June 5, 1934. J. B. LARGER 1,961,886

PISTON

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Fig. 1.

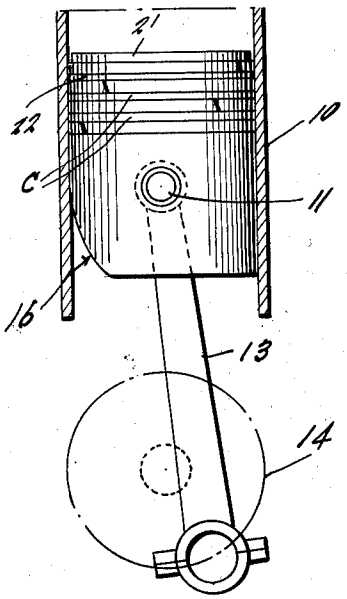

Fig. 2.

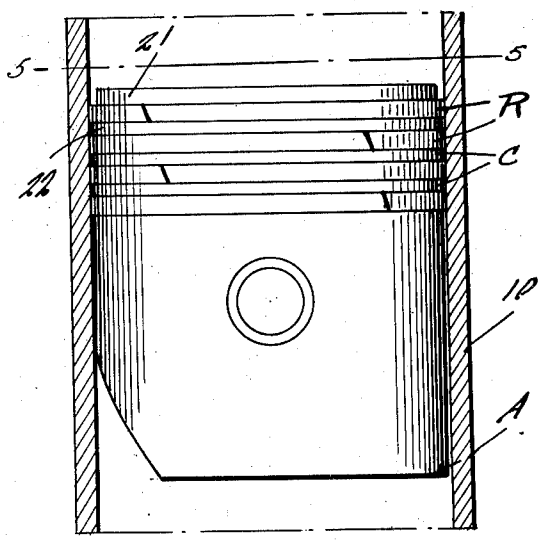

Fig. 4.

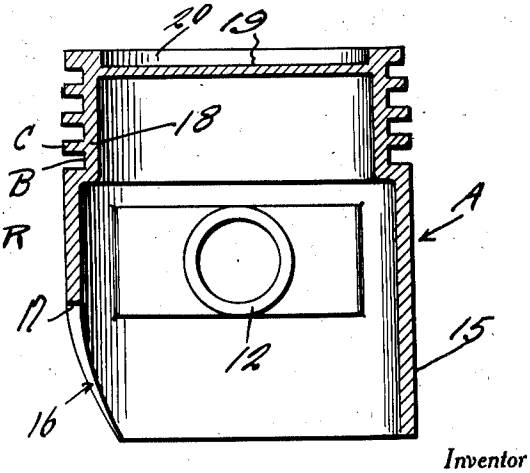

Fig. 3.

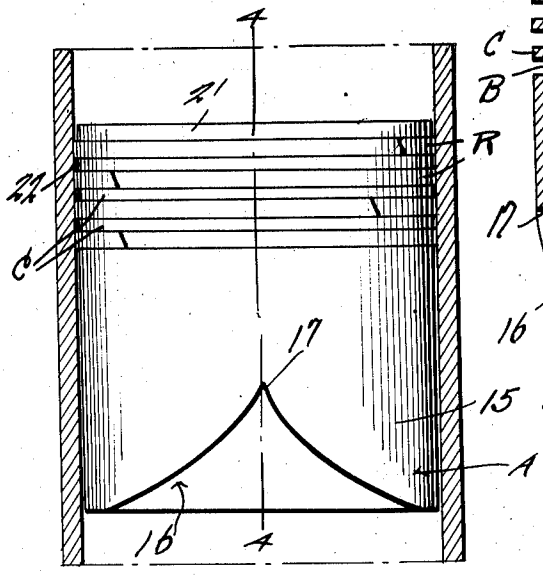

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Fig. 5.

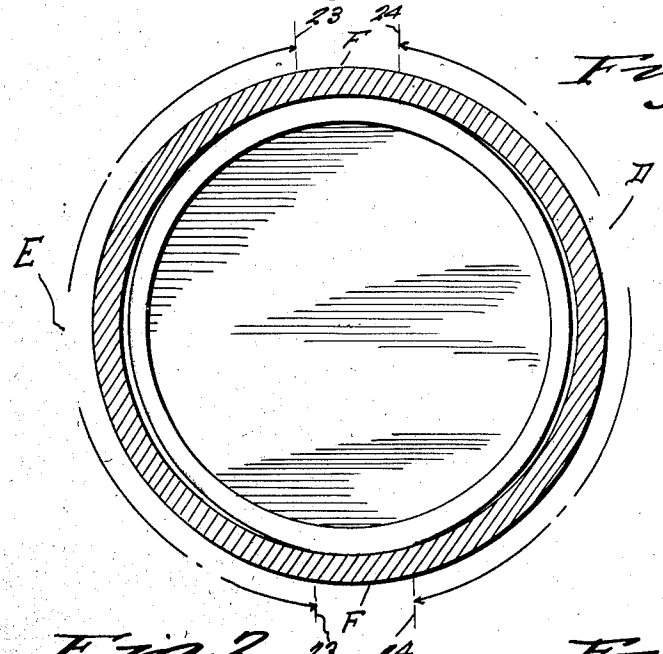
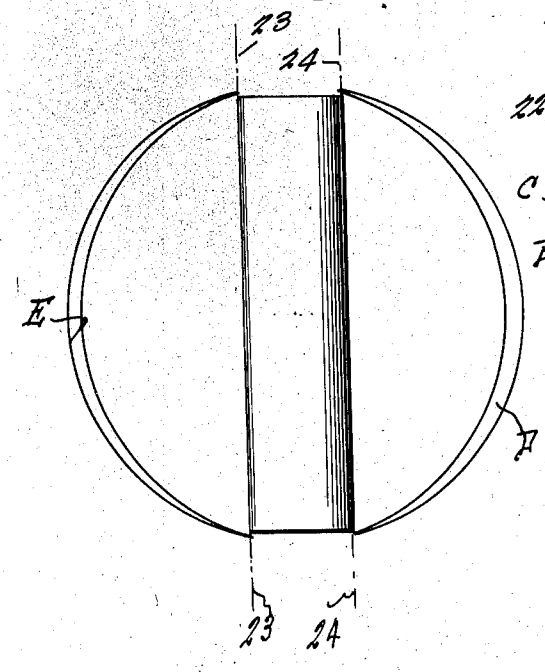
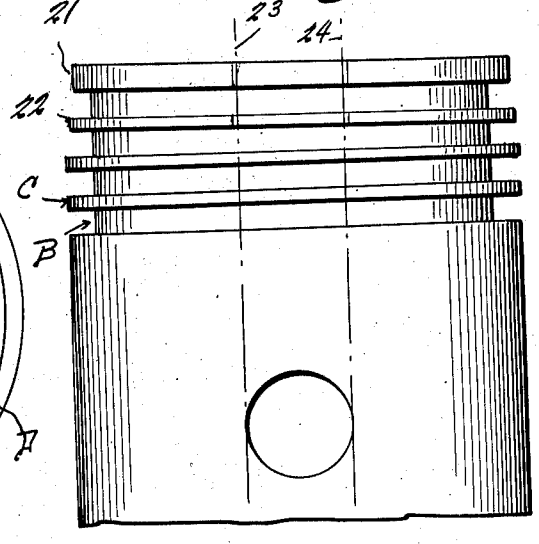


Fig. 7.



Fig



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Patented June 5, 1934 1,961,886

UNITED STATES PATENT OFFICE

1,961,886

PISTON

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Application September 28, 1932, Serial No. 635,268

3 Claims. (Cl. 309—10)

This invention relates to pistons for internal combustion engines.

It is the aim of the invention to construct a piston that translates the maximum amount of power to the crank shaft of an internal combustion engine with a minimum wear on the cylinder wall, thereby obviating the customary necessity of resurfacing the cylinder walls.

Another feature of the invention is to make the operation of the motor comparatively quiet by overcoming what I believe to be the cause of the piston knocks prevailing in the conventional internal combustion engine.

It is a fairly well established fact that the piston knocks of internal combustion engines results from the tendency of the piston to rock on the axis of the wrist pin. From my observation I believe that the forceful rocking movement that causes knocks and excessive wear occurs only on the power stroke and this tendency to rock only occurs in one direction, that is, clockwise with respect to the axis of the wrist pin. By modifying the piston crown and skirt to allow greater freedom to rock, within reasonable limits which I deem to be within a range between a thirty second and a sixty fourth of an inch over the customary practice, the excessive wear and knocking noise is eliminated to a marked degree.

In the drawings wherein for the purpose of illustration is shown the preferred embodiment of the invention, like reference characters indicate like parts throughout the several views wherein:—

Figure 1 is a vertical detailed section through a cylinder of an internal combustion engine showing the piston in accordance with the present invention in elevation.

Figure 2 is an enlarged fragmentary section of a cylinder showing the piston in elevation.

Figure 3 is a view similar to Figure 2 and taken at right angles thereto.

Figure 4 is a detailed vertical section of the piston taken substantially on line 4—4 of Figure 3.

Figure 5 is a horizontal section taken on line 5—5 of Figure 2.

Figure 6 is an enlarged fragmentary elevation of the piston, and

Figure 7 is a diagrammatic view illustrating the clearance in the crown of the piston.

In the drawings, 10 indicates the walls of the cylinder of an internal combustion engine and said walls are circular in cross section. Slidably mounted in the cylinder is a piston A constructed in accordance with the present invention. In the piston is the wrist pin 11 mounted in bearings 12 and journalled to the wrist pin is the upper end of the connecting rod 13. The lower end of the connecting rod 13 is adapted for connection to the crank of the crank shaft not shown, but the revolution of the crank is denoted by the broken line 14 in Figure 1 of the drawings.

The piston A consists of a hollow cylindrical body portion of the customary shape and has a crown portion 18, and integral head 19, a skirt portion 15, and a wrist pin 11 between the crown and skirt portions.

The piston A is formed with a round skirt 15 the surface of which is substantially tangent to the walls of the cylinders 10 except for the usual clearance used in all current practice. On one segment there is formed in the skirt an inverted V-shaped slot indicated generally at 16. The mouth of this slot is at the lower edge of the skirt 15 and the width of the slot at the mouth is substantially the length of the wrist pin 11. The sides of the slot 16 slopes uniformly to the apex 17 which is on a plane with the bottom of the wrist pin 11, and the edges of the sides are flat or square. The slot 16 is at right angles to the axis of the wrist pin 11 and in vertical alinement with the greatest clearance in the crown as will hereinafter more fully appear. Slot 16 forms a relieved area in the skirt which has the corollary advantage of reducing friction with the cylinder wall with the attendant reduction of wearing surface and increased lubrication to the parts of the piston where there is the most friction.

The crown 18 of the piston is formed with the customary peripheral piston ring grooves and piston ring flanges indicated generally at B and C respectively and four grooves are preferred in this invention. The grooves B receive the conventional piston rings R. All of the flanges prior to my modification have the customary clearance accepted by the general practice in the art. It is therefore pointed out that the flanges that are untreated by my invention conform to the usual practice with regard to clearance.

In the head of the piston I form a circular cavity 19 having a diameter substantially the same as the width of the hollow interior of the piston and of a preferred depth to the plane of the upper edge of the first piston ring groove. Above the cavity is a flat perpendicular shoulder 20, the purpose of which is to disperse the reactionary forces and products of combustion away from the cylinder walls. It is my belief that I retain a larger percentage of the power of each power stroke from the cavity in the head.

To overcome the contact of the top of the

crown of the piston with the cylinder wall caused by the rocking of the piston on the power stroke I modify the two upper piston ring flanges indicated generally at 21 and 22. Beginning at points indicated by the dotted lines 23, 24 the faces of both these flanges 21 and 22 in the segments denoted by the dotted lines D and E are relieved or cut away, or ground away, to provide greater clearance. The arc described between the lines 23 and 24 indicated at F is unmodified and conforms to the original radius. The faces of flanges 21 and 22 are relieved, cut away or ground away in a true segment, the radius of which is considerably greater than the original radius which provides the greatest clearance at right angles to the axis of the wrist pin 11.

The axis of the wrist pin is in the direction of the dotted lines 23, 24. From the point of greatest clearance the faces of the flanges taper outwardly and uniformly along the increased radius to a substantial tangency with the original radius at the lines 23, 24 where the relieved segments D and E merge with the arc F. The arc F is on the wrist pin axis. The clearance for the segments D and E on the first piston ring flange 21 is greater than the corresponding segments on the second piston ring flange 22 thereby making steps to the third or unmodified piston ring flange C.

By reason of the foregoing construction the piston of this invention is allowed a greater rocking movement, on the axis of the wrist pin. The slot 16 is provided in the skirt of the piston to compensate for the rocking of the crown since the apex 17 of the slot is located in vertical alinement with the greatest clearance in the flanges and at right angles to the axis of the wrist pin. Moreover, the tendency to rock the piston in a clockwise direction with respect to Figure 1 which latter view furnishes a clear understanding of the position of the slot 16 with respect to the clearance of the piston ring flanges 21 and 22. It is believed that the relieved area D in the crown, the slot or relieved area 16, in conjunction with the piston rings R eliminate the knock on the power stroke. The reason for the relieved area E on the same side of the crown as the slot 16, is to remove any tendency of the piston to knock on the up-stroke when the piston rocks back gradually to normal position.

Having thus described my invention, what I claim is:

1. A piston comprising a crown, a skirt, and wrist pin bearings, the skirt being smooth and formed with a relieved segment at the lower end thereof, said crown formed with plural piston ring grooves, a piston ring in each groove, the flanges of the piston ring grooves at the uppermost portion of the crown being relieved in segments allowing the balance of the lowermost flanges to remain unaltered with respect to the conventional cylinder clearance, and said relieved segments in the crown and skirt being located on the opposite side of a vertical plane passing through the axis of the wrist pin bearings whereby the said relieved portions and rings cooperate to eliminate piston knock resulting from rocking of the piston about the wrist pin as an axis.

2. A piston comprising a crown, a skirt, and wrist pin bearings intermediate the crown and skirt, said skirt formed with an inverted V-shaped slot in its lower end, said crown formed with plural piston ring grooves, rings in said grooves, the flanges of the uppermost grooves being relieved in segments less than the semi-circumference of the piston leaving the lowermost flanges of the grooves unaltered with respect to the conventional cylinder clearance, and said slot and relieved segments of the flanges being located on the opposite sides of a vertical plane passing through the axis of the wrist pin bearings whereby the said slot, relieved portions and rings cooperate to eliminate piston knock resulting from rocking of the piston about the wrist pin as an axis.

3. A piston comprising a rigid crown, skirt, and wrist pin bearings, said wrist pin bearings lying intermediate the crown and skirt, said skirt formed with an inverted V-shaped slot in its lower edge, said crown formed with plural piston ring grooves, rings in said grooves, the flanges of the uppermost grooves being relieved in segments less than a semi-circumference of the piston leaving the lowermost flanges of the grooves unaltered with respect to the conventional cylinder clearance, said segmental relieved portions of the flanges being located on the opposite sides of the axis of the wrist pin bearings, and said slot located diametrically opposite certain of the relieved flange segments whereby the said relieved portions, slot and rings cooperate to eliminate piston knock resulting from rocking of the piston about the wrist pin as an axis.

JOHN B. LARGER.