C. L. EASTMAN.

Steam Packing for Pistons.

No. 163,584. Patented May 25, 1875.

Fig. 1.

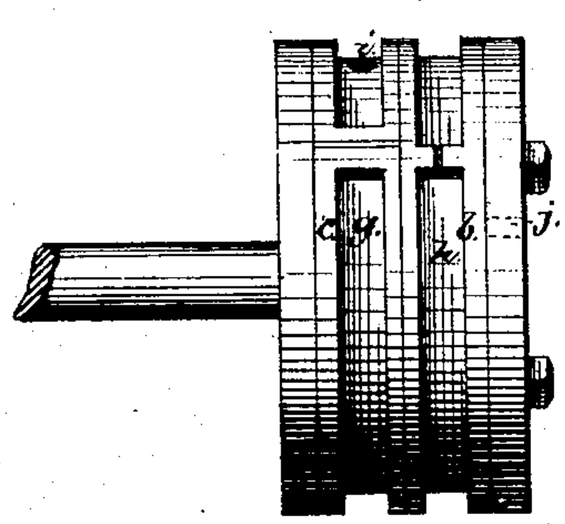


Fig. 2.

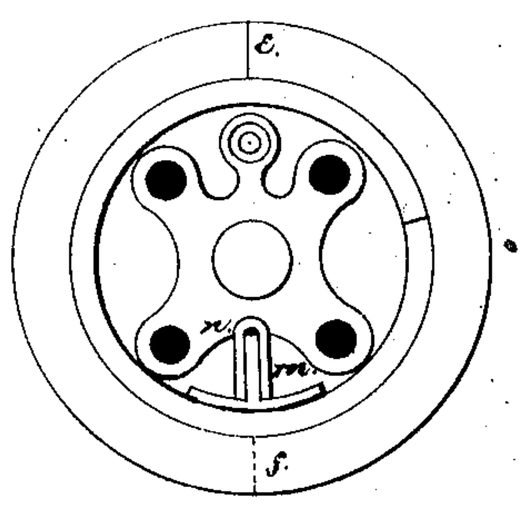


Fig. 3.

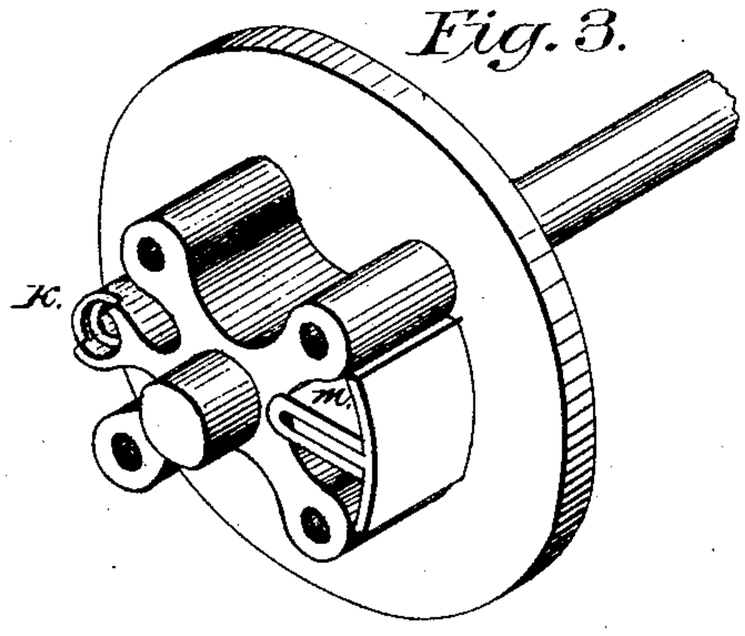
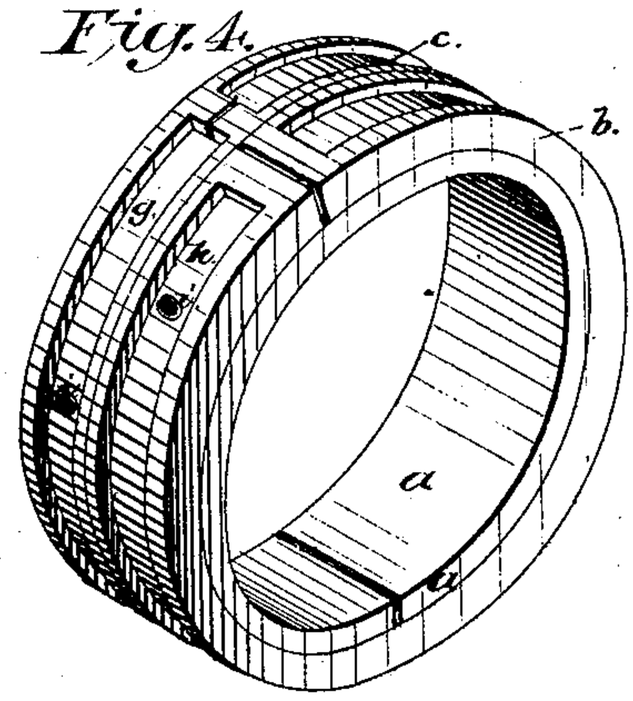
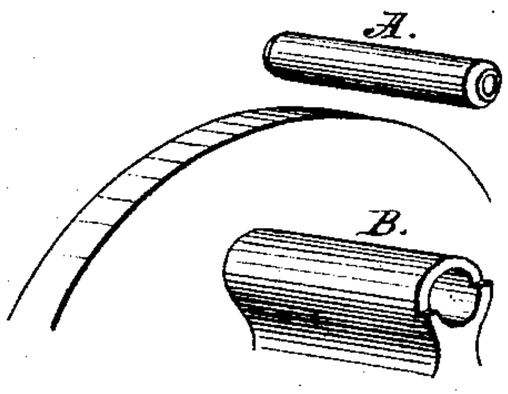
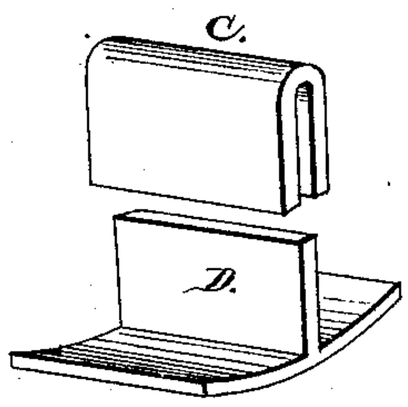
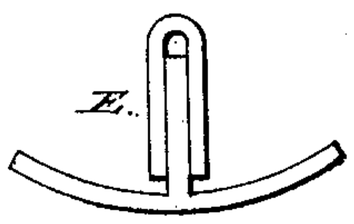


Fig. 4.









Attest:

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UNITED STATES PATENT OFFICE.

CHARLES L. EASTMAN, OF CONCORD, NEW HAMPSHIRE.

IMPROVEMENT IN STEAM-PACKINGS FOR PISTONS.

Specification forming part of Letters Patent No. **163,584**, dated May 25, 1875; application filed February 16, 1874.

To all whom it may concern:

Be it known that I, CHARLES L. EASTMAN, of Concord, in the county of Merrimack and State of New Hampshire, have invented certain Improvements in Steam-Packing for Pistons; and I do hereby declare that the following is a full and accurate description thereof, reference being had to the accompanying drawings and the letters of reference marked thereon.

Figure 1 is a drawing of the piston with the packing in. Fig. 2 is a section of my packing. Fig. 3 is a drawing showing the inside construction of my packing. Fig. 4 is a drawing showing my packing-rings and the manner in which they are constructed and put together.

At A, B, C, D, and E are shown certain parts of my invention detached, and reference to which will be made.

My invention relates to the construction of a piston-packing adjusted and operated solely by the action of the steam, entirely avoiding the use of springs, complicated steam-valves, and numerous rings, which have been hitherto used in packing, whereby I obtain at a greatly-reduced cost a much more simple and perfect packing than heretofore. It also relates to a combination and arrangement of parts whereby a uniform or regulated pressure of the packing against the inner surface of the cylinder is secured, uninfluenced and unaffected by the amount of pressure in the cylinder and upon the piston-head.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

I construct my packing-ring, Fig. 4, having three parts, an inside ring, *a*, and two outside rings, *b* and *c*, each of said rings being cut off one or more times to permit them to expand under pressure, and so arranged that the joints of the inside ring will not come over the joints of the outside rings. I provide chambers in said outside rings, as shown in Figs. 1 and 4, at *g* and *h* and at *i i*. The outer and inner rings are held together by rivets, through which rivets holes are drilled to admit steam from the inside of the packing-ring to the chambers in the outside thereof, and these holes, being drilled through the rivets instead of through the rings themselves, will conduct the steam through the rings without permitting any to escape and pass between the outer and inner rings to interfere with their proper working. Holes are drilled through the piston-head and follower-head, one of which holes is shown at *j*, and the other is opposite thereto, and between these holes a self-acting valve is placed in one of the arms of the spider, which valve operates to admit steam from the cylinder through a slot or cut-away portion of the opening, in and through which the valve A works, and as seen in Fig. 3, and in the separate figure at B, to the inside of my packing-ring from each side of the piston alternately, without permitting said steam to blow through the piston. A drawing of this valve is shown at A, and at B is shown a drawing of one of the arms of the spider in which said valve operates. The other arms of the spider are provided with holes for screws to hold the follower-head in place. I also construct a section of a circle having a tongue, as shown at D. The tongue fits into a groove made as shown at C, and this device is shown in place at *m*, Fig. 3.

My packing operates as follows: I will suppose the steam to be admitted to the cylinder so as to act upon the end of the piston shown at Fig. 1 in the drawing. The steam will pass into the opening at *j* to the inside of the packing-ring, and at the same time act upon the valve so as to close the opening in the piston-head and prevent its blowing through the piston. From the inside of the packing-ring steam passes through the hollow rivets *i i* to the chambers in the outside thereof.

It will be seen that my packing-ring bears against the cylinder only at the edge of the partition between the two chambers and the flanges on either side said chambers, and that the pressure of steam upon the inside of my packing-ring, which pressure operates to expand the same, is offset in part by the pressure of steam in the chambers, so that in effect an expansive pressure is exerted upon the inside of the ring upon a surface exactly equal to the bearing-surface on the outside, while the steam-pressure on the outside is considerably less than that on the inside, owing to the contracted area and steam-pressure surface of the

chambers *g h*. Under this pressure the ring expands and fits closely to the cylinder, while the steam in the chambers, with more or less oil which will accumulate there, will keep the bearing-surface moist and lubricated. When steam is admitted to the opposite end of the cylinder it finds its way to the inside of the ring and to the chambers in precisely the same manner through the opening in the piston-head, which corresponds to the opening in the follower-head, shown at *j*, Fig. 1.

The device referred to, shown at C and D, and at *m*, Fig. 3, is placed so as to rest as shown at *m*, Fig. 2, upon the bottom of the packing-ring on the inside the groove, being attached to the spider, as shown, so that a sheave may be introduced at *n*, Fig. 2, to hold the piston-rod up to the center of the cylinder. As the packing becomes worn the inside space will increase in size. By this device the spider may be shimmed up to center from time to time, thus preventing the piston-rod from riding on the packing of the stuffing-box and cutting the same out unequally.

The valve A is somewhat shorter than the chamber in which it works, so that whichever way it may for the time being be forced by the steam, in moving it discloses the slot or cut-away portion, and allows the steam to pass through said slot into the body or chamber of the piston. When the motion of the piston is reversed by steam on its other side, the valve A is moved through its chamber, disclosing the slot or cut-away on that side, and so on. When the slot or cut-away is disclosed on one side of the piston its mate or fellow on the other side is closed by the movement of the valve A.

The ring *a* and the segments fastened to it are free to move around the spider, so that the wearing shall be uniform, while they are controlled by the piston-head and follower; and the relation of the surface occupied by the grooves or chambers *h g* to the whole inner surface of the inner ring *a* shows the net amount of outward pressure upon the packing-rings, and this outward pressure may be greater or less by lessening or enlarging the size of the chambers or grooves. I have found it best to fix this relation so as to secure a resulting pressure outward of about twenty-two pounds to the square inch, and this pressure is maintained in the same proportion, however high it may be carried in the inside of the cylinder.

I am aware that the principle of introducing steam into grooves or channels upon the outside of rings in steam-packing is not new, such introduction being shown in the patent granted to D. R. Fraser, June 3, 1862; but under such a complication of devices as to render it of little practical value, and I therefore do not claim said principle as of my invention; but

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

1. The combination of the piston-head and follower, and the split rings *a*, *b*, and *c*, forming together a steam-chamber in the piston, said rings being fastened together, freely moving around between the head and follower, and furnished with steam-passages leading directly from said chamber to the channels in the perimeter of the external rings *b* and *c*, as and for the purpose described and represented.

2. In combination with the spider and ring *a*, the adjusting devices C D, for keeping the piston-head central in relation to the cylinder, substantially as described.

3. The combination of the valve A with the slots or cut-aways in the opening in which it works, and with the head and follower of the piston, as and for the purpose described and represented.

4. The combination of the piston-head and follower, the spider, the rings *a*, *b*, and *c*, and the steam-ways through them, whereby a steam-chamber is formed in the piston-head without other mechanisms, and a steam-tight packing is produced solely by the action of the steam, and without any wedge, spring, or other pressure exerted on the surface of the inner ring from the center outward, as represented and described.

CHARLES L. EASTMAN.

Witnesses:

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