T. Critchlow.

Rotary Blower.

No. 85,510. Patented Jan. 5, 1869.

Fig. 3.

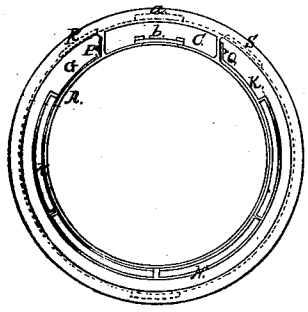


Fig. 1.

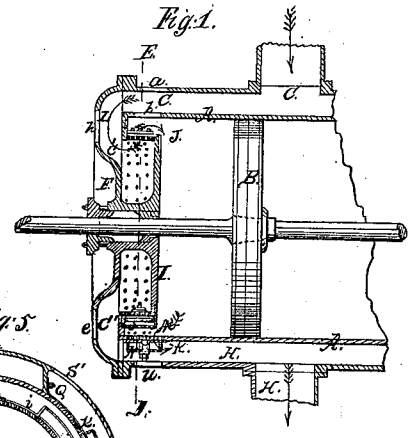


Fig. 5.

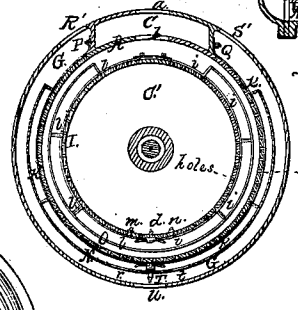


Fig. 4.

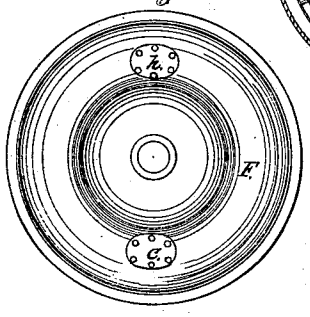


Fig. 2.

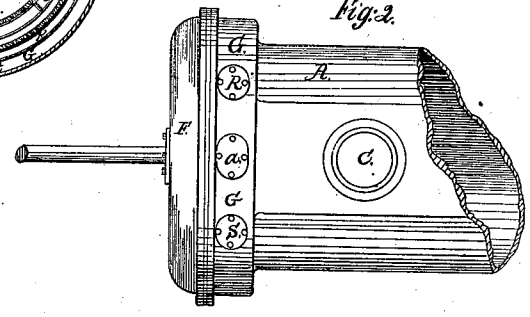
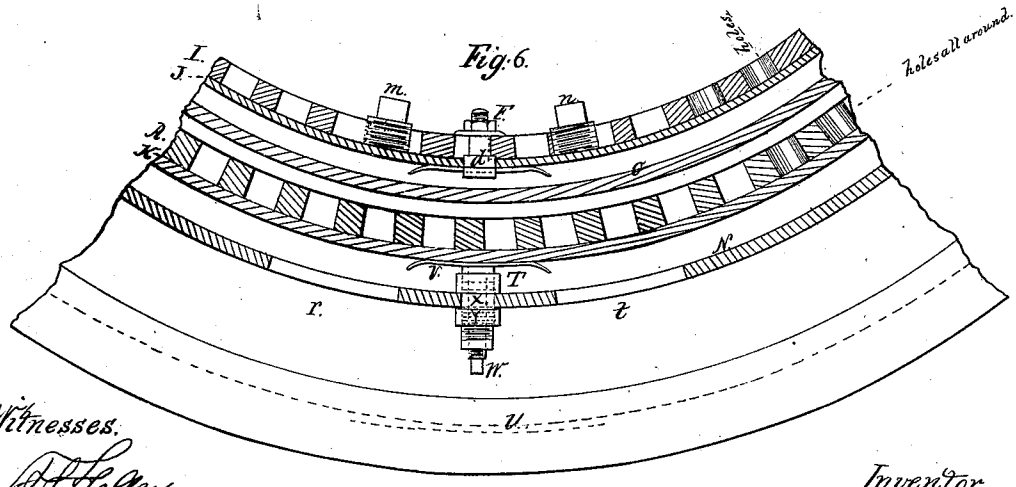


Fig. 6.



Witnesses.

A. D. Holley

H. S. Nourse

Inventor.

Thos Critchlow

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

United States Patent Office.

THOMAS CRITCHLOW, OF SWATARA TOWNSHIP, PENNSYLVANIA.

Letters Patent No. 85,510, *dated January* 5, 1869.

IMPROVEMENT IN MEANS FOR REPAIRING BLOWING-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, THOMAS CRITCHLOW, of Swatara township, county of Dauphin, and State of Pennsylvania, have invented certain new and useful Means for Repairing Blowing-Engines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

In that class of high-pressure blowing-engines, such, for instance, as the engines generally used for the Bessemer process, where the valves are made of bands of India rubber, covering small holes in the air-chambers, so as to work without slamming, the valves are subject to rapid wear and deterioration, by reason of the high air-pressure, and the heat of the air at this pressure. In order to keep the engine in good working-condition, it is therefore necessary to frequently remove the valves for repairs, and to insert new and repaired valves.

In blowing twenty-five pounds air-pressure to a pair of five-ton Bessemer converters, it is necessary to get at one or more of the valves every few days. The means heretofore employed for getting at the valves has been the removal of the heads of the blowing-cylinders, which is a comparatively long and costly operation, and, with some kinds of engines, occupies so much time as to seriously delay the operation of the works.

My improvement consists in means and apparatus for rapidly getting at and changing the valves in this class of engines, without removing the cylinder-heads.

To enable others to put these improvements into use, I will describe one form of my apparatus, reference being had to the annexed drawings, which form a part of this specification, and wherein the same letters refer to like parts.

Figure 1 is a longitudinal vertical section of a part of a blowing-cylinder of the kind described, and

Figure 2 is a plan of the same, in which—

A is the shell of the cylinder proper, in which the piston B is moved by steam or any suitable power applied to the piston-rod;

C is the induction-air passage;

C′, the induction-air chamber, covered by the outer cylinder-head F;

G, the eduction-air chamber, extending around the cylinder;

H, the eduction-air passage; and

I, the inner head of the cylinder.

The construction is further shown by Figure 3, which is an elevation of the cylinder, with the outer and inner heads removed, and by Figure 5, which is a vertical section (on the line D E, fig. 1,) through the air-passage C, the cylinder-shell A, and the inner head I.

Figure 4 is an exterior elevation of the outer head F.

The cylindrical part of the inner head I is perforated with small holes, to let the air from the induction-chamber C′ into the cylinder.

These holes are covered with an India-rubber band, J, which forms the induction-valve.

The end of the shell A of the cylinder is also perforated with small holes, to let the air out of the cylinder into the eduction-chamber and passage, and these holes are covered with a band of India rubber, K, forming the eduction-valve.

These valves and perforations are shown by Figure 6, which is an enlarged section of a part of fig. 5.

When the piston B retreats from the head, fig. 1, the air enters into the vacuum thus formed in the cylinder by lifting the induction-valve J, as shown by the arrow L. When the piston approaches the head, the air closes the valve J, lifts the eduction-valve K, and is forced into the passage H, as shown by the arrow M. The guards N and O prevent the valves from opening or stretching too far.

In order, heretofore, to get at and change the valves, the heads F and I have been removed. I get at, remove, and replace the valves in the following manner:

First, to remove the exterior or eduction-valve K, I open the hand-holes R′ S′, by removing the hand-hole plates R S, fig. 2, (which are fastened by screw-bolts, or in any suitable manner,) provided for that purpose, immediately over the two ends of the India-rubber band or valve.

I then remove the screws P Q, which fasten the ends of the valve to the shell of the cylinder, secure a string to one end of the valve, for instance, to the end P, and pull out the valve by taking hold of the end Q. The said string will then be pulled around to the position previously occupied by the valve. I then detach the string from the old valve, and attach it to one end of a new valve. I then pull out the string, which pulls the new valve into its place, where I then fasten it by the screws P Q. The hand-hole plates are then replaced.

I prefer to fasten the valve to the shell of the cylinder at the bottom also, and, in order to do this by means which may be quickly adjusted, I provide a screw-clamp, T, fig. 6, which consists, by preference, of a socket, X, secured by a nut, Y, to the guard N, and a screw, W, working through the socket, and raising or lowering the plate V, which thus is pressed against the valve K, to fasten it, or moved away from the valve, to loosen it.

When I wish to remove the valve, I loosen the screw W by working through the hand-hole U, for that purpose provided, and then proceed as above described.

Secondly, to remove the interior or induction-valve J, I open the hand-holes *a b*, fig. 1, for that purpose provided, immediately over the two ends of the valve, and also the hand-hole *h*, and, working through these holes, I remove the old valve, and insert the new one by means of a string, in the manner previously described for removing and replacing the valve K.

I also prefer to fasten the valve J at the bottom,

but as this class of engines is usually so constructed that it is difficult to get at the bottom of the valve, I employ for this purpose a screw-clamp, *d*, fig. 6, secured to the head I, and constructed and operating substantially like the clamp T, except that it pulls the valve to its seat, instead of pushing it to its seat.

By reaching through the hand-hole *e*, figs. 1 and 4, for that purpose provided, I loosen or tighten the bottom of the valve by unscrewing or screwing up the nut *f*, fig. 6.

In case of the breaking of the valve J, or if, from any cause, a string to pull in the new valve cannot be entered, as above described, by pulling out the old valve, I, in such case, put in the new valve as follows: I drop a string, (or, by preference, a leather belt, with a string attached,) through the holes *a b*, fig. 1, down the passage *i i*, fig. 5, and another string down the passage *l l*, fig. 5. By reaching through the hole *e*, fig. 1, and unscrewing the plugs *m n*, figs. 5 and 6, and working through the plug-holes, I get hold of the lower ends of both the said strings, so as to pull them up through one of the plug-holes, when I tie them together. I then have a continuous string lying in place of the valve, by which I can pull in the new valve, as before described.

The hand-holes *r t*, in the guard of the outer valve, answer the same purpose with reference to the valve K as the plug-holes *m n* answer with reference to the valve J, as last above described.

I do not confine myself to the precise methods herein shown for removing and replacing valves. When the proportions and arrangement of blowing-cylinders of this class are changed, the number and position of the hand-holes, clamps, &c., may also be changed, if required for greater convenience of working.

Neither do I confine myself to any particular construction of the clamps, as any mode of making the same, which will render them able to compress the valves, as described, and to be easily adjusted, will answer the purpose.

I desire it to be understood that I do not make any claim herein to the hand-holes, considered by themselves; but the above-described special arrangement of them, in relation to the blowing-cylinders, and their combination therewith in the manner shown, enable new and highly useful results to be accomplished in engines of the class referred to, and I confine myself to the specific arrangements and combinations represented. Neither do I claim the clamps by themselves.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with the cylinder or cylinders of blowing-engines, of one or more hand-holes, adapted to enable the induction-valves of such cylinders to be removed and replaced, as set forth, the whole arranged and operating substantially as described.

2. The combination, with the cylinder or cylinders of blowing-engines, of one or more hand-holes, adapted to enable the eduction-valves of such cylinders to be removed and replaced, as set forth, the whole arranged and operating substantially as described.

3. The combination of a continuous elastic valve, operating upon passages for air, or its equivalent, placed in different parts of a valve-seat, formed in the cylinder-head of a blowing-engine, with an adjustable clamp or compress, adapted to fasten such valve at a point or points intermediate between its ends, substantially as and for the purposes set forth.

THOS. CRITCHLOW.

Witnesses:

F. S. HOLLEY,

A. T. NOURSE.