or pump, a working cylinder formed by stationary end members, a central member connecting the end members, and a movable member surrounding the central member and extending between the end members and serving as a valve member to open and close communication with the interior of the cylinder as said member is moved, an annular piston in said cylinder and surrounding said central member, said central member being provided with ports communicating with the interior of the cylinder, a valve controlling said ports and located within said central member, piston rods connected to said piston, a crosshead to which the outer ends of the piston rods are connected, a shaft, a crank carried by the shaft, a connecting rod extending between the crank and crosshead and connected to the latter between the piston rods, and connections between the shaft and said movable member and said valve for moving them in definite relation to the movement of the piston.

6. In a blowing engine or pump, a working cylinder formed by stationary end members, a central member connecting the end members, and a movable member surrounding the central member and extending between the end members and serving as a valve member to open and close communication with the interior of the cylinder as said member is moved, a reciprocating annular piston in said cylinder and surrounding said central member, said central member being provided with ports communicating with the interior of the cylinder, a valve controlling said ports and located within said central member, and means for moving said movable member and said valve in definite relation to the movement of the piston, and means for varying the relative movements of said valve and said piston.

7. In a blowing engine or pump, a working cylinder formed by stationary end members, a central member connecting the end members, and a movable member surrounding the central member and extending between the end members and serving as a valve member to open and close communication with the interior of the cylinder as said member is moved, an annular piston in said cylinder and surrounding said central member, said central member being provided with ports communicating with the interior of the cylinder, a valve controlling said ports and located within said central member, piston rods connected to said piston, a crosshead to which the outer ends of the piston rods are connected, a shaft, a crank carried by the shaft, a connecting rod extending between the crank and crosshead and connected to

the latter between the piston rods, and connections between the shaft and said movable member and said valve for moving them in definite relation to the movement of the piston, the connections for operating said valve including an eccentric on said shaft and a rock shaft having two arms one of which is connected to the valve and the other of which is connected to said eccentric.

8. In a blowing engine or pump, a working cylinder formed by stationary end members, a central member connecting the end members, and a movable member surrounding the central member and extending between the end members and serving as a valve member to open and close communication with the interior of the cylinder as said member is moved, an annular piston in said cylinder and surrounding said central member, said central member being provided with ports communicating with the interior of the cylinder, a valve controlling said ports and located within said central member, piston rods connected to said piston, a crosshead to which the outer ends of the piston rods are connected, a shaft, a crank carried by the shaft, a connecting rod extending between the crank and crosshead and connected to the latter between the piston rods, and connections between the shaft and said movable member and said valve for moving them in definite relation to the movement of the piston, the connections for operating said valve including an eccentric on said shaft and a rock shaft having two arms one of which is connected to the valve and the other of which is connected to said eccentric, and means for adjusting the connection between the eccentric and the rock shaft to vary the movement imparted to the latter by said eccentric.

9. In a blowing engine or pump, the combination of the stationary end members A, A', the hollow central member B having the two sets of outlet ports B', the annular piston D, the movable outer member E having the inlet ports E', the hollow piston valve C C for the ports B' B', the piston rods D', the crosshead H connecting the outer ends of the piston rods, the driving piston rod I connected to said crosshead H, the shaft J extending transversely to the axis of the piston D, the crank and rod connection between the shaft J and the center of the crosshead H, the eccentrics J<sup>2</sup> and J<sup>3</sup> and connections between the said eccentrics and the member E and valve C C for moving said member and valve in definite relation to the movement of the piston D.

GUSTAV B. PETSCHÉ.

Witnesses:

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