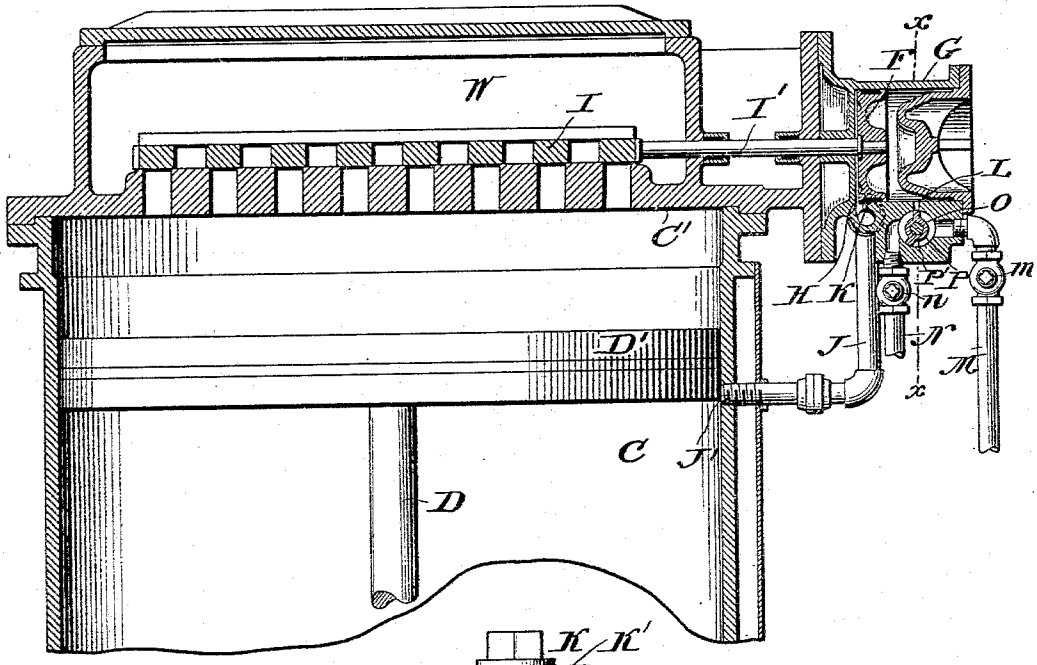
(No Model.)

W. E. GOOD.

BLOWING ENGINE OR COMPRESSOR.

No. 532,051. Patented Jan. 8, 1895.

Fig. 1.



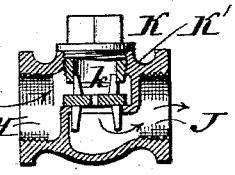
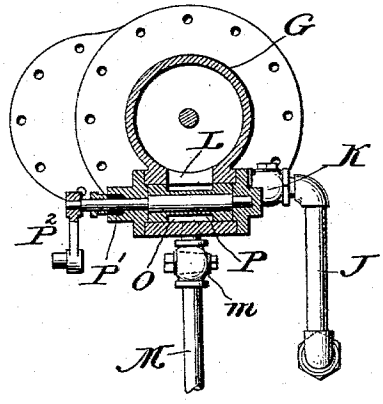


Fig. 3.

Fig. 2.



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WILLIAM E. GOOD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE SOUTHWARK FOUNDRY AND MACHINE COMPANY, OF SAME PLACE.

BLOWING-ENGINE OR COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 532,051, dated January 8, 1895.

Application filed May 15, 1893. Serial No. 474,198. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. GOOD, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Blowing-Engines or Compressors, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of the specification.

My invention relates to blowing engines or compressors and particularly to the mechanism for actuating the delivery valves of such engines; my object being to provide a simple and efficient valve actuating mechanism which will cause the valve to move at proper times to permit the passage of the air or other gas into the engine receiver.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a plan view of the upper part of the compressing cylinder or tub taken on a section extending through the delivery valve and through the auxiliary cylinder forming a part of the valve actuating mechanism. Fig. 2 is a view of the auxiliary cylinder and its connections taken on the line x—x of Fig. 1, and Fig. 3 is a longitudinal section through a check valve which forms a part of the structure.

C indicates the tub; D, the piston rod, and D the piston moving in said tub.

C indicates the head of the tub in which, as shown, is formed a slotted valve seat upon which rests the delivery valve I, said valve resting upon the outside of the tub head and lying within a branch of the receiver indicated at W; the spindle of the delivery valve being indicated at I.

The valve actuating mechanism consists of an auxiliary cylinder G having in it a piston F which is operatively connected with the delivery valve. In the design shown it is attached directly to the spindle I′. The cylinder G is provided with two ports H and L, the port H connecting through a conduit J with the inside of the tub and at a point J′ near the end of the tub but inside of the extreme position occupied by the compressing piston. The port H is placed at that end of the cylinder away from which the piston must move to open the delivery valve, and it is obvious that as the piston D′ moves toward the delivery valve the air compressed in front of it will flow through the conduit J into the cylinder G and when the pressure in said cylinder attains a determined amount will force the piston to the opposite end of the auxiliary cylinder and open the delivery valve, and I may here note, as an important factor, that the resistance of the delivery valve is largely governed by the pressure by which it is held clamped to its seat, viz: the pressure in the receiver as compared with the pressure in the tub, and it is obvious that as the pressure in the tub increases the force clamping the valve to its seat is counterbalanced and entirely disappears when the pressure in the tub and receiver become equal, at or about which point the valve should open. I also employ in addition to the pressure from the tub acting upon the auxiliary piston to open the valve, a force preferably applied in an intermittent manner and acting to close the delivery valve, this force being so regulated in amount or time of application as to close the valve after the pressure upon the piston which tends to open it is released, and this release of pressure occurs, as will be seen, when the piston D′ has passed above the point J′ where the conduit J opens into the tub.

It is obvious that the release of pressure would be practically instantaneous if the conduit J were sufficiently large to permit the free escape of the compressed air in the auxiliary cylinder, but it is preferable that the motion of the valve to seat itself should be checked and for this purpose I place in the conduit J a check valve K arranged to open freely to admit air to the auxiliary cylinder, but to close and contract without closing the conduit when the air is flowing from the auxiliary cylinder. Thus in the construction shown in detail in Fig. 3, the check valve proper, indicated at K′, is formed with a perforation k.

It is obvious that when air is passing from J to H the valve will open and permit its free passage, but when the direction of the air is reversed and it passes from H to J as indi-

cated by the arrows in Fig. 3 the valve will close and the air will only escape through the contracted orifice *k*. This device prevents the too rapid closing of the delivery valve and especially the destructive jars which would occur if its motion in closing was unchecked.

Preferably I employ to close the valve, steam or air under pressure acting upon the opposite side of the piston F to that upon which the air from the tub acts. Thus in the construction shown the port L connects with a valve chamber O which in turn connects both with a pipe M leading from a source of steam or other fluid under pressure and with an exhaust passage N; *m* and *n* indicating cocks in the pipes M and N.

P indicates a rotary valve situated in the valve chamber O and arranged to connect alternately the port L with the conduit M and the exhaust N. As shown in Fig. 2 the valve P is secured to a spindle P′ upon which is secured a lever arm P^2 and which in turn may be connected with any convenient valve actuating mechanism, which preferably should be operated by a constantly moving part of the blowing engine. It is obvious of course, that when the valve P is turned to connect the port L and the exhaust that there will be nothing to resist the action of the compressed air entering through the port H and acting through the piston F to open the delivery valve. It is also obvious that when the valve P is turned to connect the port L with the steam pipe M the pressure entering through said pipe will force the piston in the direction to close the delivery valve when the pressure on the other side of the piston is released, or less in amount than the steam pressure. Clearly also by proper manipulation of the valve P the respective forces acting upon the piston and through it upon the delivery valve can be made to balance each other to any desired degree.

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 the combination with the tub and a delivery valve seated thereon, of a cylinder G, a piston F moving in said cylinder and operatively connected with the delivery valve, a conduit J leading to cylinder G from a point in the tub near the end thereof but inside of the extreme travel of the compressing piston, said conduit entering cylinder G at a point where the air entering through it will act to move the piston in the direction to open the delivery valve, a valve K situated in the conduit J and arranged to open freely to admit air to cylinder G but to close and contract the conduit when air is escaping through it from the said cylinder, and means applied intermittently and acting intermittently upon the delivery valve when the air pressure in the cylinder G is diminished to close said valve.

2. In a blowing engine or compressor the combination with the tub and a delivery valve seated thereon, of a cylinder G, a piston F moving in said cylinder and operatively connected with the delivery valve, a conduit J leading to cylinder G from a point in the tub near the end thereof but inside of the extreme travel of the compressing piston, said conduit entering cylinder G at a point where the air entering through it will act to move the piston in the direction to open the delivery valve, a valve K situated in the conduit J and arranged to open freely to admit air to cylinder G but to close and contract the conduit when air is escaping through it from the said cylinder, a port L entering the cylinder G on the side opposite to that where conduit J enters, a valve chamber O connected with said port, a conduit M leading to said valve chamber from a source of fluid under pressure, an exhaust passage N also connected with said chamber, a valve P arranged to connect the port L alternately with conduit M and the exhaust and means for actuating said valve.

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