

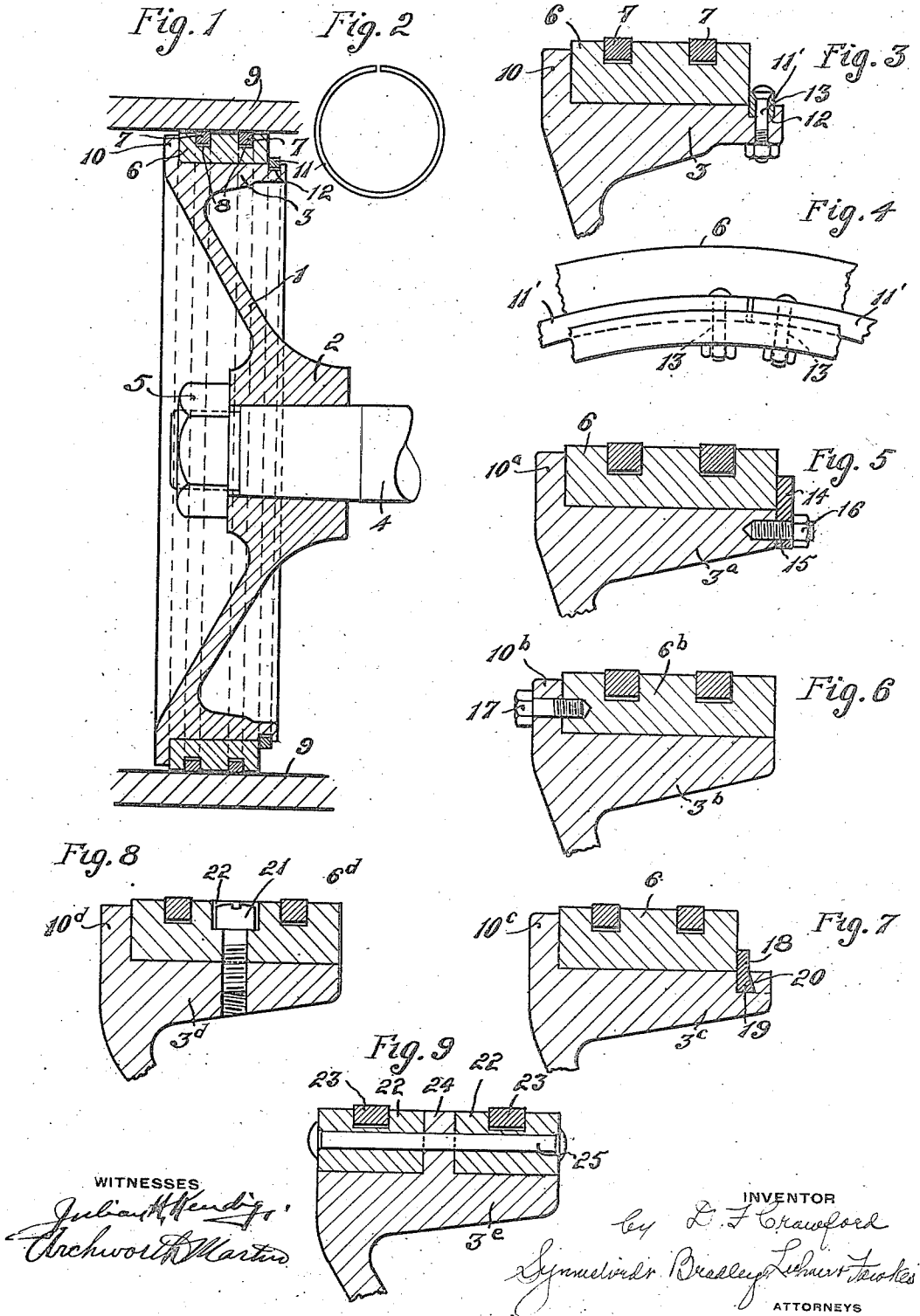
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PISTON.

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1,283,091.

Patented Oct. 29, 1918.



UNITED STATES PATENT OFFICE.

DAVID F. CRAWFORD, OF PITTSBURGH, PENNSYLVANIA.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DAVID F. CRAWFORD, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pistons, of which the following is a specification.

The invention relates to pistons and more particularly to that class of pistons used in steam locomotive cylinders, and has for its principal objects the provision of a piston having the properties of uniform expansion and contraction without increasing the tendency to wear the cylinder; the provision of a steam locomotive piston that requires no tail rod for the prevention of gouging the cylinder walls; the provision of a composite piston wherein the parts combining to make up the piston may be inexpensively made and readily assembled and taken apart; the provision of a piston wherein the wearing face may be replaced when worn without necessitating the waste incident to the discarding of a whole piston and the expense incident to refitting a new piston upon the piston rod; and such other improvements as will hereinafter appear. One embodiment of the invention together with modifications of certain details of construction are shown in the accompanying drawings, wherein—

Figure 1 is a longitudinal section through the piston and a portion of the cylinder; Fig. 2 is an elevation of a locking ring used in the piston shown in Fig. 1; Fig. 3 is a longitudinal section of a portion of a piston showing a modified form of ring locking mechanism; Fig. 4 is a front elevation of a portion of the device shown in Fig. 3; and Figs. 5, 6, 7, 8 and 9 are longitudinal sections of a portion of a piston showing modified forms of ring retaining devices.

Referring to Fig. 1, the piston consists of a central body portion 1 formed of steel by a rolling process, the body portion consisting of a hub portion 2 and a cylindrical face portion 3. A piston rod 4 extends through the hub 2 and is secured thereto by means of the nut 5.

It has been found that where a piston made of harder material than the cylinder wall is used in locomotive service, it was necessary to provide a tail rod which had a bearing in the front end of the cylinder and projected therethrough. Without the use of such tail rod the cylinder wall was found to be gouged and scored by the piston due

to the greater hardness of the piston and to prevent such scoring of the piston a wearing ring 6 is provided preferably made from similar material to that of which the cylinder is made.

It has been found that pistons made by a rolling process are far superior to those formed by casting, due to the greater strength and uniform expansion and contraction and when provided with a proper wearing face such as the cast iron ring 6, no tail rod is necessary and the piston does not score and gouge the cylinder.

The usual packing rings 7 are carried in the peripheral grooves 8 cut in the ring 6 and are adapted to closely engage the cylinder 9. The ring 6 is adapted to be slid onto the cylindrical face portion 3 of the center portion 1, and is retained by means of the flange 10 and a split locking ring 11, Figs. 1 and 2, which is sprung into a peripheral groove 12 cut in the cylindrical face portion 3. The flange 10 and the ring 11 prevent longitudinal movement of the ring 6, but the wearing ring may readily be removed by forcing the locking ring 11 from the groove and then sliding the wearing ring 6 from the face portion 3.

The wearing ring 6 may be retained in a number of ways, some of which are disclosed in Figs. 3 to 9 inclusive. Referring to Figs. 3 and 4, the ring 6 is retained by means of the flange 10 and a sectional ring 11' mounted in the groove 12. The ends of the ring sections 11' are secured to the cylindrical portion 3 by means of the bolts 13 which extend through holes in the ring sections 11' and the cylindrical portion 3. The ring sections 11' engage the wearing ring 6 in a manner similar to the construction of Fig. 1.

Fig. 5 discloses a cylindrical portion 3^a of the piston, having thereon the wearing ring 6 retained by means of a flange 10^a and a flat ring 14 which is secured by studs 15 to the cylindrical face portion 3^a. The ring 14 is slipped over the studs 15 and abuts the wearing ring 6. The nuts 16 are screwed tight against the ring 14 and thereby secure the ring 14 firmly against the wearing ring 6.

Fig. 6 shows a wearing ring 6^b mounted upon a cylindrical face portion 3^b which is provided with a flange 10^b. The wearing ring 6^b is secured to the cylindrical face portion 3^b by means of bolts 17, one of which is

disclosed, which extend through the flange 10^b and screw into the wearing ring. Longitudinal movement of the wearing ring is prevented in one direction by the flange 10^b and in the opposite direction by the bolts 17.

Fig. 7 shows another modified form, wherein the wearing ring 6 is mounted upon a cylindrical face portion 3^c which is provided with a flange 10^c for holding the wearing ring against movement in one direction. Movement in the opposite direction is prevented by means of a plurality of arcuate keys 18, one of which is disclosed, having enlarged inside edges 19 which are adapted to be inserted in a series of undercut grooves 20.

In the construction shown in Fig. 8, the wearing ring 6^d is retained upon the cylindrical face portion 3^d by means of the flange 10^d and a series of machine screws 21, one of which is shown, the screws extending through the face of the wearing ring 6^d into the cylindrical face portion 3^d. The heads of the machine screws 21 are located in counter sunk holes 22 so that they are beneath the face of the wearing ring.

Another modified form of construction is shown in Fig. 9 wherein a pair of wearing rings 22, each carrying a packing ring 23, are arranged on each side of a central flange 24 which is integral with the cylindrical face portion 3^e. Rivets 25, one of which is shown, extends through both of the wearing rings 22 and the flange 24, which

securely fasten the rings 22 to the flange 24. It is obvious that a considerable number of means may be devised to secure the wearing ring in position and the invention is not limited to specific methods shown or the specific form of ring.

What I claim is:

1. A composite cylinder piston comprising a central body portion having a cylindrical face and provided with an annular flange, a ring adapted to be slid longitudinally on the cylindrical face of the body portion and abut the flange, a peripheral groove in the cylindrical face of the body portion and a detachable lock ring in the groove adapted to engage the end of the first ring to secure it to the body portion.

2. A composite cylinder piston comprising a central body portion having a cylindrical face and provided with an annular flange, a ring adapted to be slid longitudinally on the cylindrical face of the body portion and abut the flange, a peripheral groove in the cylindrical face of the body portion, a locking member in the groove adapted to engage the end of the ring to secure it to the body portion and means for retaining the locking member in the groove.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

DAVID F. CRAWFORD.

Witnesses:

ROBT. REILLY,
W. S. CAREY.