

(No Model.)

W. J. THOMAS.
BALANCED PISTON.

No. 473,032.

Patented Apr. 19, 1892.

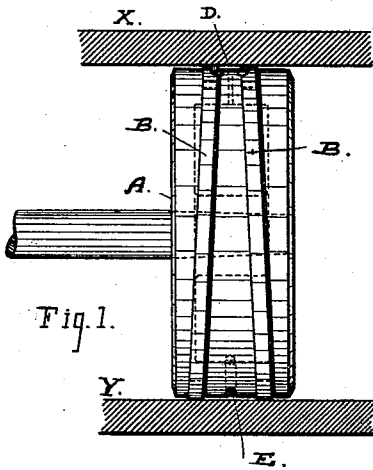


Fig. 1.

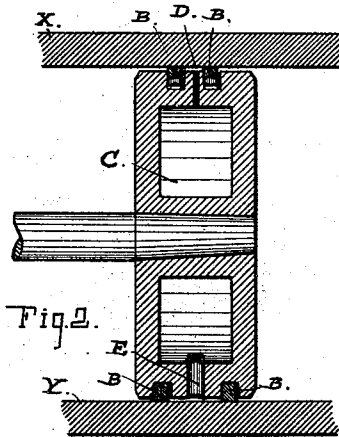


Fig. 2.

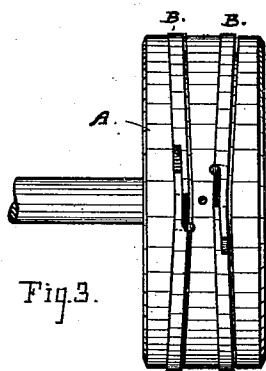


Fig. 3.

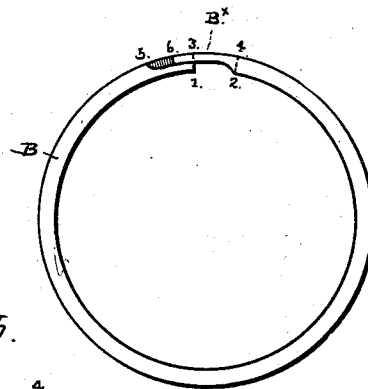


Fig. 5.

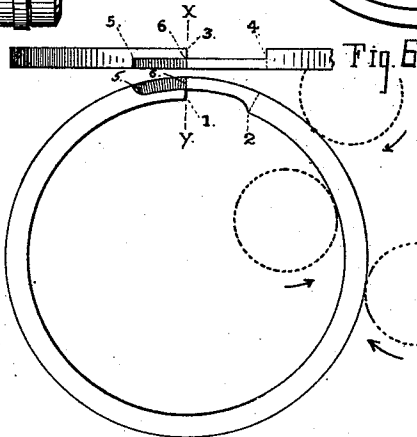


Fig. 4.

Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

WILLIAM J. THOMAS, OF SAUSALITO, ASSIGNOR OF ONE-HALF TO JOHN T. WILSON, OF SAN FRANCISCO, CALIFORNIA.

BALANCED PISTON.

SPECIFICATION forming part of Letters Patent No. 473,032, dated April 19, 1892.

Application filed June 17, 1891. Serial No. 396,620. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. THOMAS, a citizen of the United States, residing in Sausalito, in the county of Marin and State of California, have invented certain new and useful Improvements in Balanced Pistons for Steam-Engines, of which the following is a specification.

This invention relates to that improvement in balancing-pistons for which Letters Patent of the United States were issued to me on the 11th day of June, 1889, No. 405,132; and it embraces improvements in the construction of the packing-rings and in the arrangement of steam ports and passages in the piston.

The object of these improvements is to simplify the construction of the parts and to insure a better supply and perfect control of the steam-pressure by which the balancing is effected.

I proceed to attain the desired ends and object and produce these improvements by the construction and arrangement of parts represented in the accompanying drawings, in which—

Figure 1 is a side elevation of a balanced piston to which my improvements are applied, the top and bottom portions of the surrounding cylinder being shown in section. Fig. 2 is a longitudinal section through the piston in a vertical plane. Fig. 3 is a top view of the piston. Figs. 4 and 5 illustrate the manner of forming the lap and joint of the packing-ring. Fig. 6 shows the finished ring.

X Y indicate the top and bottom sides of the cylinder.

A is the piston, and B B are the packing-rings.

C is the steam-chamber or hollow space in the piston, and D E are ports and passages opening into the space C through the piston.

The packing-rings are set obliquely, the same as in my former patent, No. 405,132; but the passage D is carried from the outside into the steam-space C through that part of the face or rim of the piston which lies between the two rings at or near the top side of the piston, where the two packing-rings approach the nearest to each other. This inlet is common to the two packing-rings and steam is admitted through it into the piston-chamber

C from one groove or the other, according to the direction of the travel of the piston—that is, from the pressure side of the piston.

The packing-rings are fitted loosely in the piston-grooves and the steam from the pressure side passes around the leading or foremost ring and so into the space between the two rings where the inlet D is located.

The general action or operation of the rings is the same as in my former patent. The packing-rings have sufficient play in the grooves to let the steam from the pressure side pass into the space C, and in being shifted by the movement of the piston from one side of its groove to the other the leading ring admits steam, while the other ring, which is between the exhaust side of the piston and the steam-inlet, is pressed closely against the outer side of its groove to shut off the inlet D and the space C from the exhaust. The two rings thus act alternately upon the steam-inlet, which is common to both, and a more regular and uniform degree of pressure is maintained in the space beneath the piston between the two rings and the bottom of the cylinder on which the piston travels. The inlet D serves to give quick inlet of steam directly to the space under the piston; but in addition to that supply it will be noticed that the steam-pressure after passing the joint of the ring into the space between the two rings is free to pass around the circumference of the piston itself and then find its way into the space under the piston and a larger volume of steam is obtained to raise the piston from the cylinder through these passages. The admission and supply is more direct and quick, however, through the ports D E and the space inside the piston.

The joints of the packing-rings are constructed to give a suitable space and passage for the steam both between the ring and the bottom of the groove and on the inner side when the steam-pressure is against the outer side of the ring; but the outside face of the ring is flush and forms a joint that is closed to the steam-pressure when the outside face of the ring is seated against the side of the groove. The joint B* is therefore flush or continuous on the outer side as well as on the top or working face, while it is cut away or broken on the

bottom and on the inner side. It is also expandible to accommodate itself to the elasticity of the ring. In constructing or forming this joint the ring is first finished on the sides and top face, and the parts for the joint are formed, as shown in Figs. 4 and 5, by cutting or milling them out of the solid metal. The portion from 1 to 2 is cut away on the inner or bottom face, the portion from 3 to 4 is cut away across the ring on the outside, and the part from 5 to 6 is formed on the inner face for about one-half the thickness of the metal, the portion of metal from 1 to 2 being cut away to a corresponding amount on the opposite face. After these operations the ring is separated at the line *xy* across the milled and cut-away portions, and the lap is produced by passing the two end portions for about one-third the circumference between rollers, which are placed in relative position, as indicated by the dotted lines, Fig. 6. By this means not only a close expandible joint is obtained, but the ring when finished and sprung into place will be cylindrical. Snap-rings with lap-joints under all other modes of construction will not be true circles, and therefore not so well adapted for my purpose.

To illustrate the action of the steam in the piston, suppose the pressure to be on the right of the piston, as shown in Figs. 1, 2, and 3, the right-hand ring B will be forced against the inner edge of the groove in the piston and a space or passage for the steam will be provided between the ring and the outer edge of the groove, as seen in Fig. 3, thence under the cut-away portion 1 to 2, and out through cut-away portion 3 to 4 (see Figs. 5 and 6) into the space between the rings. The ring B on the left of the piston will at the same time make a tight joint all round against the outer edge of the piston-groove by reason of the continuous unbroken contact of the ring with the said outer edge, as may be seen in Fig. 3, and as will be clearly indicated by the side elevation of the ring, (shown in Fig. 6,) and no steam can therefore pass this left-hand

ring when the pressure is upon the right of the piston. When the pressure is shifted to the left of the piston, the condition of the rings will be reversed, as will be readily understood.

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

1. In a balanced piston for steam-engines, a piston having obliquely-set packing-ring grooves, a steam space or chamber, and passages communicating with the outside through the opposite faces of the piston and between the said grooves, in combination with packing-rings projecting beyond the periphery of the piston-body, having lapping ends, with flush outer faces and cut-away portions on the bottom and at the inner sides, constructed and arranged for operation substantially as set forth.

2. In a balanced piston for steam-engines, having a piston with obliquely-set packing-ring grooves, a packing-ring projecting beyond the periphery of the piston-body and having a lap-joint with a tongue or reduced end portion, which is cut away on the bottom of the rings and on the inner face, and a recessed end adapted to take the said tongue and form a lap-joint, as described.

3. In a balance-piston, the combination, with the hollow body of the piston having peripheral openings and annular circumferential grooves, as described, of a pair of packing-rings each having a lap-joint, said rings being of less width than the width of the grooves and each lap-joint being formed of one recessed end and one reduced end of the ring, said reduced end lying in said recess and making a tight joint all round in the groove when pressed against its outer edge, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

WILLIAM J. THOMAS. [L. S.]

Witnesses:

JAMES L. KING,
EDWARD E. OSBORN.