

No. 894,381.

H. HAMKENS.

PATENTED JULY 28, 1908.

BLOWING ENGINE VALVE.

APPLICATION FILED MAR. 3, 1906.

3 SHEETS—SHEET 1.

Fig. 2.

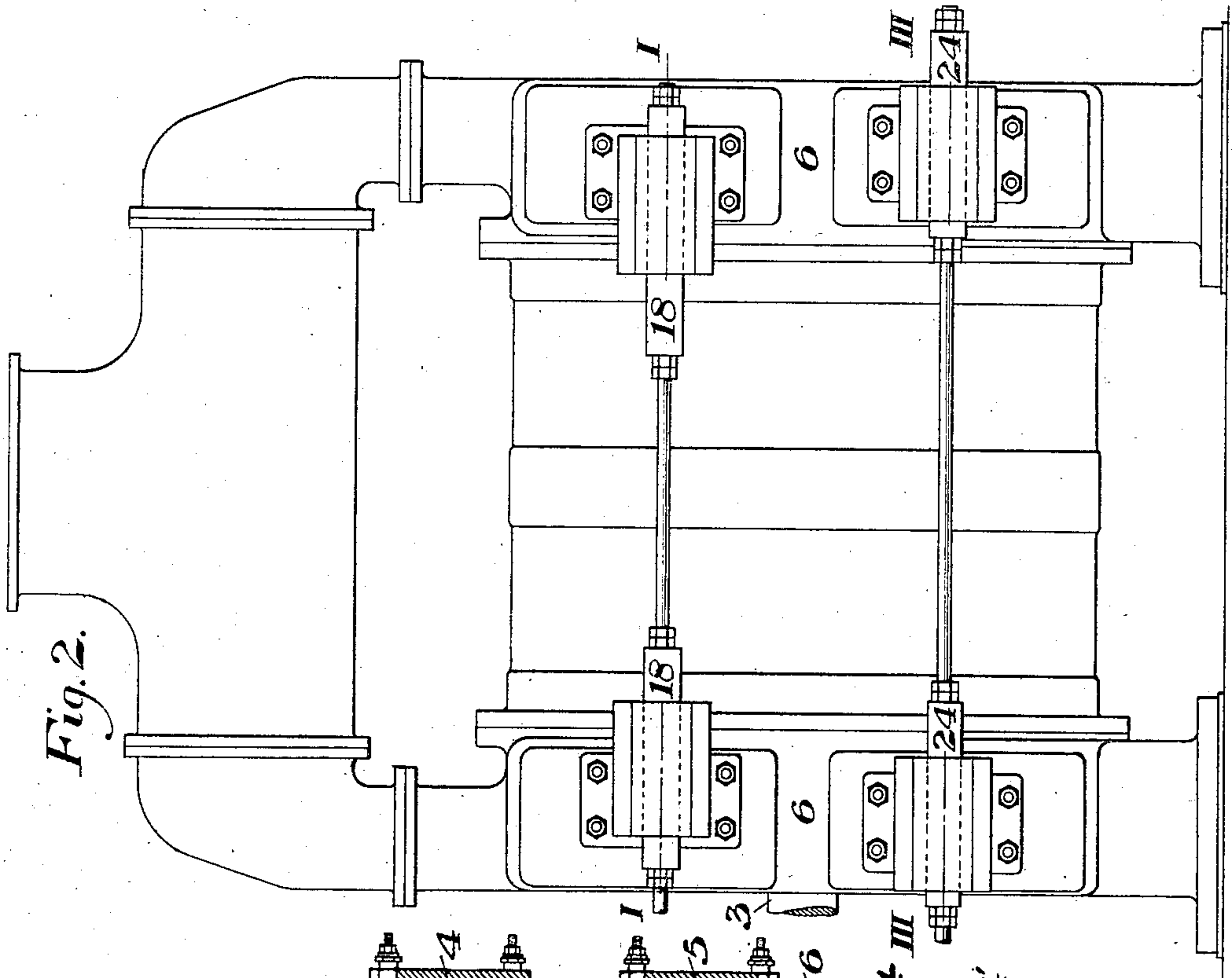
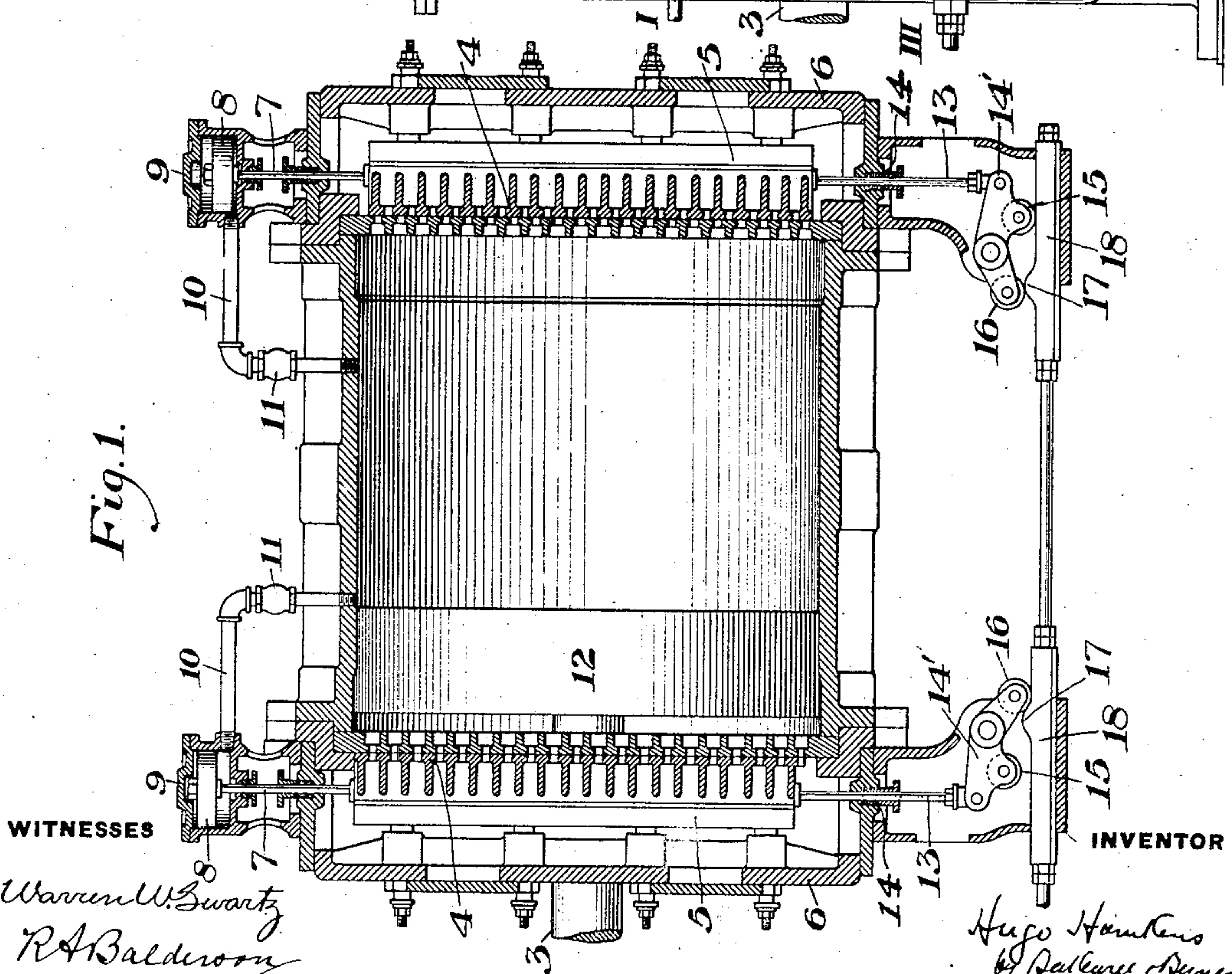


Fig. 1.



WITNESSES

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Fig. 3.

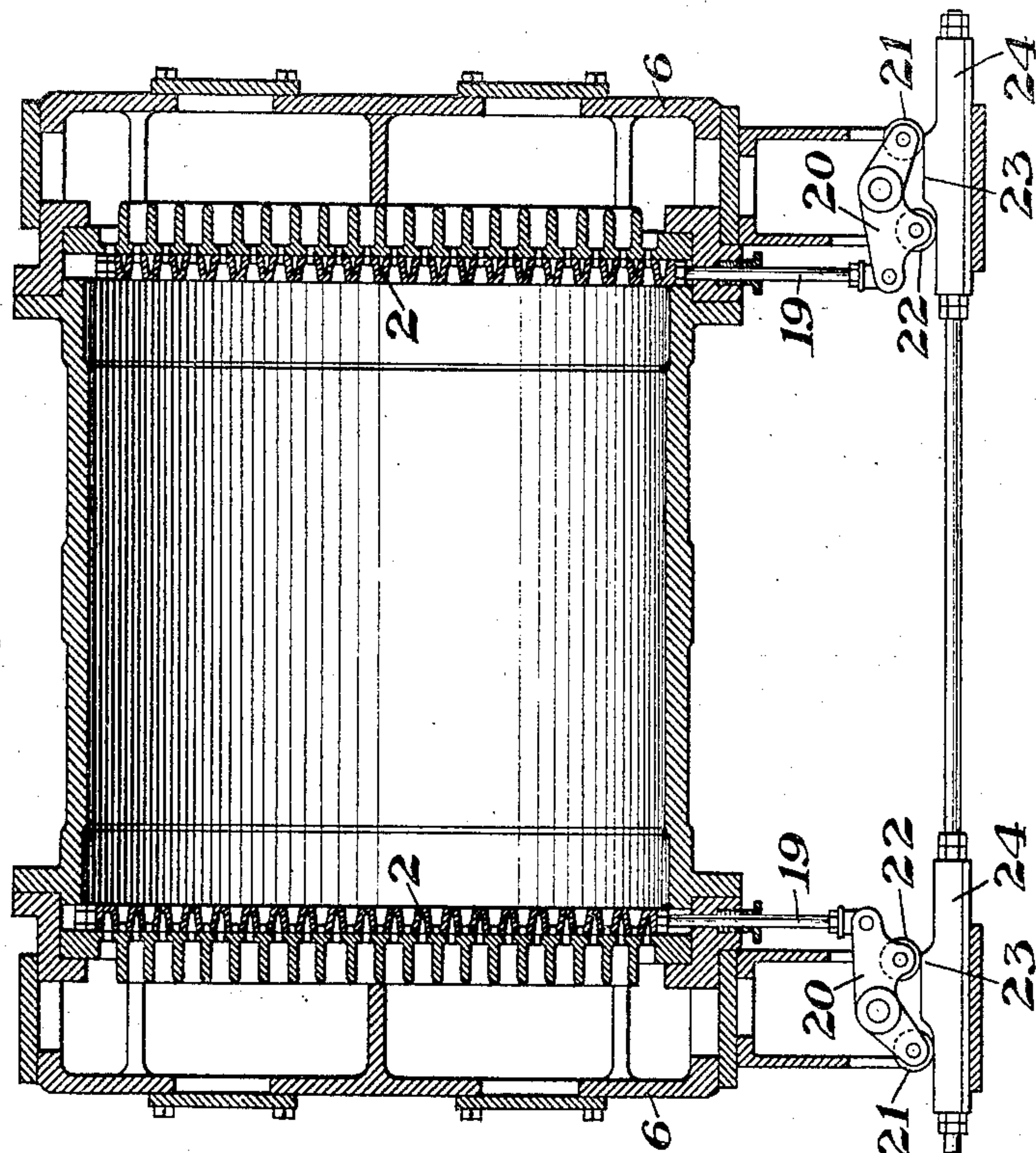
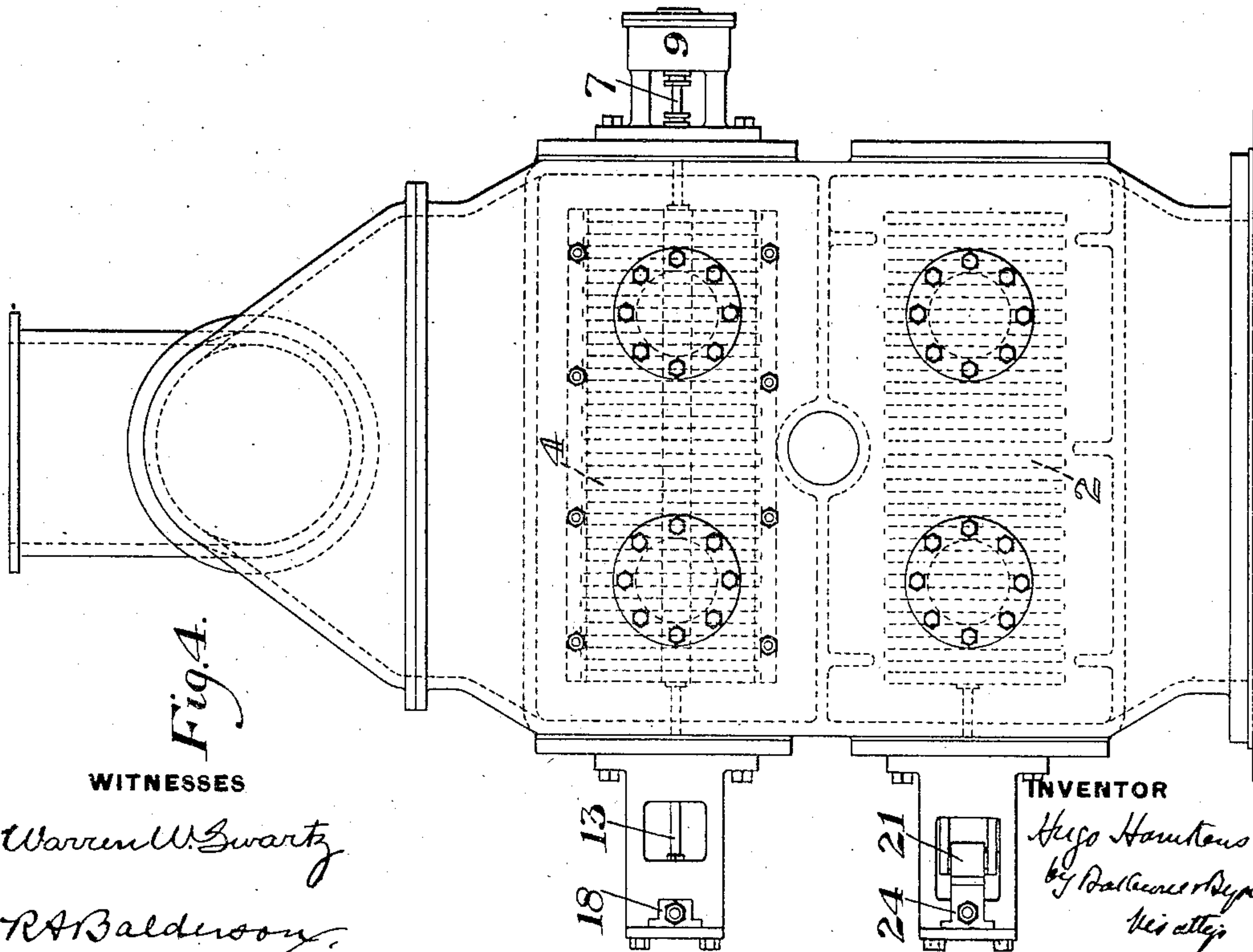


Fig. 4.



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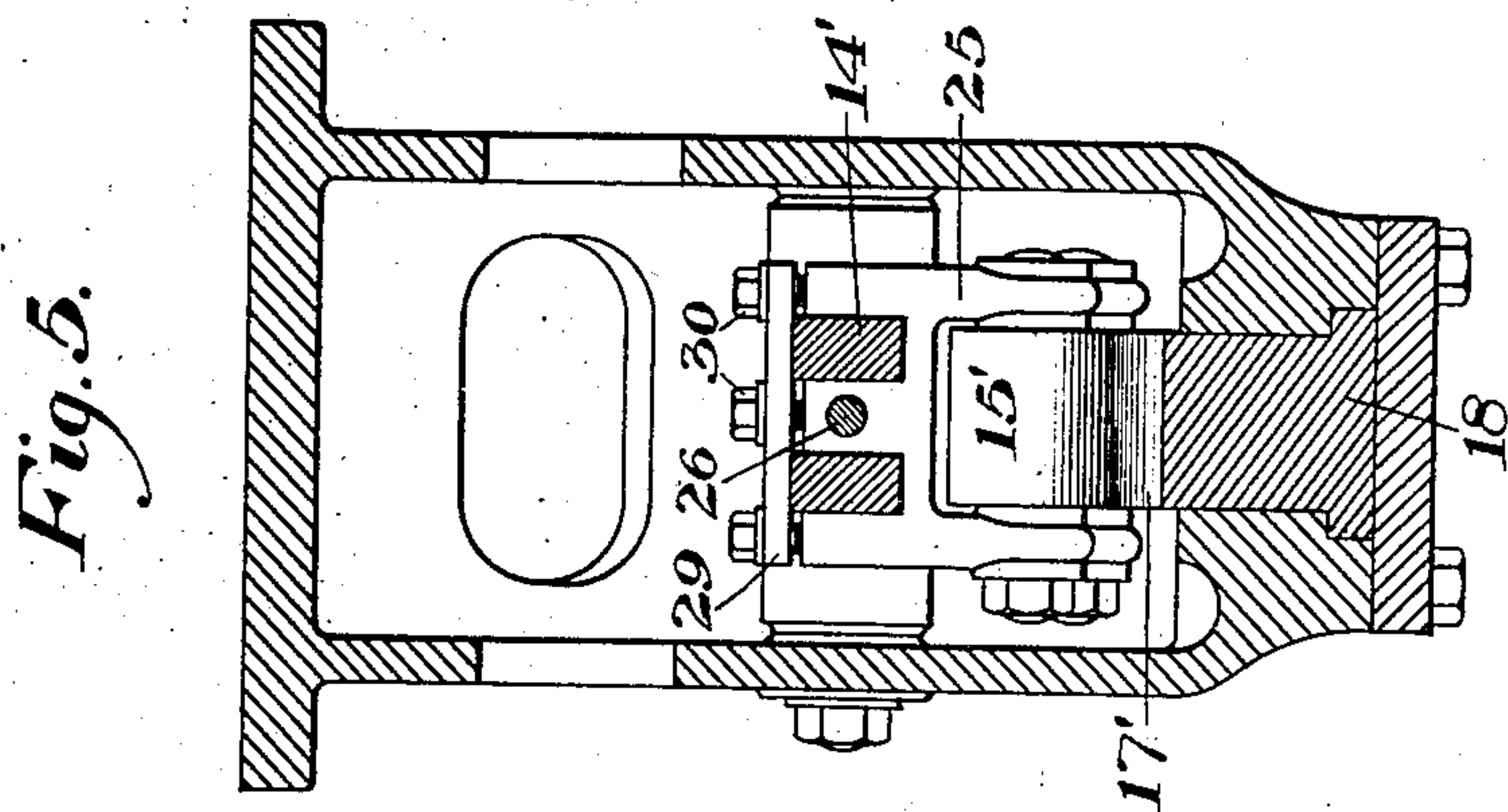
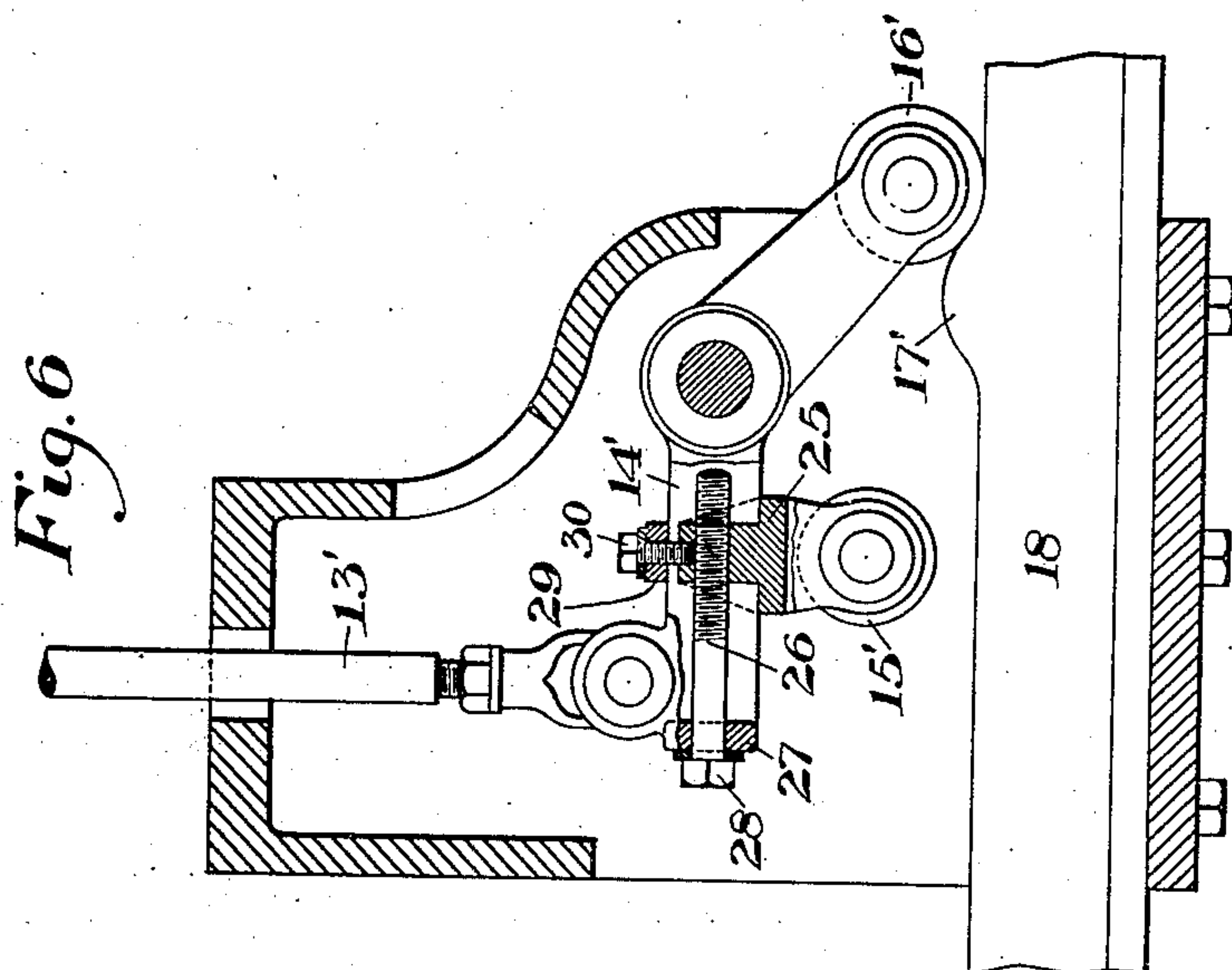
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3 SHEETS—SHEET 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

HUGO HAMKENS, OF HOMESTEAD, PENNSYLVANIA, ASSIGNOR TO MESTA MACHINE COMPANY, OF HOMESTEAD, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BLOWING-ENGINE VALVE.

No. 894,381.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed March 3, 1906. Serial No. 304,007.

To all whom it may concern:

Be it known that I, HUGO HAMKENS, of Homestead, Allegheny county, Pennsylvania, have invented a new and useful Blowing-Engine Valve, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a horizontal section on the line I—I of Fig. 2; Fig. 2 is a side elevation of the blowing engine cylinder; Fig. 3 is a section on the line III—III of Fig. 2; Fig. 4 is a plan view of the cylinder head and valves; and Figs. 5 and 6 are detail views showing an adjustable roller to vary the point of positive opening.

My invention relates to the valves of blowing engines or compressors, and more particularly to the outlet valves, though the invention in some features may be applied to any pneumatic control valve actuated by pressure.

In blowing engines and compressors, the inlet valves may be, and usually are, operated at fixed points in the travel of the piston. The outlet valves, on the contrary, should be opened at times bearing a certain relation to the pressure. For this reason, air cylinders have been connected to the outlet valves, these being operated by pressure, usually taken from the cylinder and operating to move the valve in opening or closing it, or both. It is especially necessary that the outlet valve should be opened automatically in proportion to the pressure rather than at a fixed point, while its point of closing may be fixed in relation to the position of the piston.

Where an automatic pressure device is used to actuate the outlet valve of a blowing engine, serious and costly accidents have occurred by reason of the pressure device failing to actuate the outlet valve. In case the outlet valve is closed, and the piston is moving toward it, if the valve is not opened some part must of course give way under the pressure of the air pocketed ahead of the rapidly moving piston. This is especially the case at high speeds where the snifting valves are unable to take care of the pressure. If, on the other hand, the outlet valve is not closed at the proper time, the inlet valve at the same end will open and the air under pressure will flow back from the reservoir and out through the inlet valve.

My invention is designed to overcome these difficulties and provide for automatically

actuating a blowing engine valve while at the same time positively insuring the movement of the valve in case the pressure device fails to operate it.

To this end, the invention consists in combining with a pressure device for actuating the valve, a positive mechanical connection which will move the valve at a fixed point in the travel of the piston. When applied to the inlet valve, this positive connection will preferably move the valve after the time when it would have been opened by the automatic pressure device if operating properly.

Referring now to the form of the drawings, I show the invention applied to a horizontal blowing engine having the valves in its heads. The inlet valve 2 is arranged in each head on one side of the line of the piston rod 3, while the outlet valve 4 is similarly arranged on the other side of the piston rod. The heads are arranged as gratings beneath these valves in the usual manner, and the valves may move between suitable upper and lower guides in their reciprocating movements. The outlet valve is preferably provided with a backing 5 which allows a slight play of the valve between its seal and this backing, which is preferably adjustably supported through the cap 6 of the wind-box. Each outlet valve is provided at one end with a piston rod 7 extending through a stuffing box in the wind-box, and secured to the piston 8 of a single-acting pneumatic cylinder 9. This cylinder receives air at one end through the pipe 10 which is tapped into the side of a cylinder, and is preferably provided with an adjustable check-valve 11 to regulate the back flow from the cylinder 9 after the main piston 12 has reached the end of its stroke and passed the port of the pipe 10.

The parts above described are old in the art, and possess the disadvantage above mentioned; namely, that if for any reason the pneumatic cylinder does not open the outlet valve, an accident occurs. My improvement consists in adding to this valve a positive connection which will mechanically open the valve in case it has not been opened at the proper time by the pressure device consisting of the pneumatic cylinder. For this mechanical connection I preferably employ a rod 13 extending from the opposite end of the outlet valve and through a packing box 14 in the end wall of the wind-box. This rod is pivot-

ally connected at its outer end with a bell-crank lever 14', one arm of which is provided with a roller 15 while the other arm is provided with a roller 16. These rollers are arranged to be alternately in the path of the cam 17 on a reciprocating slide 18 which thus acts to positively close the outlet valve.

In the operation of the engine, as the piston starts from the end of its stroke and begins to move toward one of the heads, the valves in such head are closed and the pressure rises. When the pressure in front of the piston reaches the wind-box pressure, it will have slightly forced back the outlet valve so that the pressure in the pneumatic cylinder 9 will open such valve. If this action takes place in the proper manner, the cam 17 will have passed beyond the roller 16 in its retracted position and will then pass the roller 15 without actuating it, since the valve will have been opened, as shown in Fig. 1. If, on the other hand, the pneumatic cylinder has failed to open the outlet valve, the cam 17 will strike the roller 15 and positively force the valve open. This action will take place at a predetermined point in the stroke of the piston, which is later in the stroke than the point at which the valve should have opened when operated by the pressure device. After the piston passes the port or pipe 10, the air will exhaust back into the main cylinder from the small cylinder 9, and on the return stroke of the piston the cam 15 will have acted upon the roller 16 and thus positively close the outlet valve at a fixed point in the stroke of the piston. It will, therefore, be seen that while I obtain the advantages of automatically opening the outlet valve at a time which is determined by the pressure; at the same time I insure the positive opening of the valve in case the automatic opening should not take place for any reason. The closing of the valve is carried out positively and at a fixed point with the mechanism shown, though the pressure device and positive device may both be employed for closing the valve, if desired.

I have shown the inlet valves 2 as mounted at the inside of the cylinder heads and actuated by rods 19 extending to bell-crank levers 20 having the two arms provided with rollers 21 and 22 actuated by cam 23 on the reciprocating slide 24 actuated from the eccentric or other moving part of the engine.

In order to adapt my system for different pressures to be carried so that the engine may be adjusted to properly operate the valve for higher or lower pressures, I preferably employ adjusting mechanism by which the point in the travel of the piston at which the valve is positively opened may be varied. This may be done either by making the cam adjustable on the rod or by adjusting the roller on the lever connected to the valve.

In Figs. 5 and 6 I show the latter and preferred form. In this case the roller 15' is mounted on a slide 25. The lever arm 14' may consist of two parallel arm portions while the slide 25 is provided with recesses receiving these two portions of the arm as shown in Fig. 5. The slide may be adjusted by a screw 26, having a screw-threaded portion engaging a screw-threaded hole in the slide-block. This screw 26 is shown as extending through an end bar 27 on the lever arm and having a squared head 28 to turn and adjust it.

In order to clamp the slide in its adjusted position, I may provide the top cross-bar 29 having the screws 30, which engage screw-threaded holes in the three parts of the slide-block. By loosening the screws 30 and then turning the head 28 of the screw 26, the roller 15' may be adjusted to any desired position in the length of the arm. It will then be clamped by turning down the screws 30.

The advantages of my invention will be apparent to those skilled in the art, since the advantages of automatic pressure actuating of the valve are obtained while the dangers of such systems are done away with. Another advantage results from connecting opposite ends of the valve to actuating devices, thereby making a symmetrical construction and simplifying the actuating connections.

The rods 13 being of substantially equal diameter, effect a perfectly steady and balanced action of the valves, which is of great importance in their practical operation.

The double-actuating feature may be applied to any blowing engine or compressor valves,—and by the words "blowing engine" in my claims I intend to cover any compressor irrespective of size or construction.

Many other changes may be made in the form and arrangement of the valves and actuating devices both as to the positive actuating and the pressure actuating, without departing from my invention.

I claim:—

1. In a blowing engine valve, a fluid pressure device arranged to automatically move the valve in one direction, and a mechanical connection for said valve arranged to positively move it in the same direction; substantially as described.

2. In a blowing engine, an outlet valve, a pneumatic cylinder arranged to move the valve in at least one direction, and a mechanical connection arranged to move the valve in the same direction at a fixed point in the stroke of the piston; substantially as described.

3. In a blowing engine, a gridiron valve, a pneumatic cylinder connected to the main cylinder and arranged to open said valve, and a mechanical connection arranged to positively open the valve when it is not actu-

ated by the pneumatic cylinder; substantially as described.

4. In a blowing engine, inlet and outlet valves, mechanical connections arranged to positively move both of said valves, and a fluid pressure device arranged to open the outlet valve; substantially as described.

5. In a blowing engine, inlet and outlet valves, mechanical connections arranged to positively move both of said valves, and a fluid pressure device arranged to open the outlet valve, said pressure device being connected to the main cylinder to receive its pressure therefrom; substantially as described.

6. In a blowing engine, a reciprocating element having connections arranged to positively open and close the inlet valves, another reciprocating element having connections arranged to positively open and close the outlet valve, and fluid pressure devices arranged to positively open the outlet valves at times determined by the pressure in the cylinder; substantially as described.

7. In a blowing engine valve, a fluid pressure actuating device having positive connection therewith, and a mechanical actuating device arranged to bear upon a portion of the valve or its parts and move the valve in the same direction as it is moved by the pressure device whenever the pressure device fails to actuate the valve; substantially as described.

8. In a blowing engine valve, a fluid pressure actuating device having positive connection therewith, and a mechanical actuating device having a cam arranged to bear upon a portion of the valve or its parts and move the valve in the same direction as it is moved by the pressure device whenever the pressure device fails to actuate the valve; substantially as described.

9. In a blowing engine valve, a fluid pressure device having actuating connections therewith, a mechanical actuating device arranged to bear upon a portion of the valve or its parts and moving the valve in the same direction as it is moved by the pressure device, and an adjusting device arranged to vary the point of opening said valve; substantially as described.

10. In a blowing engine valve, a fluid pressure device arranged to automatically move the valve in one direction, a mechanical connection for said valve arranged to positively move it in the same direction, and adjusting mechanism for changing the point at which the valve is positively moved; substantially as described.

In testimony whereof, I have hereunto set my hand.

HUGO HAMKENS.

Witnesses:

C. P. BYRNES,
H. M. CORWIN.