G. H. REYNOLDS & J. MILLER.

Valve and Box for Air Compressors.

No. 165,120. Patented June 29, 1875.

Fig. 1.

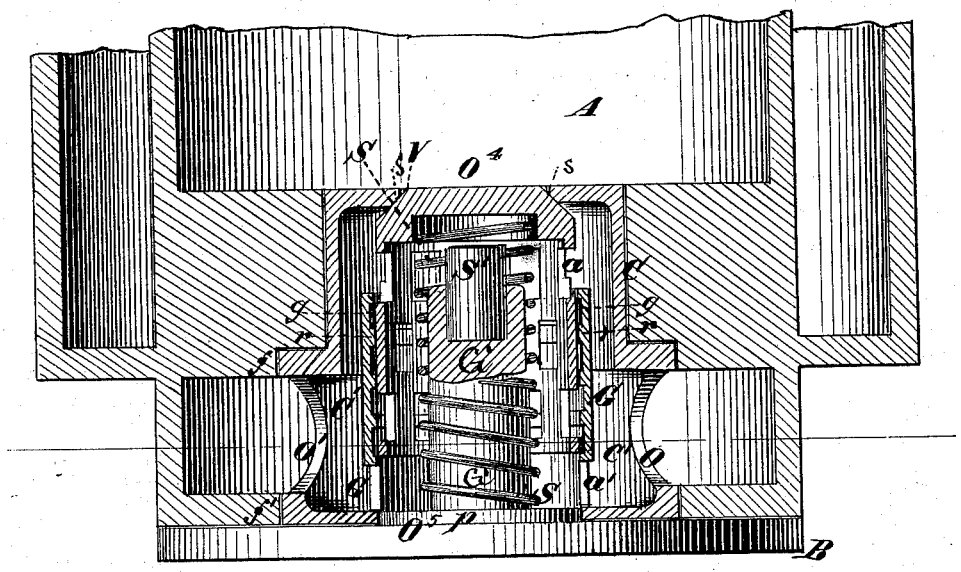
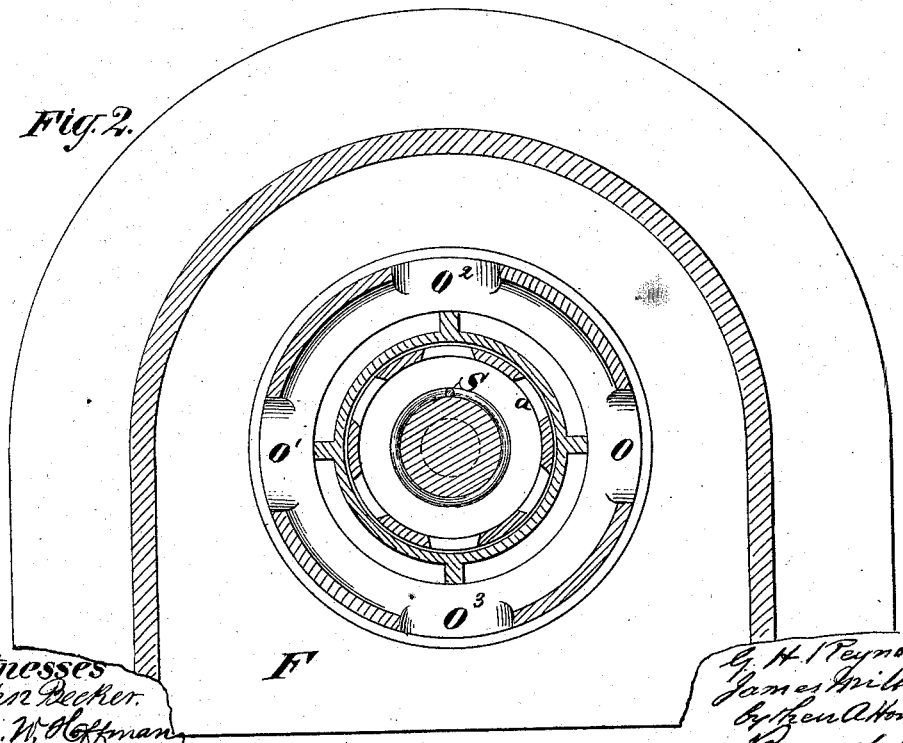


Fig. 2.



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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS AND JAMES MILLER, OF NEW YORK, N. Y., ASSIGNORS OF ONE-HALF THEIR RIGHT TO CORNELIUS H. DELAMATER AND GEORGE H. ROBINSON, OF SAME PLACE.

IMPROVEMENT IN VALVES AND BOXES FOR AIR-COMPRESSORS.

Specification forming part of Letters Patent No. **165,120**, dated June 29, 1875; application filed April 26, 1875.

To all whom it may concern:

Be it known that we, GEORGE H. REYNOLDS and JAMES MILLER, both of the city, county, and State of New York, have invented certain new and useful Improvements in Valves and Valve-Boxes of Air-Compressors; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

Our invention relates to improvements in valves and valve-boxes of air-compressors used for the purpose of converting the power of prime motors into static pressure by the compression of air, the air thus compressed being transmitted through conduits to engines remote from the prime motors, and its expansive force reconverted into power for the purpose of operating machinery.

Our invention consists of a hollow cylindrical valve having scraping openings, in combination with an outer cylindrical seat, constructed with grooves having scraping edges, as will hereinafter more fully appear.

The invention further consists of certain other improvements which will be fully described and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 represents a central vertical section of the lower part or head of an air-compressor cylinder, and of our improved valve and valve-box. Fig. 2 represents a horizontal section made on the plane indicated by the line *x x* in Fig. 1. Similar letters of reference designate corresponding parts in both figures.

A represents the lower part of an air-compressor cylinder, in the lower head of which cylinder our improved valve-box C C′ is inserted. We construct this box all in one piece, as indicated in the drawings. The general form of this valve-box is that of a cylinder, C, superimposed upon a larger cylinder, C′, the cylinder C′ having at its upper and lower parts the flanges *f* and *f′*. Through the sides of the part C are formed the large openings or air-passages O O^1 O^2 O^3. Through the top of the valve-box, which would otherwise be closed, is formed an opening, O^4, which is the air-passage between the cylinder A and the interior of the valve-box C C′. The lower part of the top of the valve-box, which bounds this opening, is beveled off to form a seat, *s s*, for the valve V. Through the bottom of the valve-box, which would otherwise be closed, is formed an opening, O^5, and rising from this opening and forming a part of the valve-box, is a hollow cylinder, G, which is the valve-guide, the valve being, as hereinafter described, so formed that it reciprocates within this hollow cylinder. It is thus seen that we form the valve-box C C′ together with the valve-seat *s s* and the valve-guide G, all in one piece, and that the relations of position toward each other in these parts must always be constant, unless the valve-box should be bent or broken.

In the interior surface of the valve-guide G are formed parallel horizontal grooves *g*, having a rectangular cross-section. The forming of these grooves leaves a series of parallel horizontal ribs, *r*. The angular form of the ribs *r* causes them to have a scraping edge at each of the interior angles, and these edges serve to scrape off from the exterior surface of the valve any dirt or foreign substance that may adhere to the valve, and the dirt thus scraped off enters the grooves *g* in the valve-guide, where it remains until it escapes from these groves through apertures *a* in the valve V, hereinafter to be described. The dirt which thus escapes through the openings *a′* passes into the interior of the valve V, which is cup-shaped, as hereinafter described, and then falls to the bottom of the valve-box, where it finds exit through the apertures *a′*, formed in the lower part of the valve-guide G.

The valve V, which is shown in vertical section in Fig. 1, is cup-shaped—that is, it is a hollow cylinder, with one end thereof closed. The interior diameter of this cylinder is uniform throughout, except at the top, where the diameter is for a short distance diminished, to form a recess for the reception of the upper end of the spring S. The exterior diameter is also uniform for about two-thirds the length of the valve. At the upper third it is slightly diminished, so as to form a slight shoulder or

scraping edge, extending entirely around the valve, which aids in keeping the valve-guide free from dirt. The larger part, which constitutes the lower two-thirds of the valve, fits accurately, but not too tightly, the interior of the valve-guide G, in which the valve, when in action, reciprocates. The top of the valve, where it meets the valve-seat *s s*, is beveled to correspond with the bevel of the valve-seat formed at the top of the valve-box, as heretofore described. The hollow cylindrical part of the valve V is perforated with rectangular apertures *a*, Figs. 1 and 2, the walls of these apertures being slightly beveled from the interior outward, so as to form an acute angle at the outside, or, in other words, to produce scraping edges, which not only remove the dirt from the surface of the valve-guides, but tend to direct toward the interior of the valve such dirt as may pass into these apertures from the grooves *g* of the valve-guide. These apertures are placed around the cylindrical portion of the valve in such a manner that the apertures in any one row do not stand directly above those in the next lower row, or under those in the next upper row, that the scraping edges may act upon all, or nearly all, the interior surface of the valve-guide, to keep it clean and to prevent obstructions. B represents the valve-bonnet, which consists of a flat plate or disk fastened to that portion of the air-cylinder head inclosing the air-passage F. When the bonnet is thus placed in position it forces the upper flange *f* of the lower part of the valve-box C′ into a recess formed in the head of the air-cylinder, in which it is fitted accurately, and the lower flange *f′* of the valve-box then fits into a circular opening in the lower wall of the air-passage F. The valve-bonnet is held to its place by bolts or screws, and in this way, while it closes, it at the same time firmly holds, the valve-box in its position. A great advantage of this arrangement is, that by the removal of the bolts which hold the bonnet to its place the valve-box and the valve, with all its appurtenances, may be at once taken out for cleaning or other purposes. In the middle of the inner side of the bonnet is a circular projection, *p*, or, in other words, a circular disk superimposed upon the bonnet B, and which is a part of the valve-bonnet. This circular projection or disk exactly fits the opening O^5 in the bottom of the valve-box, and closes this opening when the bonnet is placed in its proper position. From the center of the circular projection *p* rises the valve-spring guide G′. This valve-spring guide is a cylindrical post formed with and a part of the valve-bonnet. It serves to keep the valve-spring S in position, and to prevent its buckling. In the top of the valve-spring guide G′ is formed a depression or recess, and in this depression or recess is placed a spring, S′, of gum-elastic, which receives the blow of the under side of the top of the valve on its descent, obviating the disagreeable sound and injurious shock which would otherwise result from the impact of the valve upon the top of the valve-spring guide G′.

The valve-box and its appurtenances are shown in the drawings and herein described as inserted in the bottom head of a vertical cylinder, but they may be inserted at either end of such a cylinder, whether in a horizontal or vertical position.

We claim—

1. The combination of the hollow cylindrical valve V, having the scraping openings, with the outer cylindrical seat G, constructed with grooves *g*, having scraping edges, all substantially as described.

2. The bonnet B having the disk *p*, in combination with the valve-box C C′, having the valve-seat *s* and lower opening O^5, in which the disk *p* fits, the valve-spring guide G′ rising from the said disk C, and provided at its upper end with a spring, S′, and the valve V arranged over said guide, all substantially as and for the purpose described.

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