H. D. Dunbar,

Metallic Packing for Steam Pistons,

No. 50,697, Patented Oct. 31, 1865.

Fig. 1

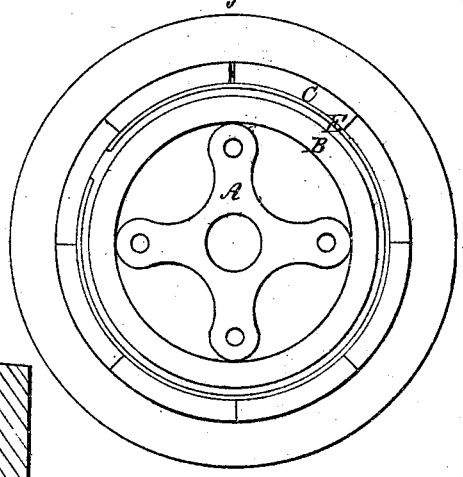


Fig. 2

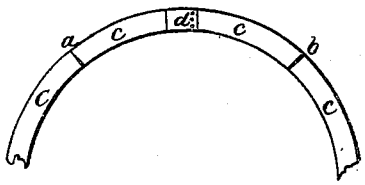


Fig. 3.

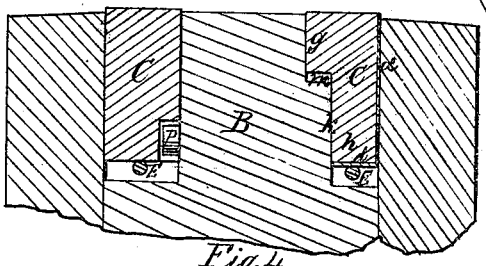


Fig. 4

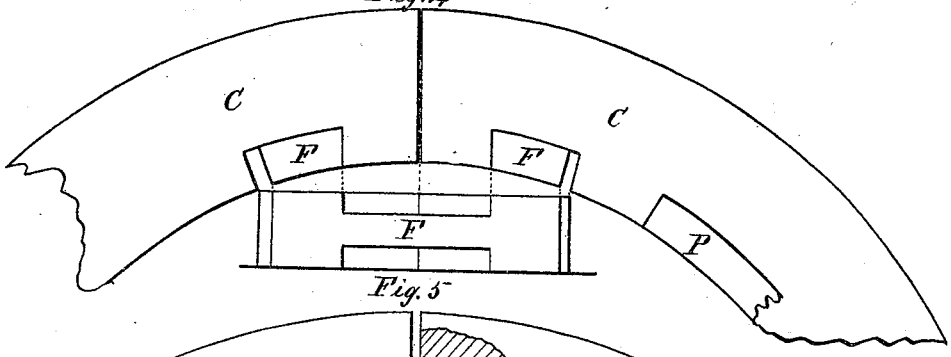
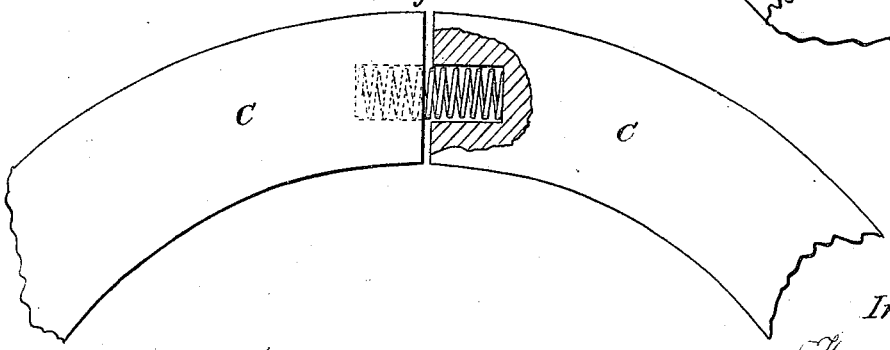


Fig. 5



Witnesses
J. B. Woodruff
A. B. Stuart

Inventor
Henry D. Dunbar
By his Atty
R. D. C. Smith
491 Seventh St.

UNITED STATES PATENT OFFICE.

HENRY D. DUNBAR, OF SPRINGFIELD, MASSACHUSETTS.

IMPROVEMENT IN METALLIC PACKING FOR STEAM-PISTONS.

Specification forming part of Letters Patent No. **50,697**, dated October 31, 1865.

To all whom it may concern:

Be it known that I, HENRY D. DUNBAR, of the city of Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Metallic Piston-Packing; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a piston-head with my packing applied, the piston-head cap being removed. Fig. 2 is a diagram to exhibit the action of the segmental elastic ring. Fig. 3 is a cross-section of the elastic packing and central ring, showing the relative position of the parts. Figs. 4 and 5 are enlarged views of the joints of my segmental rings.

The nature of my invention consists in making the elastic metallic packing-rings for pistons in segments and placing between two of said segments an elastic device or spring which shall keep all the other adjoining ends of the several segments in close contact with each other, as shown in Fig. 1, so that while the exterior form of the packing-ring may freely depart from that of a circle in order to adapt itself to irregularities in the bore of the cylinder, still the several ends will always remain in contact and form close joints, through which steam cannot leak.

It also consists in so forming the central and packing rings that the outward pressure of the steam within the piston-head may be limited and regulated so as to reduce to the minimum the amount of friction between the packing and interior surface of the cylinder consistent with a steam-tight joint.

It also consists in a mode of coupling the ends of the packing-rings so that the expansion and movements of the said ring may be limited.

That others may understand the construction and operation of my invention, I will particularly describe it.

I propose to construct the piston-head in any suitable way and to use the solid uncut ring described and patented to me in my Letters Patent of August 14, 1860, and reissued July 18, 1865. I also propose to use segmental rings, as described, and patented as above; but I do not consider it necessary to use double rings, as therein described, for the reason that with my present improvement in construction the joints or cuts of the ring are always kept closed, so that no steam will leak through them, and it is not, therefore, necessary to have said joints covered by another elastic ring.

A represents the piston-head, and B the solid uncut ⊥-ring described in my patent above mentioned.

C is the segmental ring, of which there should be two, one on each side of the web of the solid ring B. The object attained by cutting the ring C into a number of parts or segments is the superior facility with which a ring so constructed adapts itself to any irregularities of the interior surface of the cylinder. An elastic ring having only one cut will conform to simple inequalities of size or interior diameter so long as the surface remains truly cylindrical; but such a ring will not conform to those other irregularities which are simply of surface and do not extend entirely around the cylinder. The action of the cut ring in this respect is illustrated in Fig. 2, whereby it is seen that a small protuberance, as at *a*, will cause the portion of the ring C at that point to yield, while the friction-surface of the packing is not disturbed beyond the limits of that particular section. A slight depression of the surface, as at *b*, will have the opposite effect, allowing that portion of the packing to expand and fill that space as it passes, and the greater the number of the sections of the ring C the more perfect will be this action.

In order to permit the segments of the ring C to rise and fall in the manner specified, it is necessary that they should not unitedly be quite equal to the interior circumference of the cylinder, and if they are left loose and detached from each other, steam may leak through either one or all of the joints at their ends. This must be guarded against, and it may be done by a second elastic ring, as in my patent of August 14, 1860, which is costly, or by covering all of these joints by elastic plates, as hereinafter described, which is also costly, as well as troublesome. My present improvement provides for this difficulty by placing between the contiguous ends of two of the said sections, a spring of sufficient power to force the other contiguous ends of the several sections together and always keep them in contact. In this way but one open joint remains to be pro-

tected, and this I deem it more economical to cover by a thin plate of metal secured to one section and overlapping the end of the other, as shown at *d*, Figs. 2 and 3.

In order to retain the segments of the ring C always in position when the pressure of steam behind them is taken off, I, as heretofore, introduce the spring E, though it may be considered preferable in some cases to couple the ends of the ring C by means of the link F, Fig. 4, or an equivalent device.

It is common to admit steam from the cylinder behind the elastic packing-ring in order to increase its pressure against the interior of the cylinder during the time when that ring is required to act, and contrivances have been made designed to regulate the amount of said pressure, so that no more may be exerted than necessary to secure a steam-tight joint; but so far as my information extends all such devices are more or less complicated. I propose to accomplish the same purpose by varying, as may be found proper, the relative areas of frictional surface and steam-pressure surface behind the ring, as is clearly shown in Fig. 3. I there show the packing-ring made with an L-shaped section, the horizontal flange *g* overflapping a corresponding shoulder of the solid ring, and the edge *h* of the vertical flange exposed to the steam-pressure, the two vertical surfaces at *k* forming a steam-tight joint, so that no steam will gain admittance to the space *m* behind the flange *g*. With this arrangement of parts it is evident that the amount of friction between the outer surface of the packing-ring and the interior surface of the cylinder due to the steam-pressure may be reduced and regulated in accordance with the lights of experience applied to any individual case.

It is a common practice to insert pins or similar devices for the purpose of preventing all endwise movement of the packing-rings. This is done to prevent the possibility of the open joints ever coming opposite each other, so as to admit a passage of steam through the packing. This is a necessary provision; but the packing and surface of the cylinder may in consequence wear in ridges, and to prevent such an effect I prefer to allow the packing-rings as much endwise motion as consistent with safety, and I accordingly provide a slot, *p*, Figs. 3 and 4, in which the head of a pin rests, so that the ring may move back and forth to the extent of the length of said slot.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The segmental packing-ring C, in combination with a spring or equivalent placed between two contiguous ends of the segments, for the purpose set forth.

2. In combination with the segmental packing-ring C, the L-shaped plate *d*, to cover the joint, substantially as described.

3. The link F, in combination with the packing-ring C, substantially as described.

4. The arrangement of the parts by which to vary the relative areas of the frictional surface and steam-pressure surface of the segmental packing-ring C, for the purpose of regulating and reducing the effect of such pressure to the lowest point consistent with the proper action of the packing-ring, substantially as described.

5. In combination with the elastic packing-ring of a steam-piston head, the slot *p*, with its stop or pin, for the purpose of allowing a limited circular motion of said ring, substantially as described.

HENRY D. DUNBAR.

Witnesses:
R. D. O. SMITH,
EDM. F. BROWN.