(No Model.)

J. B. MILLER.

BALANCE VALVE.

No. 281,907. Patented July 24, 1883.

Fig. 1.

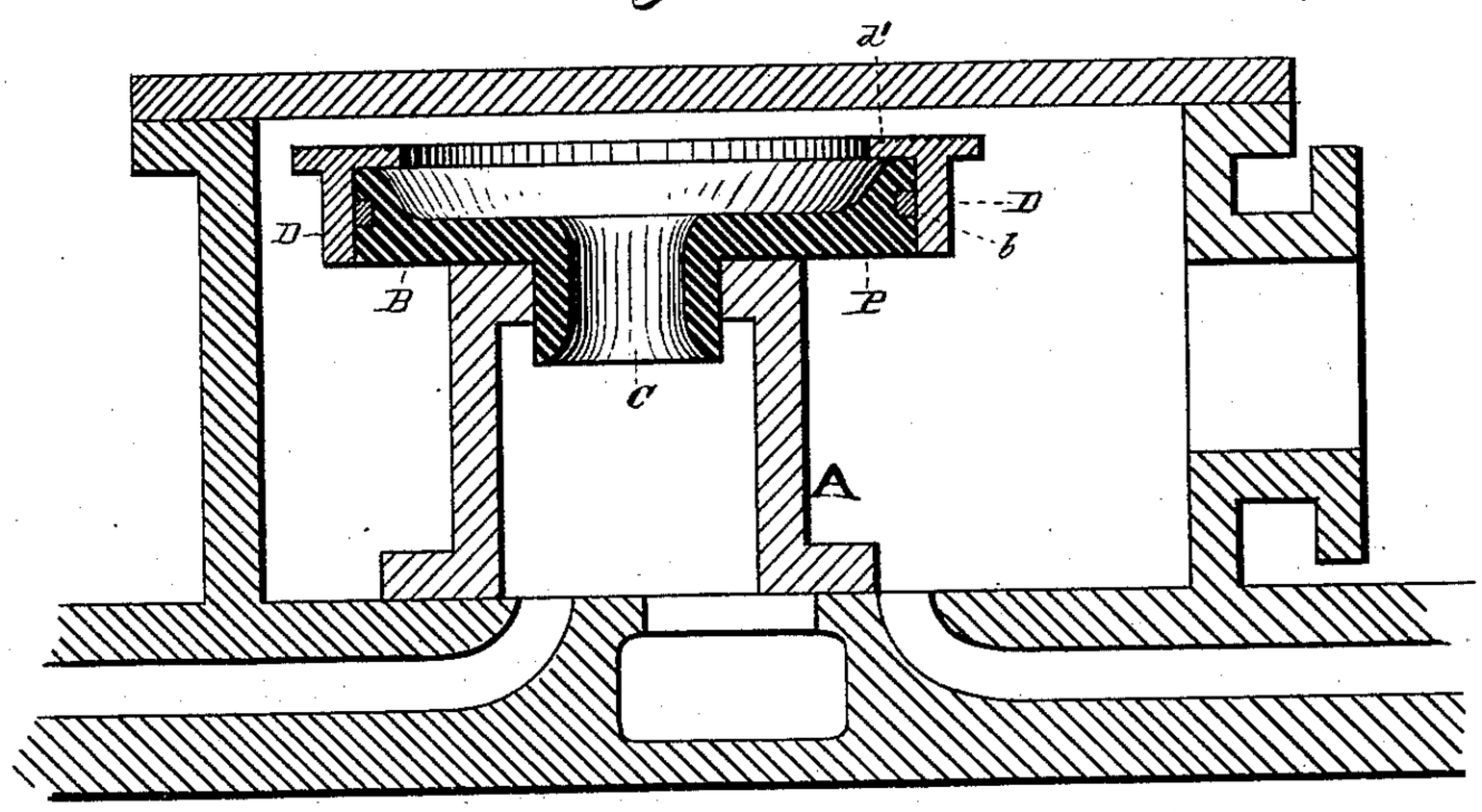


Fig. 2.

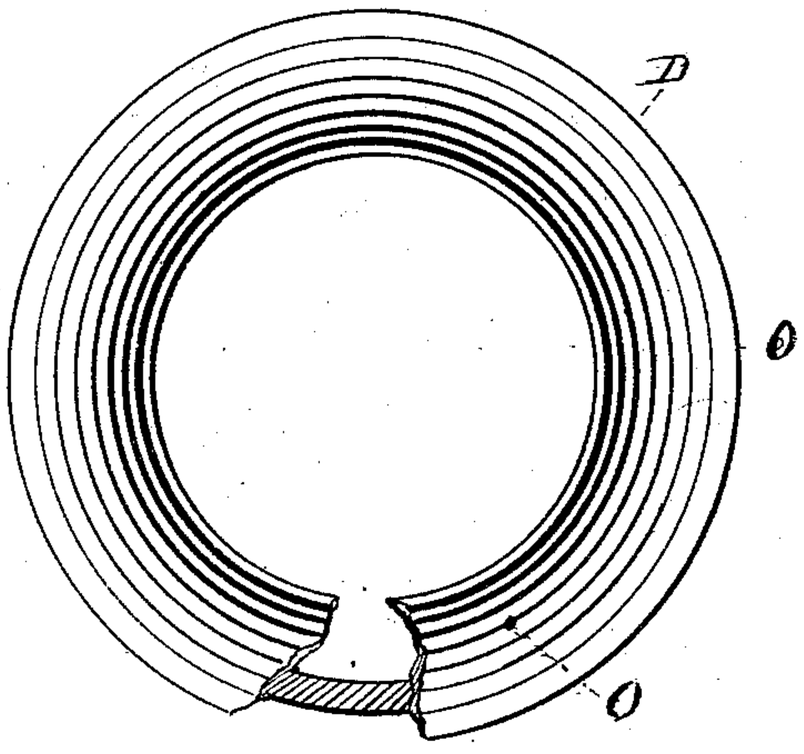
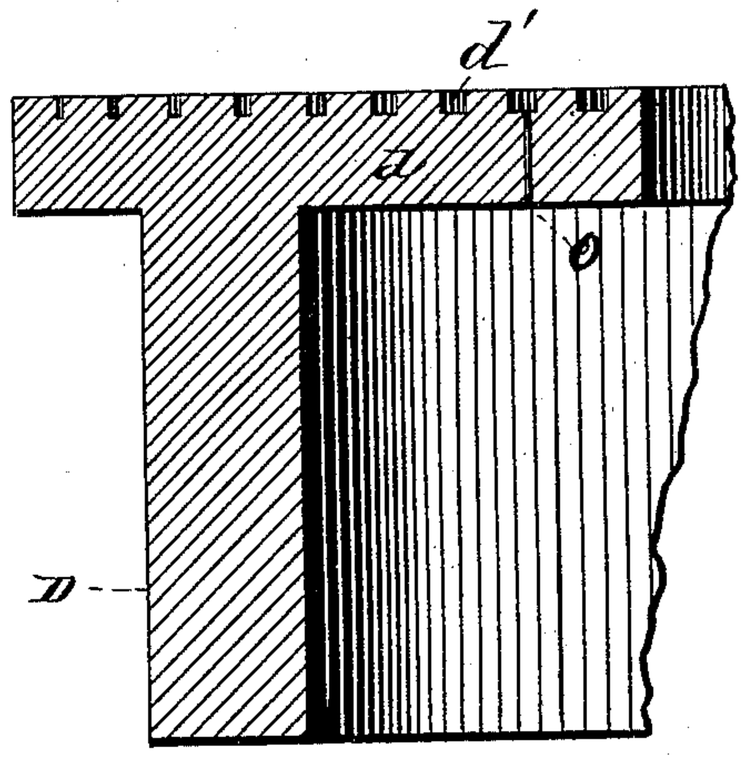


Fig. 3.



WITNESSES

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JAMES B. MILLER, OF KENT, OHIO.

BALANCE-VALVE.

SPECIFICATION forming part of Letters Patent No. 281,907, dated July 24, 1883.

Application filed April 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. MILLER, of Kent, in the county of Portage and State of Ohio, have invented certain new and useful Improvements in Balance-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in balance-valves; and it consists of certain features of construction and in combination of parts, hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a cross vertical section of the valve, disk, and ring. Fig. 2 is a plan view. Fig. 3 is an enlarged detailed sectional view, showing the grooves in the ring.

A represents the valve; B, the circular disk attached to the valve, and C the opening leading through the disk into the exhaust-chamber of the valve. The outer edge of the disk should be grooved and provided with the packing-ring *b*. Around the disk B is the ring D, whose inner edge is bored to make an easy fit on the rim of the said disk; but by means of the packing-ring *b* a steam-tight joint is maintained between the said ring and the said disk.

The mechanism and operation of this kind of valve are so well understood as to need but little description. The pressure of steam on the bottom of the ring D holds it against the steam-chest cover or other plate above, and by means thereof the pressure of steam is excluded from the top of the disk B. It will therefore be seen that the area of the disk upon which the steam presses upward will counterbalance an equal area on the valve upon which the steam presses downward; hence the respective areas of the disk and valve may be made of such relative proportions that the excess of pressure downward on the valve more than the upward pressure on the disk will be only so much as is required to hold the valve steadily on its seat. The thickness radially of the ring D should be only so much as that the exposed surface upon which the steam may press upward will insure a tight joint between the ring and the cover above. A ring so thin, however, would not be durable, because of the small wearing-surface above. To obviate this difficulty I have devised the flange *d*, attached to the ring on the inner edge, and made a part thereof. The flange adds greatly to the wearing-surface of the ring, and may be extended indefinitely toward the center of the ring, but does not add any surface upon which the steam can press. Therefore the addition of the flange to the ring does not increase the friction of the ring against the cover above. It is found that by means of the reciprocation of the valve, and by means also of the unequal distribution of friction on the surface of the ring, the ring turns more or less on the disk, first one way and then the other way, as the valve reciprocates. It is found also that the ring usually turns more in one direction than it does in the other, so that it frequently makes entire revolutions around the disk, although the reason for such revolutions is not apparent. As a result of all this turning and revolving of the ring, the ring wears unequally. The outer part, because it travels farther, wears faster than the inner part. To overcome this difficulty and to make the ring wear evenly, I have devised a system of circumferential grooving, *d'*, on the face of the ring, as shown in the drawings.

To illustrate my system, suppose the face of the ring were plated or covered with broad circumferential lines or bands—say one-quarter of an inch broad: Of the metal on the surface of the ring that is represented by any one of these lines or bands, so much of it should be removed by grooving, as aforesaid, as that the remainder shall bear the same proportion to the whole of the metal in this band, before the grooving, as the distance that this band travels, in making a revolution around the disk, bears to the distance that the outside band travels in making the same revolution. For example, if the radius of the outside band of the ring be six inches, the band whose radius is five inches will travel five-sixths ($\frac{5}{6}$) of the distance of the outer ring, and it will require five-sixths ($\frac{5}{6}$) of its metal for wearing purposes. The other one-sixth ($\frac{1}{6}$) should be removed. So the band whose radius is four inches will move a comparative distance that will be represented by four-sixths, ($\frac{4}{6}$,) and should have two-sixths ($\frac{2}{6}$) or one-third ($\frac{1}{3}$) of

its metal removed, and the band with a three-inch radius should have the one-half of its metal removed.

I do not confine myself to the mathematical theory upon which my system is based, as this theory can be carried out in practice only approximately; but any approximation of this theory in practice will produce a ring that will give better results than the ordinary ring without grooves.

In operating a valve provided with mechanism such as I have described, steam is liable to get into the grooves *d'*. As an accumulation of steam in these grooves might destroy the equilibrium of the ring, I have devised the holes O, leading from the bottom of the grooves into the inner part of the ring, where access is had to the exhaust-chamber of the valve, by means of which any possible pressure of steam in these grooves will be avoided.

I am aware that a balance-valve has been provided with a disk encircled by a wearing-ring, the latter having a bearing on the under face of the steam-chest cover or plate, and hence I make no broad claim to such parts. In my improvement I provide said ring with a flange that increases its wearing-surface without increasing its exposed steam-area while in operation. Thus I am enabled to use a comparatively thin ring, and still insure ample wearing-surface and small steam-exposed area.

What I claim is—

1. In a balance slide-valve, the combination, with the valve A and the disk B, of the ring D, provided with the flange *d*, that extends inwardly and forms an increased wearing-surface, substantially as set forth.

2. In a balance slide-valve, the ring D, provided with grooves, as hereinbefore described, adapted to secure a more uniform wearing of the surface of the ring than the ordinary rings made without grooving, substantially as and for the purpose set forth.

3. In a balance-slide valve, the combination of the disk B, the ring D, provided with the flange *d* and the grooves *d'*, substantially as shown and described.

4. In a balance-slide valve, the combination, with the ring D, provided with the flange *d* and the grooves *d'*, of the holes O, substantially as described, and for the purpose specified.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES B. MILLER.

Witnesses:

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