966,469.

G. B. PETSCHE.

BLOWING ENGINE.

APPLICATION FILED FEB. 25, 1907.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

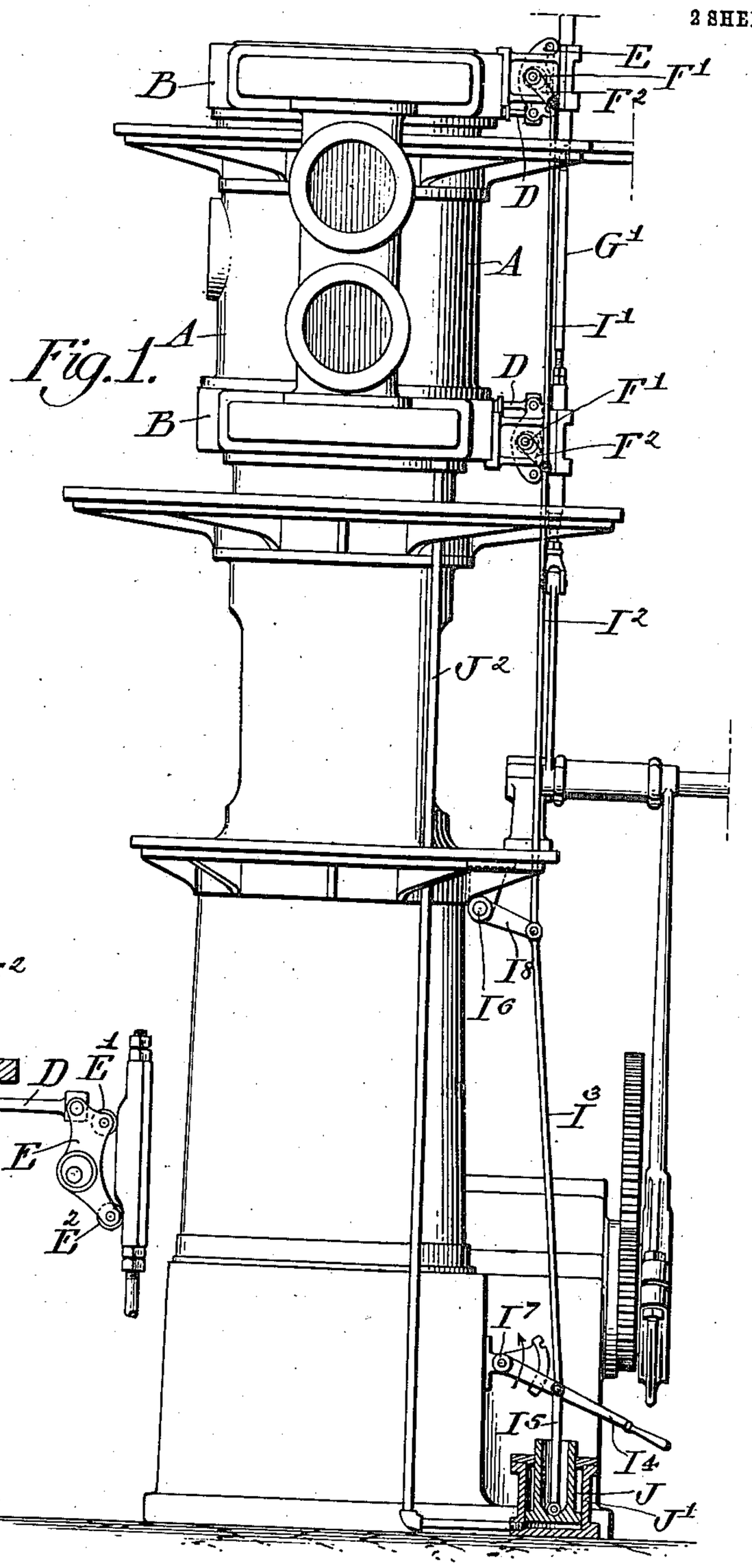
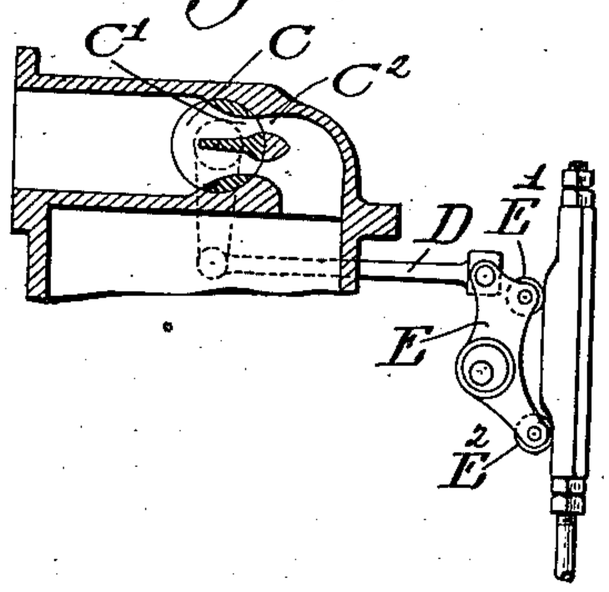


Fig. 2.



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2 SHEETS—SHEET 2.

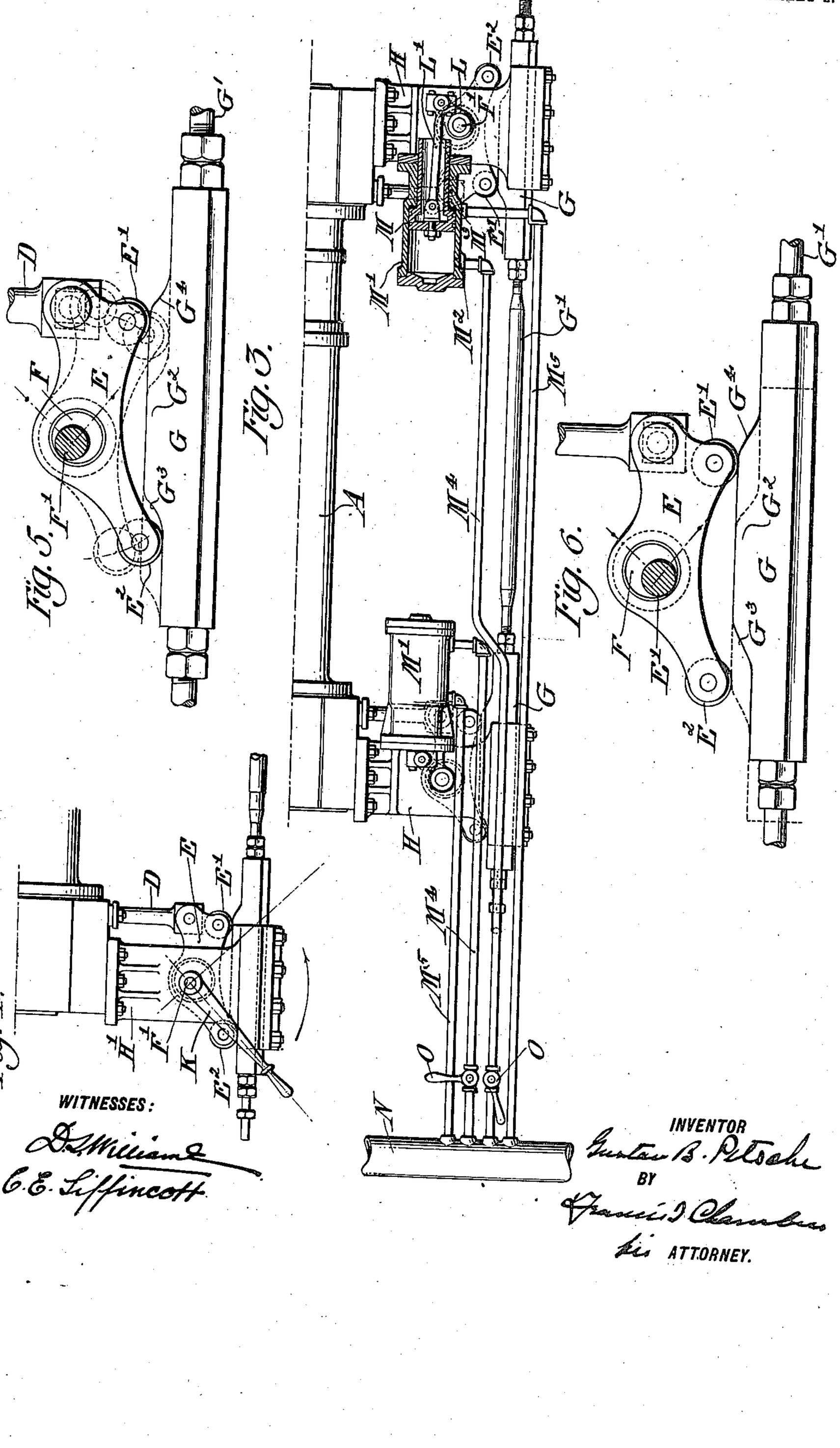

Fig. 3.

Fig. 5.

Fig. 6.

Fig. 4.

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BLOWING-ENGINE.

966,469. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed February 25, 1907. Serial No. 359,290.

To all whom it may concern:

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

My present invention relates to blowing engines or compressors and has for its object the provision of simple and effective means for opening the compressing chambers or cylinders to the atmosphere whenever desirable as in starting, to reduce the load on the driving engine in bringing the compressor up to speed, or when the conditions of service make it undesirable or unnecessary to carry out compression in the compressing chambers or cylinders while the engine is operating at the regular speed.

In the particular forms in which I have herein shown my invention as embodied, I have provided means whereby the regular admission valves controlling the admission to the compressing chambers of the air or gas compressed, and which are alternately open and closed in normal operation can be maintained in the open position when desired in a simple manner and with but slight changes in the valve gear for operating the valves.

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, and the advantages possessed by it, reference may be had to the accompanying drawings and descriptive matter in which I have illustrated and described various forms in which my invention may be carried out.

Of the drawings Figure 1 is an elevation of a blowing engine or compressor with many parts not closely relating to my invention omitted or shown in outline only. Fig. 2 is a sectional elevation showing one form of admission valve and operating mechanism which may be employed. Fig. 3 is an elevation partly in section, taken similar to Fig. 1 but showing only a portion of the blowing engine and an arrangement of the valve operating mechanism different from that of Fig. 1. Fig. 4 is an elevation showing a third form of valve operating mechanism. Fig. 5 is a large scale view of the valve operating lever and cam which may be employed with the constructions shown in Figs. 1, 2, 3, and 4, and Fig. 6 is a view similar to Fig. 5 but showing the parts in a different relation.

The blowing engine shown in Fig. 1 is of a well-known type, such for instance as is shown and described in my Patent 784,122, granted March 7, 1905. In this figure A represents the double acting compressing cylinder having receivers G, G at its upper and lower ends and also admission and delivery valves at each end. These valves (not shown) are preferably of the grid-iron type shown in my prior patent, though they may be of the rotary type shown in Fig. 2 where the valve body C has ports C^1 moved into and out of register with the ports C^2 of the valve casing. The valve rods D for moving the admission valves back and forth to open and close the admission ports extend transversely to the axis of the compressing cylinder and are each connected to one end of a corresponding rock lever E. Each rock lever carries at the end adjacent the connection to the valve rod, a roll E^1 and at its other end a similar roll, E^2. In all the forms of my invention shown each rock lever E is pivoted on an eccentric disk or portion of the corresponding rock shaft F^1.

In regular operation the disk F is so located that the corresponding rock lever is rocked to move the valve rod D in and out, and open and close the admission valve connected to it through the instrumentality of a cam block or member G, carried by a reciprocating rod G^1. The cam G has a raised portion G^2 of a length somewhat less than the distance between the centers of the rolls E^1 and E^2. This raised portion terminates at one end in an inclined portion G^3 adapted, when the block is moved in one direction to engage the roll E^2 and swing the rock lever E in one direction until the roll rides on the side of the cam thereby closing the valve. Similarly the other end of the cam has an inclined surface G^4 which when the block G is moved in the opposite direction engages the roll D^1 and swings the lever in the opposite direction and opens the valve.

In Fig. 5 the position of the parts when the valve connected to the rod D is open is

shown in full lines, and the dotted lines show the position of the parts when the valve is closed. By rotating the shaft F^1 from the position shown in Fig. 5 to that shown in Fig. 6 the rock lever is moved away from the line of movement of the cam G so that while the roll E^1 may be engaged by the cam to move the valve to the open position, both ends of the rock lever will thereafter clear the cam block.

Each shaft F may be mounted in a bracket H connected to the compressing cylinder and having bearings for the cam blocks G. The rods G^1 for reciprocating the cam blocks G are connected in any suitable manner to, and move in a predetermined relation with the compressing piston.

Various means, both manual and automatic may be employed for rotating the rock shafts F^1 to bring the levers E into and out of the position in which they are rocked by the cam blocks G. In the construction shown in Fig. 1, crank arms F^2, connected to the rock shafts, are connected by links I^1, I^2, I^3 to a lever I^4 and the latter is connected by a link I^5 to a piston J moving on a cylinder J^1. The lower end of the cylinder J^1 beneath the piston J is connected by a conduit J^2 to one of the receivers B of the compressor so that the pressure in the receiver is transmitted to the cylinder J^1 below the piston J. The arm I^5 pivoted to the links I^2 and I^3 and to the frame work in the machine at I^6, is employed simply for the purpose of preserving the alinement of the parts. The lever I^4 is pivoted to the frame work of the machine at I^7. The operation of this form of my invention is as follows:

When as in starting, it is desired to maintain the admission valves open regardless of the receiver pressure, the lever I^4 is manually turned about its pivotal axis I^7 in the direction indicated by the arrow, thus rotating the rock shafts F^1 to carry the rock levers E from the position shown in Fig. 5 to the position shown in Fig. 6. When it is desired to thereafter commence compressing, the lever I^4 is returned to its initial position and the admission valves are then alternately opened and closed. When in operation the receiver pressure equals a pre-determined maximum the shafts F^1 are automatically rotated to the position in which the admission valves are held open through the action of the receiver pressure on the piston J, the parts being so adjusted that at the pre-determined maximum of receiver pressure the pressure in the cylinder J^1 is sufficient to overcome the weight of the piston and parts connected to it and move them upward.

In the arrangement shown in Fig. 4 each rock shaft F^1 is independently rotatable by means of a hand-lever K connected to it. In this arrangement which is purely manual, the mechanism is, of course, extremely simple. Moreover it permits each admission valve to be independently controlled.

In the construction shown in Fig. 3 each rock shaft F^1 has connected to it a crank arm L connected by a link L^1 to a differential piston M reciprocating in a cylinder M^1 secured to the corresponding bracket H. Ports M^2 and M^3 leading from the opposite ends of each cylinder M^1 are connected to a source of compressed air such as the pipe N by conduits or pipes M^4 and M^5, respectively. As shown the pipes M lead from the ends of the cylinders toward which the large area ends of the differential pistons face and toward which the pistons move to carry the rock levers from the position shown in Fig. 6 to the position shown in Fig. 5. The connection between each conduit M^4 and the supply pipe N is controlled by a three way valve, O, operated manually or automatically as by the arrangement shown in Fig. 1. When the valves O are turned to connect the pipes M^4 to the pipe N the pressure acting on the large area end of the pistons M overbalancing the constantly acting pressure on the smaller ends of the pistons moves the rock levers so that the admission valves are held open. When the valves O are turned to close communication between the pipe N and the conduits M^4 and to connect the latter to exhaust, the pressure acting on the small area ends of the pistons moves the pistons to carry the rock levers into the position in which the admission valves are alternately opened and closed. In Fig. 3 the pipe M^4 in communication with the right hand cylinder M^1 is open to the pipe N and the corresponding rock lever F has both ends clear of the ends of the cam G, while the left hand rock lever is in the regular working position.

The arrangement shown in Fig. 3 forms a simple and effective one for rotating the shafts F^1 by power, an important feature in large engines where the valves and operating mechanism therefor are quite massive.

While my present invention is of general utility regardless of the character of engine employed to drive the blowing engine, it is particularly useful where the driving engine is a gas engine or the like as it is difficult to start such an engine under load or to operate at over loads such as occur when the receiver pressure is unduly high.

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

1. In a blowing engine or compressor, a member moving in a definite relation to the speed of the blowing engine, a valve actuating rock lever pivotally supported between its ends and means for adjusting the pivotal support of the lever to carry the lever from

one position in which said member alternately engages the two ends of the lever to open and close the valve controlled by it to another position in which both ends of the lever may clear said member.

2. In a blowing engine or compressor, a member moving in a definite relation to the speed of the engine, a valve actuating rock lever, a support pivotally supporting said rock lever between its ends, said support being angularly adjustable about a center laterally displaced from the pivotal axis of the rock lever to carry the lever from one position in which the member alternately engages the two ends of the lever to open and close the valve controlled by it to another position in which both ends of the lever may clear the member, and means for so adjusting said support.

3. In a blowing engine or compressor, a member moving in a pre-determined relation to the speed of the blowing engine, a valve actuating rock lever, an angularly adjustable shaft having an eccentric portion, said rock lever being journaled on said eccentric portion, and means for angularly adjusting said shaft to carry said rock lever from one position in which the member alternately engages the two ends of the lever to open and close the valve controlled by it to another position in which both ends of the lever may clear the member.

4. In a blowing engine or compressor, the combination with a valve therefor, of a cam moving in a predetermined relation to the speed of the engine, a rock lever connected to the valve to actuate the latter and movable from one position adjacent the path of movement of the cam, in which the latter engages the rock lever and rocks it to thereby actuate the valve, into another position in which the cam movements do not affect the rock lever, and an adjusting device for shifting the rock lever from one position into the other.

5. In a blowing engine or compressor, a member moving in definite relation to the speed of the engine, an admission valve actuating rock lever pivotally supported between its ends, and means actuated manually at will and automatically upon a predetermined variation in the receiver pressure for adjusting the pivotal support of the lever to carry the lever from one position in which said member alternately engages the ends of the lever to open and close the valve controlled by it to another position in which both ends of the lever may clear said support.

6. In a blowing engine or compressor, a member moving in definite relation to the speed of the blowing engine, an admission valve actuating rock lever pivotally supported between its ends, and means responsive to the receiver pressure for adjusting the pivotal support of the lever to carry the lever from one position in which said member alternately engages the two ends of the lever to open and close the valve controlled by it to another position in which both ends of the lever may clear said member upon a predetermined variation in the receiver pressure.

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