(No Model.)

H. H. MERRILL.

PISTON.

No. 560,004. Patented May 12, 1896.

Fig. 1.

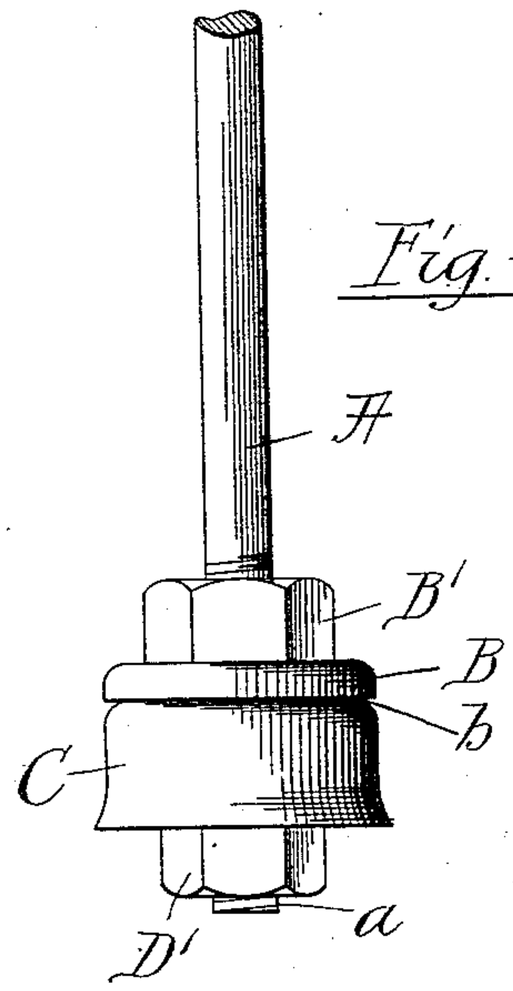


Fig. 2.

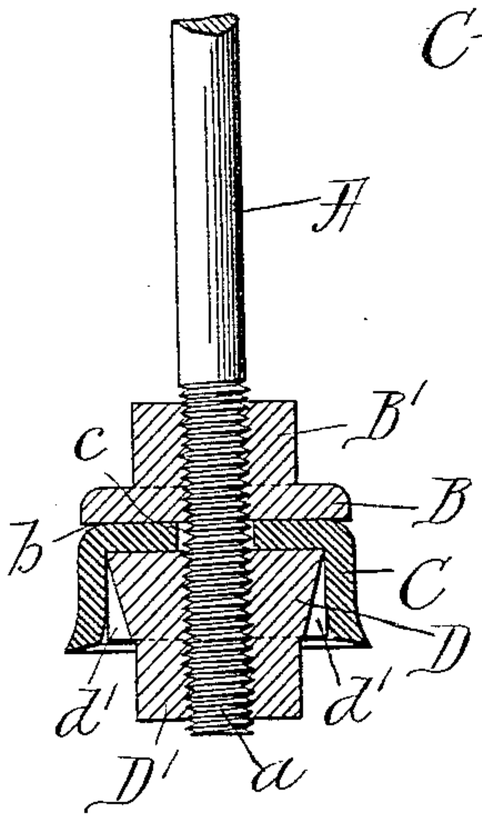


Fig. 3.

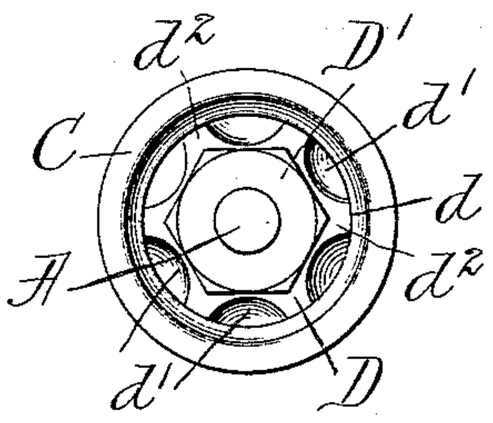


Fig. 4.

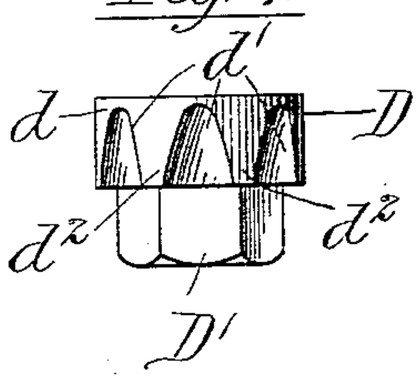


Fig. 5.

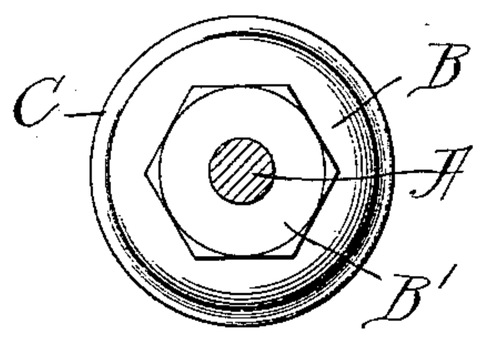


Fig. 6.

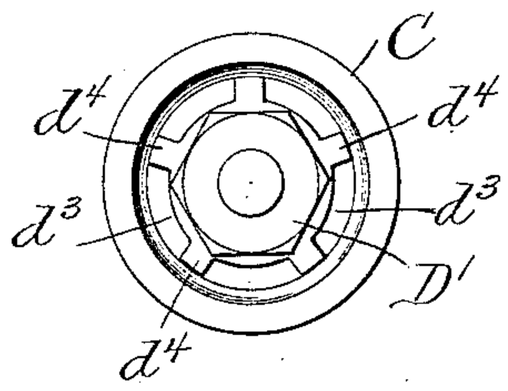
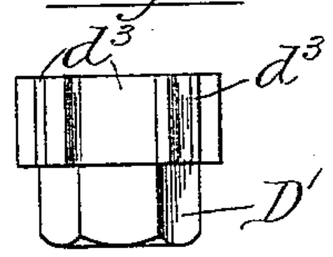


Fig. 7.



Witnesses:-
John W. Adams.
L. Clinton Hamlink

Inventor:-
Hattie H. Merrill.
by:- Dayton, Cooke & Brown
her Attys.

UNITED STATES PATENT OFFICE.

HATTIE H. MERRILL, OF CHICAGO, ILLINOIS.

PISTON.

SPECIFICATION forming part of Letters Patent No. 560,004, dated May 12, 1896.

Application filed November 4, 1895. Serial No. 567,819. (No model.)

To all whom it may concern:

Be it known that I, HATTIE H. MERRILL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pistons; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pistons, and refers more specifically to an improved form and arrangement of the packing devices of pistons subject to the pressure of liquids or gases.

The object of the invention is to provide a piston of simple construction in which the packing-leather is arranged in such a manner as to prolong its working life and to retain its full effectiveness until entirely worn out, the invention having also in view the production of a piston which will not become inoperative, or partially so, by reason of the packing-leather becoming stuck fast to its support from the piston remaining unused for a long period of time, or from any other cause.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, and the same will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a piston embodying my invention. Fig. 2 is an axial section of the same. Fig. 3 is a bottom end view. Fig. 4 is a side view of the inner packing-support. Fig. 5 is a top plan view of the outer packing-support. Figs. 6 and 7 are views similar to Figs. 3 and 4, respectively, showing a modification.

Referring to said drawings, A designates a piston-rod having its end portion screw-threaded, as at *a*.

B designates a packing-supporting disk or ring screw-threaded to fit upon the piston-rod A, having at one side a smooth annular face *b* and provided at its opposite side with an integral nut B′, by means of which the ring may be turned upon or removed from the piston-rod A. The exterior diameter of said disk B is slightly less than the interior diameter of the cylinder within which the piston is designed to work.

C designates a cup-shaped packing-leather centrally apertured, as at *c*, for the passage of the piston-rod A and adapted to rest at its bottom or base portion directly against the smooth annular face *b* of the supporting-disk B.

D indicates an inner circular packing-support threaded upon the rod A and of such diameter as to practically fill the space within the leather-packing cup C and hold the latter outward in contact with the interior of the cylinder, the exterior or peripheral surface *d* of said packing-support being cylindrical and arranged to extend parallel with the wall of the cylinder and being of a width equal to the depth of the cup-leather C. Within said peripheral surface *d* are formed a plurality of channels *d′ d′*, placed at uniform intervals around said inner packing-support and extending inwardly from the outer end thereof toward the bottom of the cup-leather C. These channels are made tapering or of gradually-diminishing capacity from their outer ends toward the bottom of the cup-leather, as indicated clearly in Fig. 4, being conveniently and as herein shown made in the form of concave or rounded grooves relatively wide at their outer ends and tapering uniformly to the outer surface of the support at the base of the cup-leather. Said grooves or channels *d′* are so spaced as to leave intervening portions d^2 d^2 between each pair of grooves, which portions d^2 serve to support the packing-leather throughout the full length of its cylindric portion. The support D is provided with suitable means for turning it upon the piston-rod, herein shown as in the form of an integral nut portion D′, adapted to be engaged by any ordinary wrench, whereby the said part may be turned up to clamp the cup-leather between its inner face and the outer packing-support D.

The construction described, in which the cup-leather is both supported and subjected to internal pressure throughout its full depth, is a novel one and productive of new and beneficial results. The pressure of the liquid is transmitted through said channels to the interior of the cup-leather throughout the full depth of the latter, thus insuring a close and

perfect packing and distributing the wear over the entire outer surface of the leather. This internal pressure is, however, by reason of the tapered form of the pressure-channels, operative over a greater area of the leather at the margin of the packing, and consequently said margin will be pressed outward more forcibly and will wear away faster than the remainder of the leather. By reason of said tapered form or gradually-diminishing capacity of the channels this relatively greater pressure at the margin of the packing-leather will be maintained as the latter wears down throughout the entire working life of the packing.

Another and important advantage obtained by carrying the channels to the full depth of the packing-cup is that the packing is thereby expanded at all parts, and thus maintained fully operative throughout its entire depth, whether the piston be used daily or only occasionally at long intervals apart, whereas, in the constructions ordinarily employed, it has been found that the rusting or oxidizing action of the water upon the metal packing-supports and the tendency of the leather to become sticky, when long submerged in liquid, cause the packing to stick fast to said supports wherever it lies in contact with the latter and is not subjected to a direct separating pressure, and thus renders the piston defective long before the packing is otherwise worn out. This objection is entirely obviated by the construction described.

I am aware that it is not broadly new to subject the interior of a packing-leather to pressure by means of passages formed in the inner packing-support especially provided for this purpose, such provision being shown in the patent to Collyer, No. 236,987, dated January 25, 1881, and also in the patent to Baldwin, No. 220,784, dated October 21, 1879. I am not aware, however, that a construction has ever before been devised wherein a packing-leather having a cylindrical side portion adapted to rest in working contact with the interior of the cylinder has been subjected to pressure throughout substantially the full depth or width of said cylindrical side portion by means of channels arranged in the manner shown, nor a construction wherein the area of pressure upon the interior of the packing-leather is gradually diminished from its outer margin inwardly throughout its depth.

In Figs. 6 and 7 I have shown a modification in which the pressure-channels d^3 are of uniform capacity throughout their entire depth and are separated by relatively narrow ribs d^4. This construction, while not in all respects as desirable as that shown in the previously-described figures, is nevertheless an improvement in the art, and obviously possesses most of the advantages attained by said prior construction.

It is to be particularly noted that in each of the forms described the construction is such that a piston embodying my invention may be made at as low a cost as can one of the ordinary construction, while its durability is very considerably increased.

I claim as my invention—

1. In a piston the combination of a cup-shaped packing-leather adapted to rest with its side surface in contact with the interior of the cylinder, an exterior supporting-ring against which the base of the cup-shaped packing-leather rests, and an inner packing-support connected at its base with the outer support, the periphery of said inner packing-support being in contact with and constructed to support the packing-leather throughout substantially the full depth of the latter and being provided with pressure-channels at intervals around said periphery and extending substantially the full depth of the cup-leather, substantially as described.

2. In a piston, the combination of a cup-shaped packing-leather having a cylindrical side adapted to fit against the interior of the cylinder, an outer packing-support against which the base of the cup-leather is secured, and an inner packing-support having a cylindrical periphery adapted to fit within and support the cup-leather throughout its full depth, the periphery of said inner support being provided with pressure-channels at uniform intervals around said periphery and extending from the outer margin of the support inwardly the full depth of the cup and of gradually-diminishing width from said outer margin inwardly, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 31st day of October, A. D. 1895.

HATTIE H. MERRILL.

Witnesses:
C. CLARENCE POOLE,
WILLIS D. SHAFER.