

W. BUCHANAN.
PISTON PACKING.

Fig: 1.

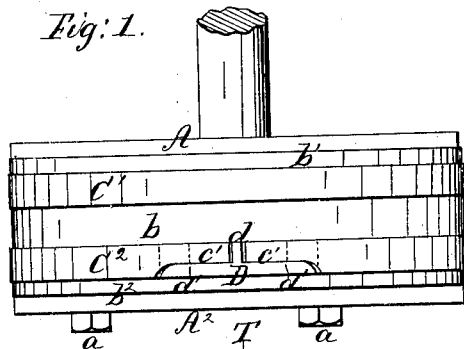


Fig: 2.

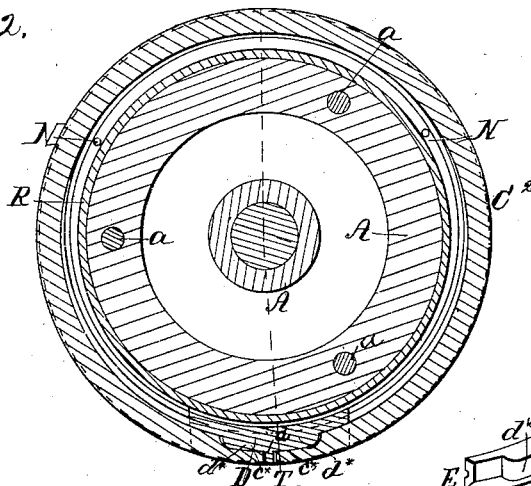


Fig: 3.

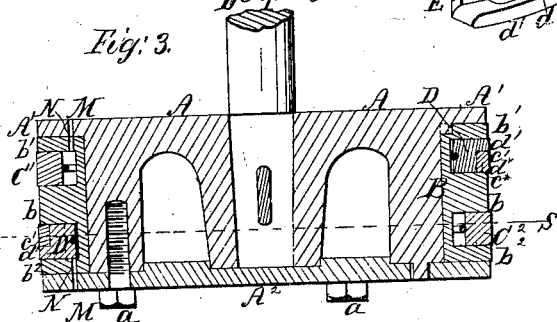
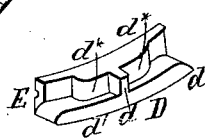


Fig: 4.



Witnesses;

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IMPROVEMENT IN PISTON-PACKING.

Specification forming part of Letters Patent No. 49,853, dated September 12, 1865.

To all whom it may concern:

Be it known that I, WILLIAM BUCHANAN, of the city and county of New York, and State of New York, have invented a certain new and useful Improvement in Pistons; and I do hereby declare that the following is a full and exact description thereof.

The accompanying drawings form a part of this specification.

Figure 1 is a side elevation of the piston and packing. Fig. 2 is a cross-section on the line S S in Fig. 3. Fig. 3 is a longitudinal section on the line T T in Fig. 2. Fig. 4 is a view of the tongue-piece D detached.

Similar letters of reference indicate like parts in all the drawings.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings and of the letters of reference marked thereon.

A is the body of the piston, and A' the flange thereon. A² is the follower, which is confined in the ordinary manner by bolts a.

B is a casting in the form of a ring, and which I term a "bull-ring." It is fitted tightly by scraping or grinding to the inner faces of the flange A' and the follower A², so that steam cannot pass. It is recessed or grooved on the exterior, as indicated. I have designated the central projection or ridge b and the ridges at the edges by b' and b².

C' and C² are rings of rectangular section, which, with the aid of a tongue-piece adapted to each, described below, forms the packing proper. The width of each packing-ring C' and C² coincides with the width of the groove or space between the ridge b and b' or b². Each packing-ring is cut or divided at one point, as indicated, and it is narrowed near that point, and is also diminished in depth, as indicated. The depth or radial thickness of each of these packing-rings is something less than the depth of the groove in which it is fitted.

Each packing-ring is provided with a tongue-piece, D, which prevents the passage of steam through the joint in the packing. The construction of this tongue and its application relatively to the adjacent surfaces of the packing are very important. A portion, d, extends across the entire thickness of the packing, and serves to prevent the tongue-piece from slipping out

of place. The surface d' is exactly parallel to the ridge b', and the corresponding faces, c', on the narrowed part of the packing-ring are also parallel to the said ridge. It follows that the packing-ring may expand and contract to a considerable extent by sliding the surfaces c' against the surfaces d' without opening any joint between these surfaces.

There is a part of each tongue-piece D which extends across the whole width of the groove under each end of the packing, as represented. Its outer faces, d*, are exactly concentric with the axis of the piston. The corresponding faces, c*, on the inside of the thinned part of the packing, near the ends, are also concentric with the same axis. It follows that the packing-ring may extend and contract to a considerable extent by sliding these faces c* against the faces d* without opening any joint or escape for steam at those points. The depth of the entire tongue-piece is about equal to the full depth of the groove in which the packing lies. There is a groove, E, on the under side of the tongue-piece, as represented.

Holes M are formed in the piston on both faces, as represented. Corresponding holes, N, are formed in bull-ring B, and are made to coincide in position exactly with the holes M, a dowel being fitted in the piston and in the bull-ring to prevent their changing their positions relatively to each other. The holes M and N allow the steam to enter from one face of the piston and fill the entire space under the packing-ring C' and its tongue-piece D. The corresponding holes on the opposite side of the piston allow the steam to enter in a similar manner and fill the space under the ring C² and its tongue-piece D. The pressure of the steam on either face of the piston therefore serves to hold the packing on that side, including the ring and the tongue-piece, out against the interior of the cylinder. When the pressure of the steam is relieved on that face these parts may yield inwardly. The admission of steam to the opposite face of the piston produces a corresponding outward pressure on the other set of packing. The steam cannot flow past either set of packing when thus forced outward by its pressure. As the packing wears, and the interior of the cylinder also wears, the packing-rings C' and C² gradually expand themselves, and the tongue-pieces also gradually

move outward radially in the piston; but this action may proceed to a considerable extent without inducing leakage, because the faces c' can slide steam-tight on the faces d' , and the faces c^* can also slide steam-tight on the faces d^* .

I have applied my piston with success and used it for a considerable period on a locomotive using steam at a pressure of one hundred pounds and upward and working at high velocities. I made the bull-ring B of such dimensions as to apply in an ordinary piston. I made the packing-rings C' and C^2 each half an inch wide on the face and half an inch deep. I made the grooves in which they fitted five-eighths of an inch deep, and made the steam-tight faces c' d' about one and a half inch in length on each side of the dividing-web or thinned part d . I made the steam-tight surface d^* somewhat less in length and extended the tongue-piece under the entire body of the packing-ring, beyond this thin portion of the packing-ring, as indicated in Fig. 2. The packing-rings C' C^2 and their respective tongue-pieces D were all of ordinary cast-iron. I found no difficulty in introducing packing-rings of this dimension in a piston of sixteen inches in inches in diameter by springing them in.

It will be evident that my packing will allow of various modifications in material and in dimensions. I propose to use this piston not only for locomotives and other steam-engines, but for air-pump and other pumps and engines where pistons are required.

I do not consider the groove E absolutely essential to the success of the other portions of my invention. It is important that the steam shall enter under the tongue-pieces D and force them outward with the same promptness as the packing-rings to which they are fitted. In most instances the steam might do this

without the grooves E; but the presence of these grooves renders it absolutely certain that the steam can enter freely at each end of the tongue-pieces. The moment the steam has entered into this groove it exerts a pressure outward, and immediately lifts the tongue-piece and allows the steam to enter under the whole of its under or inner surface. The side ridges, b' and b^2 , when once fitted by grinding against the corresponding faces of the piston, require no further labor. There is no friction on those surfaces to induce wear, and the packing-rings C' C^2 , with their corresponding tongue-pieces, may be exchanged as often as is necessary without involving any grinding.

Having now fully described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In combination with a piston, A' A^2 , the single bull-ring B, formed separate from the spider of the piston, and having the three ridges b' b^2 , with suitable packing in the spaces between the ridges, substantially as and for the purpose herein set forth.

2. A tongue-piece, D, adapted to defend the joint in the packing-ring C' against the passage of steam both longitudinally and radially, substantially in the manner and for the purpose herein set forth.

3. The surfaces d' d^* on the tongue-piece D, in combination with the surfaces c' c^* in the packing-ring C' , arranged substantially in the manner and for the purpose herein set forth.

4. The groove E under the tongue-piece D, and adapted to insure the admission of the fluid, substantially as and for the purpose specified.

WM. BUCHANAN.

Witnesses:

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