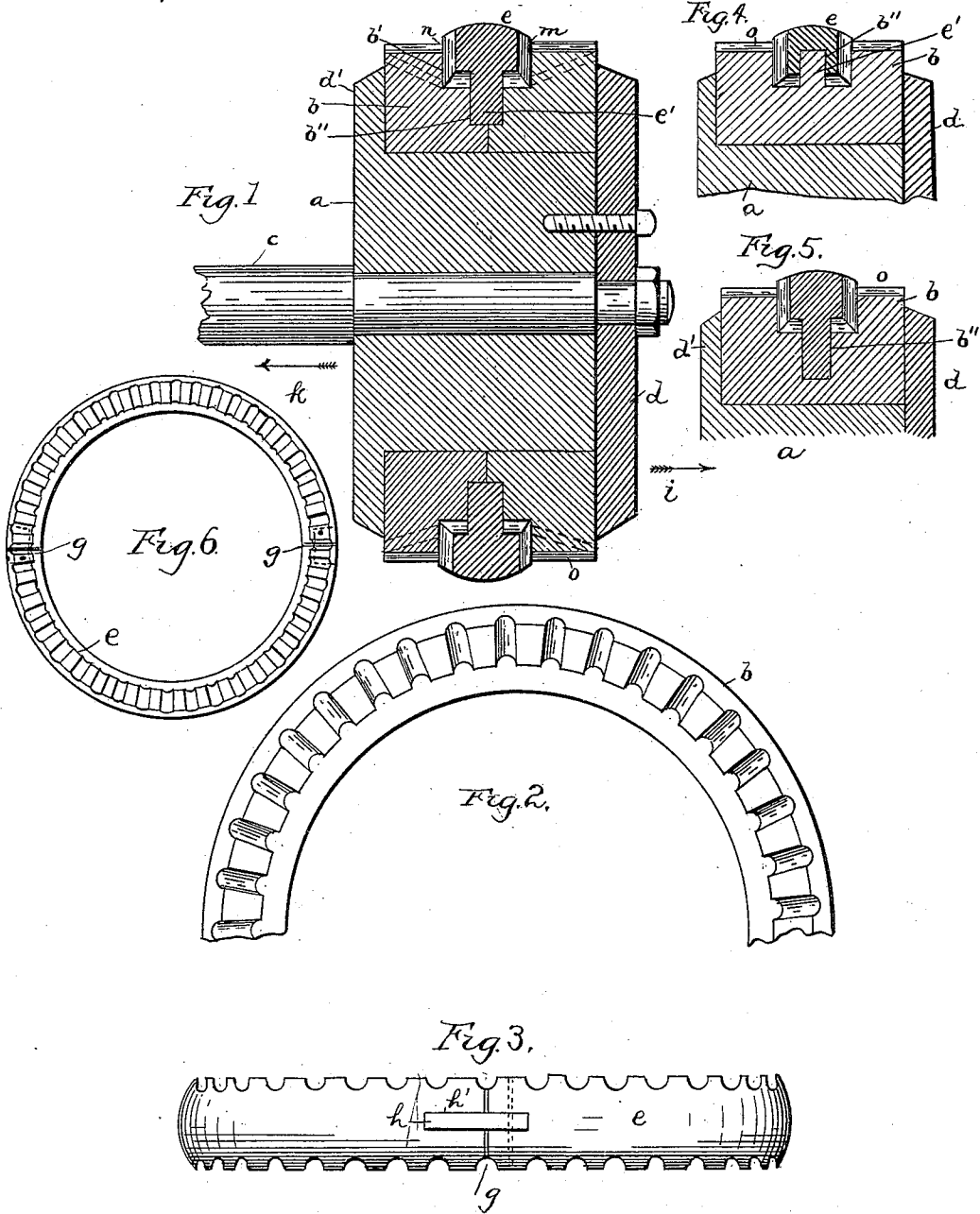


(No Model.)

J. PATTEN.
METALLIC PACKING.

No. 394,789.

Patented Dec. 18, 1888.



WITNESSES:
Ira P. Steward,
Sadie Smith.

INVENTOR
Jefferson Patton
BY
W. A. Canfield
ATTORNEY,

UNITED STATES PATENT OFFICE.

JEFFERSON PATTEN, OF BROOKLYN, NEW YORK.

METALLIC PACKING.

SPECIFICATION forming part of Letters Patent No. 394,789, dated December 18, 1888.

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To all whom it may concern:

Be it known that I, JEFFERSON PATTEN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Metallic Packings for Steam-Cylinder Pistons, of which the following is a specification.

The object of my invention, which is fully disclosed in the following description and claims, is to provide a perfectly steam-tight metallic packing for the pistons of steam-cylinders in cases where but a single ring is required by constructing the ring forming the packing and combining it with the piston in such a manner that the steam in the cylinder will be admitted under the packing-ring, which will be pressed outward against the inner surface of the cylinder, and thereby insure a close fit and steam-tight connection between the packing-ring and the cylinder, while at the same time allowing for the easy movement of the piston.

To enable others skilled in the art to construct and use my improvement, I will proceed to describe its construction and operation by the aid of the accompanying drawings, in which like letters of reference designate like or equivalent parts wherever found throughout the several views, and in which—

Figure 1 is a central vertical section of the piston provided with my improved packing-ring. Figs 2 and 3 show details in the construction of said ring, and Figs. 4, 5, and 6 show modified forms of my improvement.

Referring to Fig. 1 of the drawings, which shows the preferred form of my improvement, *a* is the piston-head; *b* *b*, the piston or bull ring, which in this case is made in sections; *c*, the piston-rod, and *d* the plate or follower, which is secured to the head *a*, and by which the piston or bull ring *b* or the two sections thereof is held in place. The outer rim of the head *a* is cut away, as shown, in such a manner as to leave a flange, *d'*, on one side, and within or upon this cut-away portion is placed the bull-ring *b*. The bull-ring in this form of my improvement, as above stated, is composed of two separate sections, each of which is cut away on its inner face in such a manner as to form when the sections are in position, as shown, a triangular groove or cavity, *b'*, ex-

tending entirely around the ring; also a second similar cavity or groove, *b''*, about one-third the width of the first and extending inward or toward the center of the piston from the bottom of the cavity *b'*.

The packing-ring *e* is of such form in cross-section as to exactly fill the grooves or cavities *b'* and *b''*, being provided with a main or body portion, which fits within the groove or cavity *b'*, and with a flange, *e'*, formed on the inner side or face thereof, which closely fits the groove *b''* in such a manner as to form a steam-tight joint. The side or pressure faces of the body of the piston-ring are corrugated or provided with a large number of small radial grooves, which are in communication or coincident with similar grooves or corrugations formed on the inner faces of the body of said ring on each side of the flange *e'*. At a point, as *g*, the ring *e* is cut and one end thereof is provided with a tongue, *h*, which is secured thereto by rivets, as shown in dotted lines in Fig. 3, and the other fits movably within a slot or groove, *h'*, formed in the opposite end of the ring. The ring *e* may be made of any metallic substance preferred, and the tongue *h* should be made of some metal having a higher degree of expansion under the influence of heat than that of which the ring is composed. This is not, however, absolutely necessary, as it is evident that the parts may be made of the same material and operate successfully. The outer edges of the packing-ring may also be slightly beveled, as shown in Fig. 1, and thus the friction-surface be reduced.

My invention is not limited to the means herein shown and described for uniting the ends of the packing-ring, as any form of connection, including the well-known lap-joints, may be employed.

The corrugations on the sides of the body of the ring *e* may be omitted and the steam admitted to the space or corrugations beneath the ring by means of openings or perforations formed in the bull-ring, as shown in dotted lines in Fig. 1. It is probable, however, that with this form of construction the said space or corrugations would become clogged with sedimentary deposits of various kinds to such an extent as to render this form of construction objectionable.

I have shown in Fig. 4 a modification of the construction shown in Fig. 1, in which the groove b'' is formed in the packing ring e and the flange e' on the piston or bull ring, said piston or bull ring being formed of a single piece, and in Fig. 5 another modification, in which the packing ring e is constructed as in Fig. 1, the piston or bull ring consisting of a single piece, as in Fig. 4. In each of these modifications, however, the packing-ring e must be made in sections, as shown in Fig. 6, the form of connection being that shown in Fig. 3, or any other preferred. In cylinders where large rings are required, however, it is evident that the ring may be made as shown in Fig. 3 and sprung into position.

The body of the packing-ring e should be made of such thickness that it will be held closely and firmly by the separate connections of the bull-ring when the latter are in place, as shown in Fig. 1, or so as to fit closely within the groove b'' when the form of construction shown in Figs. 4 and 5 is employed. This fit, however, should not be so tight as to prevent the easy movement of the ring under the influence of the steam-pressure beneath it. With this construction, the surface of the ring being corrugated, as herein shown and described, the friction-surface on the front or pressure sides thereof is reduced by means of said corrugations formed thereon. The corrugations on the under or inner face of the ring coincident with the corrugations on the side thereof increase the elasticity of the ring, and also the surface area of the inner face of the ring on each side of the flange e' and groove b'' , upon which the steam acts to cause the expansion of the ring, whereby I am enabled to employ a ring with much greater elasticity and with much less impinging-surface and still have a perfectly steam-tight fit between the cylinder and the ring.

The operation is as follows: When the piston is making its forward or up stroke in the direction of the arrow i , the live steam rushes through the corrugations at m on that side of the ring e , down and into the corrugations on the under or inner face thereof, and its expansive force, operating in said corrugations and upon the entire inner face on that side, causes the ring to expand and forces it outward against the surface of the cylinder, thus securing a perfectly steam-tight packing. On the reverse stroke of the piston in the direction of the arrow k , the operation is the same. The steam is forced into the corrugations at n , and passing into the corrugations on the under or inner face of the ring on that side causes its expansion as in the first instance, and this operation or action of the parts is repeated as long as the engine is running. The outer face of the bull-ring b may also be provided with radial corrugations, as shown at o in Figs. 1, 4, and 5, by which a free passage of the steam to the corrugations formed upon the packing-ring is provided.

I am aware that steam has been employed

to cause the expansion of the piston packing-rings for steam-cylinders by admitting the steam under the ring in various ways, and also that corrugations have been formed upon the rings for this purpose, as shown in the United States Letters Patent No. 384,272, granted to me June 12, 1888; and I do not therefore herein claim, broadly, these features of construction. It is evident, however, that corrugations might be formed upon the side and bottom walls of the groove within which the body of the piston-ring e fits, and the side walls and inner faces of said ring be left smooth or formed with plain surfaces without departing from the spirit of my invention. In any case, however, the connection between the flange e' and the groove b'' must be such as to form a steam-tight joint and prevent the passage of the steam from one side of the packing-ring to the other.

Having fully described my invention, its construction, and mode of operation, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination of a piston or bull ring, a packing-ring the body of which fits within a groove formed in the bull-ring, said bull-ring and packing-ring being also provided one with a groove, as b'' , and the other with a flange, as e' , which fits within said groove b'' , forming a steam-tight joint, said groove b'' and flange e' being located centrally of the inner face of the packing-ring and occupying about one-third of the same, steam spaces or corrugations on each side of said groove b'' and flange e' underneath the packing-ring, and means for admitting steam to said steam spaces or corrugations, substantially as shown and described.

2. The combination of a piston or bull ring and a packing-ring the body of which fits within a groove formed in the bull-ring, said bull-ring and packing-ring being also provided one with a groove, as b'' , and the other with a flange, as e' , which fits within the groove b'' , forming a steam-tight joint, said groove b'' and flange e' being located centrally of the inner face of the packing-ring and occupying about one-third of the same, steam spaces or corrugations underneath said ring on each side of the flange e' and groove b'' , and passages between the body of the packing-ring and the bull-ring on each side thereof to admit steam to said steam spaces or corrugations, substantially as shown and described.

3. In a piston-packing, the combination of a bull-ring and a packing-ring the body of which fits within a groove formed in the bull-ring, said bull-ring and packing-ring being also provided one with a groove, as b'' , and the other with a flange, as e' , which fits within the groove b'' , forming a steam-tight joint, said groove b'' and flange e' being located centrally of the inner face of the packing-ring and occupying about one-third of the same, the side walls of said packing-ring and the inner faces on each side of said groove b'' and flange

e' being corrugated, whereby steam is admitted for the purpose of expanding the ring, substantially as shown and described.

4. In a packing for steam-cylinder pistons, the combination of a bull-ring formed in two sections and a packing-ring, said bull-ring being provided with a groove within which the body of the packing-ring fits, and a second groove, as *b''*, within which a flange formed on the central inner portion of the packing-ring fits, the sides of the body of said ring and the inner faces on each side of the flange *e'* being corrugated, substantially as shown and described.

5. In a packing for steam-cylinder pistons, the combination of a bull-ring provided with a circumferential groove on its outer surface and a packing-ring which fits within said groove, said bull-ring and groove being also provided one with a circumferential groove or cavity, *b''*, and the other with a circumferential flange, *e'*, said flange *e'* and groove or cavity *b''* being located centrally of the inner face of the packing-ring and occupying about one-third of the same, the side walls of the body of the packing-ring and the inner faces on each side of the groove *b''* and the flange *e'* being corrugated, substantially as shown and described.

6. The combination of a piston or bull ring and a packing-ring the body of which fits within a groove formed in the bull-ring, said bull-ring and packing-ring being also provided one with a groove, as *b''*, the other with a flange, as *e'*, which fits within the groove *b''*, forming a steam-tight joint, said groove *b''* and flange *e'* being located centrally of the

inner face of the packing-ring and occupying about one-third of the same, steam spaces or corrugations underneath said ring on each side of the flange *e'* and groove *b''*, passages between the body of the packing-ring and the bull-ring on each side thereof to admit the steam to said steam spaces or corrugations, and corrugations on the outer surface of said piston or bull ring, substantially as shown and described.

7. The combination, with a steam piston or bull ring provided with a groove for the reception of a packing-ring, of a packing-ring within said groove, corrugations or steam-passages for admitting steam at the side of and underneath said ring, and corrugations on the outer surface of the piston or bull ring, which communicate with the corrugations or steam-passages at the side of the packing-ring, substantially as shown and described.

8. The combination, with a steam piston or bull ring provided with a groove for the reception of a packing-ring, of a packing-ring within said groove, said ring being provided with corrugations on its inner side or face and holes or perforations through the sides of the bull-ring for admitting steam underneath said ring and into the spaces formed by said corrugations, substantially as shown and described.

Signed at New York, in the county of New York and State of New York, this 5th day of July, A. D. 1888.

JEFFERSON PATTEN.

Witnesses:

DANIEL E. DELAVAN,
WILLIAM P. EGAN.