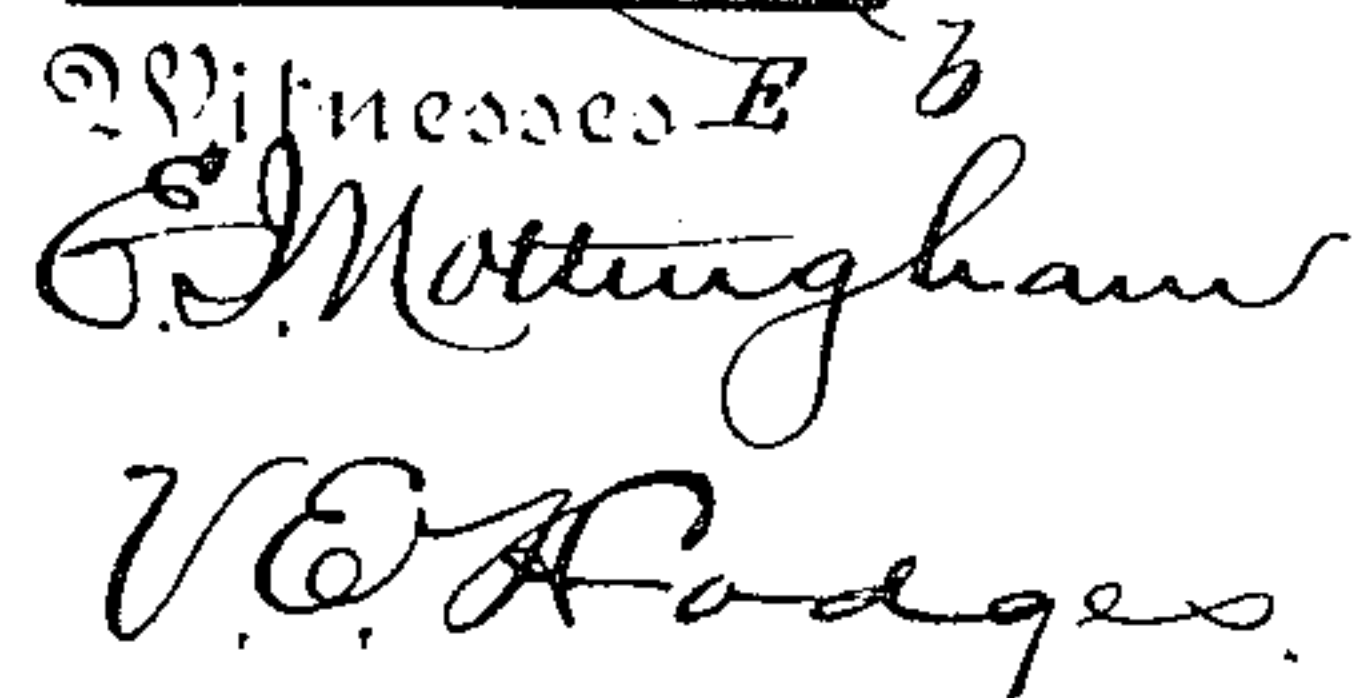


S. HUGHES.  
PISTON PACKING.

Patented May 21, 1889.



By his Attorney  
H. S. Symon.



# UNITED STATES PATENT OFFICE.

SAMUEL HUGHES, OF CHARLESTON, SOUTH CAROLINA.

## PISTON-PACKING.

SPECIFICATION forming part of Letters Patent No. 403,753, dated May 21, 1889.

Application filed January 9, 1889. Serial No. 295,828. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL HUGHES, of Charleston, in the county of Charleston and State of South Carolina, have invented certain new and useful Improvements in Piston-Packing; 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 pistons for steam and other engines, and has for its object to provide a ring-packing that can be put into ordinary pistons without removing them from the cylinder, and also a packing that can be adapted at small cost to new pistons.

A further object is to so construct and arrange the packing-rings that its sections will be forced outwardly against the walls of the cylinder and the outward pressure on the sections equalized.

A further object is to produce a piston which shall be simple in construction, cheap to manufacture, and effective in operation.

With these objects in view the invention consists in certain features of construction and combinations and arrangement of parts, as will be hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my improved piston with the follower removed. Fig. 2 is a longitudinal section of the same with the follower in position. Fig. 3 is an interior view, partly in section, of the packing-rings; Figs. 5 and 6, detail views, and Fig. 4 is a separate view of one of the springs.

A represents an ordinary piston-spider which is centrally perforated for the reception and attachment of the piston-rod. (Not shown.)

B is a bull or junk ring, which is made of any suitable metal, and is fitted to and supported upon the outer ends of the spider-arms *a*. Ring B is constructed with an ordinary projecting flange, *b*, one surface of which is seated against the inner surface of the spider or one end of the piston. The flange *b* is preferably made so that it will project slightly beyond the periphery of the piston.

C is a follower which is fitted to the hub of the spider and secured in place by means

of suitable bolts, *c'*. It will be observed that an annular groove, D, is formed by the follower and bull-ring, and within such space or groove I insert the packing-rings *D'* *D*<sup>2</sup>, the side of ring *D'* fitting steam-tight against the inner surface of follower C, while the side face of ring *D*<sup>2</sup> fits steam-tight against the inner surface of the flange *b* of the bull-ring. The meeting-faces of the packing-rings are constructed to form an overlapping steam-tight joint, E.

The packing-rings are first made as complete and continuous rings, which are then cut into segments, as shown in Figs. 1 and 3, the joints between the sections being preferably diagonal, and the joints of ring *D*<sup>2</sup> are so arranged as to break joints with those of ring *D'*, in order to prevent any escape of steam through or past the rings. At opposite sides of each joint of the segments of rings *D'* *D*<sup>2</sup> pins *d* are secured to said rings on their inner faces for the attachment of the free ends of springs F, one of such springs being provided at each joint of the segments and resting parallel with the interior surface of the packing-rings, the springs of one ring projecting in the opposite direction from those of the other ring.

As shown in the drawings, each ring is divided into four segments, and hence eight springs will be sufficient to impart the necessary outward pressure to them. The springs applied to one ring will alternate with the springs applied to the other ring, and thus ample room is insured for the proper and effective operation of the several springs.

Each one of the springs F is preferably made of steel wire, which is first bent so as to form a central coil or spiral, *e'*, and two outer coils, *e e*, the latter terminating in free extensions or arms *e*<sup>2</sup> *e*<sup>2</sup>. Between the pins on the adjacent ends of each section or segment of the packing-rings is forced one of the springs F, the arms *e*<sup>2</sup> *e*<sup>2</sup> engaging the pins and thereby transmitting the expansive force of the springs in opposite directions on the adjacent sections, forcing them outwardly and causing them to be forced in snug contact with the inner surface of the cylinder. By reason of the peculiar formation of the springs I am enabled to avoid angular bends, which would result in the breakage of the springs,



and to provide a long and free-acting spring in very small compass.

Should it happen that one of the springs F be stronger than the others, the force exerted by such spring would be compensated for by the remaining springs of the series.

In horizontal engines it will be advisable to employ one or two shoes, G, at the lower part of the piston, so as to take up for uneven wear due to the weight of the piston and to maintain the piston-rod in the center of the cylinder. The shoes may be composed of screw-threaded bolts passing through a perforation in the bull-ring, said bolts being provided at one end with a shoe,  $f'$ , to bear upon the packing-rings, and at their other ends with angular heads  $f^2$ , for the attachment of a wrench. Nuts  $f^3$  will be screwed upon the bolts  $f$  and adapted to bear upon the bull-ring to afford means by which the shoes may be adjusted.

By the employment of the bull-ring and follower a new piston is practically formed upon an old one without removing the piston from the cylinder, thus saving much time and expense.

It will be observed by reference to Fig. 2 that an annular space,  $h$ , is formed between the bull-ring and packing-rings, which, if desired, may be utilized for the reception of steam-pressure to afford additional means by which the packing-rings are forced out against the cylinder. A pressure-valve, H, is inserted in the follower F, so as to admit steam to the space  $h$  of the piston, a spring, I, upon the stem of the valve preventing escape of steam from the piston. This device permits the use of a valve at one side only of the piston, which is an improvement over having a valve at each side. One side of the piston is always easily accessible, and in ordinary cases the other is almost inaccessible. Placing the valve at the accessible side of the piston admits of its being easily kept in order.

When it is not desired to have the packing-rings set out by steam, the springs F are preferably made somewhat stronger and will press out the segments in the same way that the steam would—i. e., with a tendency to enlarge the diameter of the packing-rings. With rings so expanded there is no tendency to wear a cylinder out more in one place than another.

The packing is easily put in and removed from the cylinder, and does not require any nice adjustment by the engineer.

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

1. In a piston-packing, the combination, with a bull or junk ring having an outwardly-projecting flange, and a piston-follower, of segmental packing-rings arranged side by side, the edge of one ring overlapping the edge of the other, said packing-rings being secured between the follower and the flange of the bull-ring, substantially as set forth.

2. In a piston-packing, the combination, with piston body or spider, a removable junk-ring having an outwardly-projecting flange and a follower, of segmental packing-rings greater in diameter than the bull-ring, and springs located within the space between the bull-ring and packing-rings and engaging abutments projecting inwardly from the inner faces of the segments composing the packing-rings, substantially as set forth.

3. In a piston, the combination, with a piston body or spider and a bull-ring mounted thereon, of segmental packing-rings located side by side and having overlapping side edges, and springs located between the bull-ring and packing-rings for exerting longitudinal pressure upon the segments of each of the packing-rings, substantially as set forth.

4. In a piston, the combination, with a hub, of segmental packing-rings carried thereby and having overlapping longitudinal edges, pins projecting from the inner faces of each of said rings, springs bearing on said pins and adapted to exert a longitudinal pressure upon the segments of the packing-rings, and a follower secured to the hub and bearing on one of said packing-rings, substantially as set forth.

5. In a piston, the combination, with a hub, of a flanged bull-ring mounted thereon, packing-rings having overlapping longitudinal edges, pins projecting inwardly from both packing-rings, springs bearing on said pins and adapted to exert a longitudinal force on the segments of both rings, and a follower secured to the hub and extending parallel with the outer faces of the packing-rings, substantially as set forth.

6. In a piston-packing, the combination, with sectional packing-rings provided with pins on their inner surfaces, of springs having central and outer coils and provided with expansible arms which engage said pins, substantially as set forth.

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

SAML. HUGHES.

Witnesses:

L. R. FITZSIMONS,  
ST. JOHN P. KINLOCH.