H. J. BACHMAN.

PISTON.

APPLICATION FILED NOV. 15, 1916.

1,322,748. Patented Nov. 25, 1919.

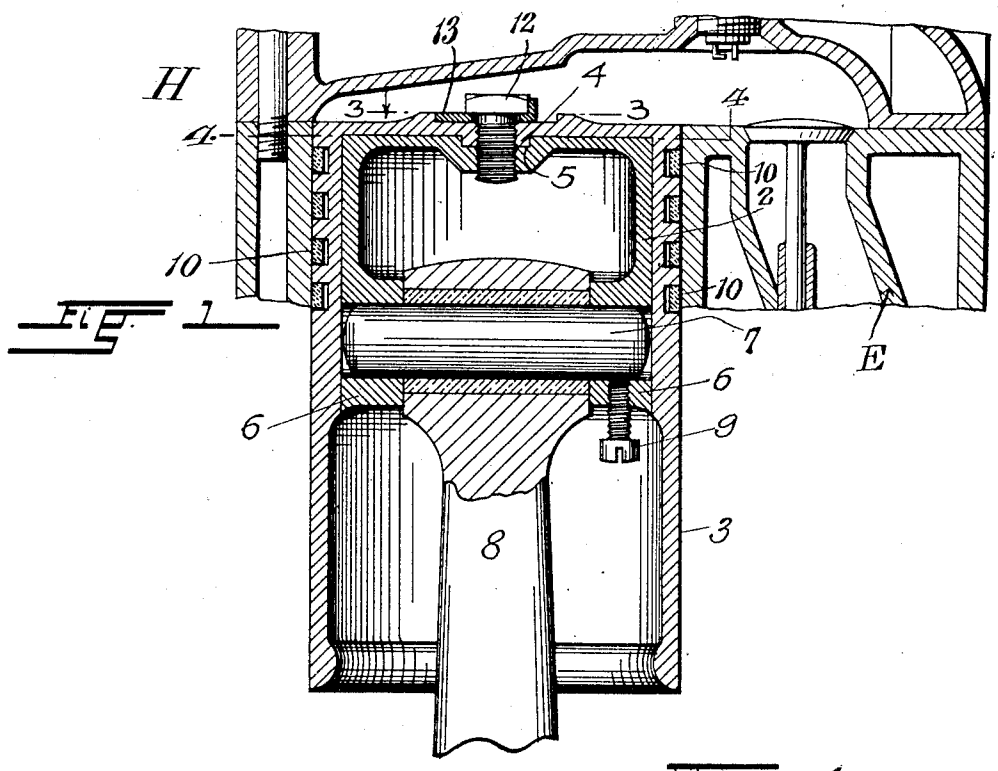


Fig. 1

Fig. 2

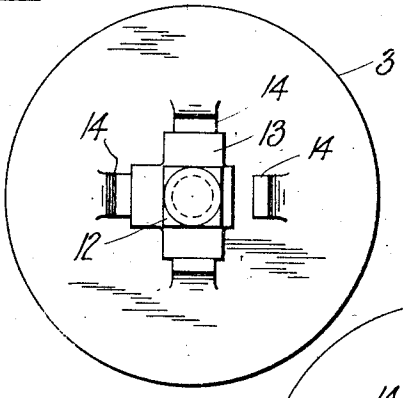
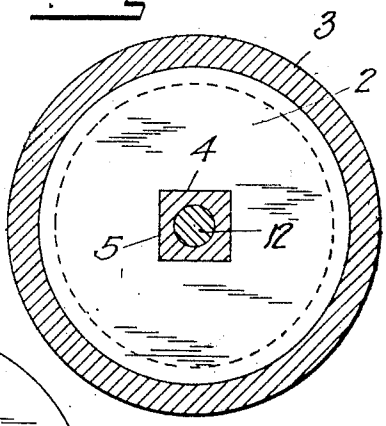


Fig. 4



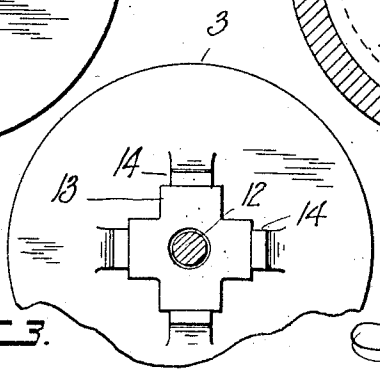


Fig. 3.

WITNESS:

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PISTON.

1,322,748. Specification of Letters Patent. **Patented Nov. 25, 1919.**

Application filed November 15, 1916. Serial No. 131,518.

To all whom it may concern:

Be it known that I, HUGO J. BACHMAN, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Pistons, of which the following is a specification.

This invention relates to improvements in reciprocating pistons of the type commonly used in the cylinders of pumps, compressors, motors and other similar machines, and more particularly to pistons for gas engines.

In gas engines, the cylinder of which has a removable head, the removal of the piston from the cylinder is a difficult matter, since it requires the removal of the crank case and other parts, causing great inconvenience.

Some of the objects of this invention, therefore, are to provide a piston which is so constructed and freely attached to the connecting rod, as to permit bodily removal of the piston without disturbing the connecting rod.

Another object is to provide a construction which permits of the part of the piston which contacts with the cylinder wall, to be readily removed for refinishing its surface, replacing its packing rings, or other repairs, without the necessity of disturbing other parts of the machine, with which the piston is operatively connected.

Further objects will appear from the detail description taken in connection with the accompanying drawing, in which:

Figure 1 is an axial section through a portion of a gas engine and a piston made in accordance with this invention, showing the connection of the piston with the connecting rod of said gas engine.

Fig. 2, an end view of the piston shown in Fig. 1, with the means for locking the device by which the parts of the piston are fastened together, in its locked condition.

Fig. 3, a fragmentary sectional view taken along the line 3—3, Fig. 1, showing the locking means above referred to, in the condition in which the fastening device is unlocked to permit of its adjustment for the separation of the piston parts, and

Fig. 4, a section taken along the line 4—4, Fig. 1.

The cylinders of gas and other engines are usually provided with detachable heads, and by removal of these heads the pistons can be removed through the head ends of the cylinders. In accordance with this invention, therefore, the piston comprises a piston shell and a carrier, in the form of a sleeve, to which the connecting rod is attached. The carrier is arranged to seat within the piston shell, but the shell is freely removable endwise from the carrier. A detachable connection, accessible from the head end of the cylinder, is provided between the shell and carrier; whereby the piston shell can be readily detached from and removed through the head end of the cylinder, without disturbing the connection between the carrier and its attached connecting rod, and without dismantling the crank case and crank.

Referring more specifically to the drawings, Fig. 1 shows a trunk piston, comprising, an inner body part or carrier 2 to which the piston- or connecting-rod is attached, and an outer piston shell or mantle 3 which is slidably fitted upon the carrier in coaxial relation thereto, so that the carrier seats freely within the shell.

Both parts of the piston are cylindrical and closed at one of their ends, the inner part or carrier being shorter than the outer part or shell and fitted in the closed end thereof; the coöperating faces of the shell and carrier are machined so as to position the shell freely but accurately over the carrier. The shell 3 of the piston has on its end-wall a central, inwardly projecting tenon 4 of angular section which is fitted in a correspondingly formed socket 5 in the outer surface of the end-wall of the carrier, to prevent rotation of either part with relation to the other when they are connected.

The carrier 2 of the piston has at its open end, two diametrically opposite, inwardly projecting bosses 6 which have axially alined bores to receive the ends of a pin 7 by which the head of a connecting rod 8 fitted between the bosses, is pivotally secured, and a set-screw 9 extending through a threaded aperture in one of the bosses engages the pin to hold it against rotation.

The shell 3 of the piston has in its exterior surface a number of circumferential grooves in which packing rings 10 are fitted for the usual purpose. The lower edge of the shell is beveled as shown in Fig. 1.

The two piston parts are securely connected against separate longitudinal move-

ment by a square-head bolt 12 which extends through registering threaded openings in both of the end walls of the two parts. To lock this bolt against accidental displacement, a washer 13 is provided, having four wings, which in their normal condition as shown in Fig. 3, abut against a corresponding number of lugs 14 formed integrally with the end wall of the outer shell 3, at quadrant points around its bolt-hole. The washer is made of pliable material, and by bending one of its wings outwardly against a face of the bolt-head, as shown in Figs. 1 and 2, the bolt is securely locked against rotation.

When the carrier and piston shell are secured together, as shown in Fig. 1, they will form in effect, an integral trunk piston structure, as they are secured both laterally and axially with the required accuracy, but so freely as to permit bodily removal of the piston shell from its carrier.

The cylinder in which the piston is used may be of a type common in engines, pumps, compressors, motors and similar machines, and, as herein shown sufficiently for purposes of illustrating this invention, comprises a cylinder C of a gas engine E that has a cover or head H detachably secured to its upper or head end. The head H is readily removable from the cylinder C to permit access to parts within the cylinder, such as the means which secures the piston shell to its carrier, so that the said shell may be detached from its carrier and withdrawn from the open head end of the cylinder.

When it is desired to remove the piston from the cylinder, for refinishing its surface, replacing one or more of the packing rings, or other repairs, the cylinder head H is removed, and by then loosening the screw 12, the piston shell 3 can be bodily or as a unit removed from its carrier without disturbing the connecting rod. It will be understood that the bent wing of the washer 13 is returned to its original position by bending it against the surface of the piston, and the bolt 12 being thus released, is turned until its inner end is free from the carrier of the piston, but still engages the thread in the piston shell. The bolt when in this position provides a ready means for engagement by a tool to effect the removal of the piston-mantle or shell by sliding it longitudinally through the open end of the cylinder. The presence of the piston rings on the piston, of course, necessitates the provision of means whereby a part, such as 12, on the piston can be gripped by any suitable tool as the piston is normally flush with the end of the cylinder.

It will be observed that since the piston is a trunk piston, having its head end (that is the end exposed to the gases) closed, and having its other end open to the crank case, the joints between the piston and its carrier are not only protected against the corrosive action of the gases, tending to cause them to stick together, but these joints are subjected to the lubricating oil splashed into the cylinder from the crank case; the joint will, therefore, remain clean and free, so that when the screw is loosened, the piston can be freely withdrawn from its carrier, through the head end of the open cylinder. This carrier is of considerably smaller diameter than the cylinder, and the condition of the walls of the cylinder can, therefore, be readily observed.

When the piston shell is again replaced, the provision of the beveled edge of the shell, causes this shell to center itself on the carrier and, therefore, permits quick and accurate replacement of the piston shell on its carrier. After the shell is replaced the screw 12 is tightened and locked by turning up one of the wings on the washer 13 as shown in Figs. 1 and 2.

It is understood that the construction and relative arrangement of the parts of which the improved piston is composed, may be varied within the spirit of the invention in accordance with the design of the engine or the machine of which the piston is a part. It is further obvious that various changes may be made in the details of construction without departing from the spirit of this invention. It is, therefore, to be understood that this invention is not to be limited to the specific construction shown and described.

Having thus described the invention, what is claimed is:

1. A piston composed of two cylindrical parts closed at one end and fitted one around the other for longitudinal removal, the said closed ends of the parts having registering threaded openings for the application of a bolt to fasten them together, and the closed end of the outer part having lugs adjacent its said openings, a headed bolt fitted in said openings, and a pliable washer having wings abutting against said lugs and adapted to be bent in engagement with the head of the bolt for locking the same against rotation.

2. A piston composed of two cylindrical shells closed by heads at one of their ends and slidingly fitted one within the other with their said heads adjoining one another, the inner shell having means for its connection with a motion transmitting agent, one of said heads having a non-circular socket and the other one having a correspondingly formed tenon within the socket, and means for uniting the two shells.

3. A piston composed of two cylindrical shells closed by heads at one of their ends and slidingly fitted one within the other

with their said heads adjoining one another, the inner shell having means for its connection with a motion transmitting agent, one of said heads having a non-circular socket and the other one having a correspondingly formed tenon within the socket, said tenon and the bottom of said socket having alined apertures, and a bolt in said apertures to secure the shells together.

4. A piston comprising an inner, pitman-connected member having an end wall and an outer member having an end wall, and fitting the inner member, the end walls of the two members being adjacent, means removably connecting said end walls consisting of a single screw, means to lock the screw from turning, and means to lock the two members against independent, turning movement.

5. A piston comprising an outer member and an inner pitman-connected member having adjoining end-walls and slidingly fitted one upon the other, said heads having coöperative means for holding the members against independent rotation, and a screw connecting the heads and adjustable from outside the piston, for disconnecting the same.

6. In a gas engine having a cylinder, a carrier adapted for attachment to a connecting rod, a trunk piston closed at its head and adapted to seat freely over said carrier, and constructed and arranged to permit its bodily removal and replacement from and on said carrier through the head end of the cylinder, and means operable from the head end of said piston adapted to detachably connect said piston with said carrier.

7. In a gas engine having a cylinder, a carrier having a wrist pin connection, a trunk piston closed at its head end adapted to telescopically seat freely over said carrier, and constructed and arranged to permit its bodily removal and replacement from and on said carrier through the head end of the cylinder, and means operable from the head end of said piston adapted to detachably connect said piston with said carrier.

8. In a gas engine having a cylinder, a carrier sleeve of smaller diameter than the cylinder and having a wrist pin connection, a piston shell adapted to telescopically seat freely over said sleeve and form therewith a trunk piston, said piston shell being constructed and arranged to permit its bodily removal and replacement from and on said sleeve through the head end of the cylinder, and means operable from the head end of the piston adapted to detachably connect said shell to said sleeve.

9. The combination of a cylinder having a removable head, and a piston comprising two members, an inner one with which the pitman is connected, and an outer one fitting over and removable from the inner one and from the cylinder by an outward endwise movement from the side opposite the pitman.

10. The combination with a cylinder having a removable head, a piston comprising two members, an inner one and an outer one fitting over a wrist pin mounted within the inner piston member, and a pitman connected with said wrist pin, said outer piston member being removable from the inner member and from the cylinder by an outward endwise movement from the side opposite the pitman.

In testimony whereof I have affixed my signature in presence of two witnesses.

HUGO J. BACHMAN.

Witnesses:
G. J. ROLLANDET,
L. RHOADES.