

May 21, 1940.

J. H. NICHOLSON

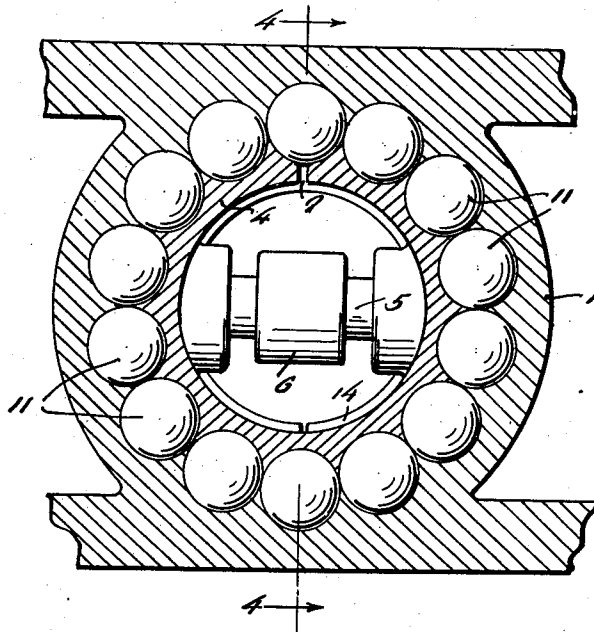
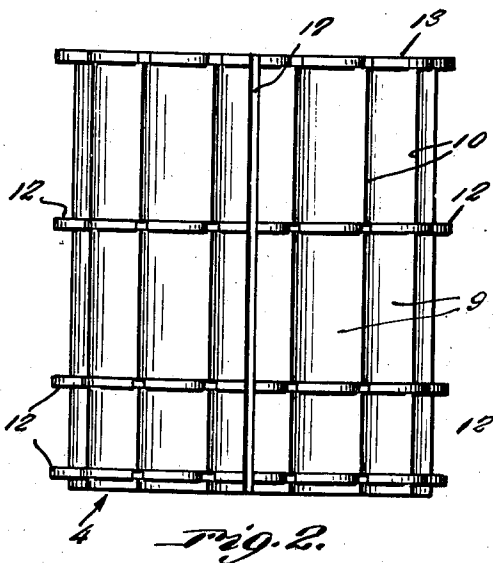
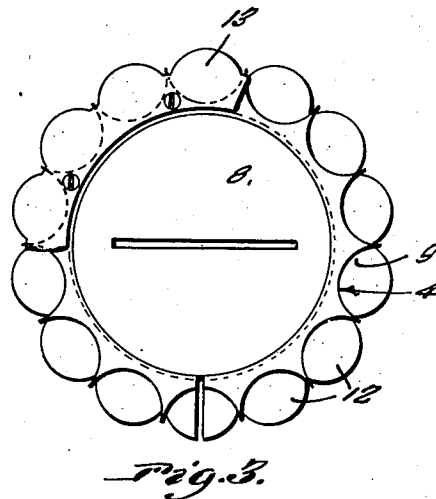
2,201,739

PISTON

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Fig. 1.



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Fig. 4.

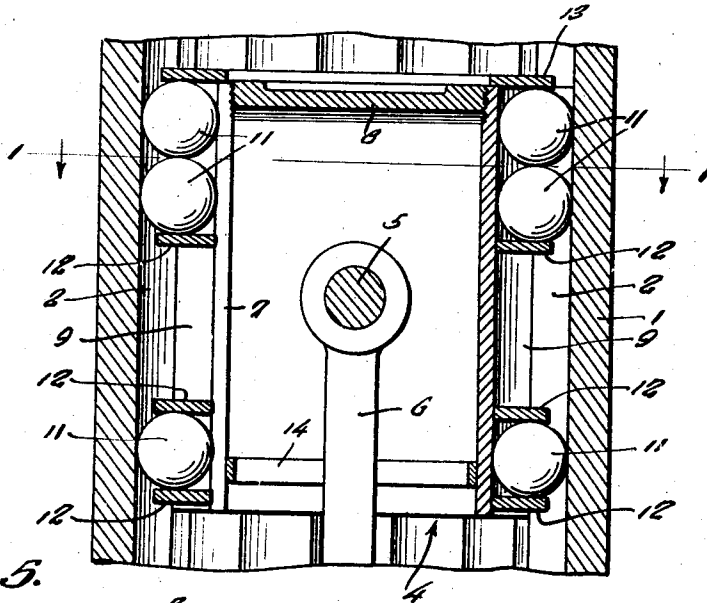


Fig. 5.

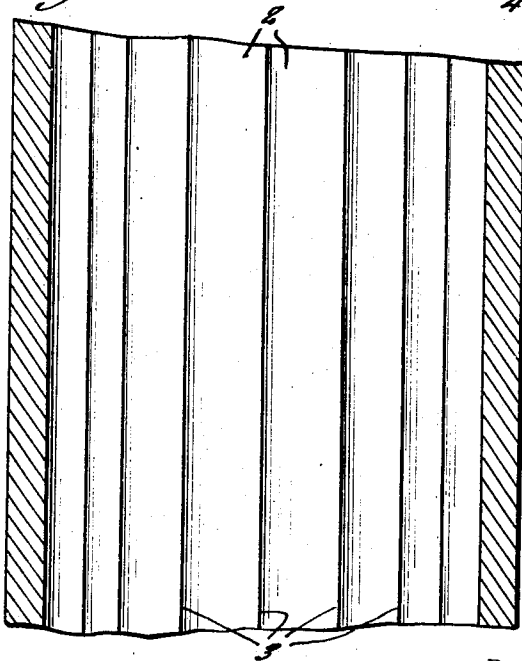


Fig. 6.



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UNITED STATES PATENT OFFICE

2,201,739

PISTON

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Application March 28, 1939, Serial No. 264,617

2 Claims. (Cl. 309—1)

The present invention relates generally to engines and more particularly to new and useful improvements in the pistons and cylinders thereof.

5 The primary object of the invention is to provide, in a manner as hereinafter set forth, a piston and cylinder construction wherein the usual resilient rings are eliminated and through the medium of which the friction between the piston and its cylinder will be materially reduced or substantially eliminated.

Other objects of the invention are to provide an engine cylinder and piston construction which will be comparatively simple, strong, durable, reliable in operation and which may be manufactured at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views, and wherein:

Figure 1 is a view in horizontal section through a piston and cylinder constructed in accordance with the present invention, taken substantially on the line 1—1 of Fig. 4.

Figure 2 is an elevational view of the piston.

Figure 3 is a top plan view of the piston.

Figure 4 is a vertical sectional view, taken substantially on the line 4—4 of Fig. 1.

Figure 5 is a fragmentary view in vertical section through the cylinder.

Figure 6 is a detail view in elevation of one of the ball bearings.

Referring now to the drawings in detail, it will be seen that the embodiment of the invention which has been illustrated comprises a cylinder 1 of suitable dimensions. The walls of the cylinder 1 are fluted or vertically grooved, as at 2. The lands between the vertical grooves 2 taper to knife edges, as at 3. It may be well to here state that the vertical grooves in the cylinder 1 are substantially semi-circular.

Mounted for reciprocation in the cylinder 1 is a piston which is designated generally by the reference numeral 4. The piston 4 is provided with a wrist pin 5 to which a connecting rod 6 is coupled.

The piston 4 is vertically split, as at 7. As best seen in Fig. 4 of the drawings, the piston 4 also includes a threadedly mounted removable head 8. It will be observed that the head 8 and the upper end portion of the piston 4 into which it is screwed are slightly tapered. Thus, the piston 4

may be expanded if desired to obtain the correct fit in the cylinder 1.

The piston 4 has formed vertically therein grooves 9 which are opposed to the cylinder wall grooves 2. The lands between the piston grooves 9 also taper to a knife edge, as at 10. Mounted in the piston grooves 9 are ball bearings 11 which travel in the cylinder wall grooves 2. Elements 12 of suitable metal are provided for supporting the ball bearings 11 in the grooves 9. It will be observed that a single set of balls 11 is provided on the lower end portion of the piston 4 and that a double set of said balls are provided on the upper portion of said piston. A removable retaining ring 13 for the upper ball bearing 11 is secured on the upper end of the piston 4.

It is thought that the operation of the invention will be readily apparent from a consideration of the foregoing. Briefly, as the piston 4 reciprocates in the cylinder 1 the ball bearings 11 move therewith, traveling in the grooves 2 of said cylinder. The construction and arrangement is such that the walls 11 substantially close and seal the spaces between the piston 4 and the cylinder 1 and at the same time function as bearings for greatly reducing friction and drag between said piston and cylinder. The upper balls prevent the escape of gases from the combustion chamber while the lower balls prevent the passage of excessive oil from the crank case. By screwing the slightly tapered head 8 downwardly in the correspondingly shaped upper end portion of the piston 4, said piston may be conveniently expanded to secure proper fit of the assemblage in the cylinder. The reference numeral 14 designates an expansion ring in the lower portion of the piston 4.

It is believed that the many advantages of an engine piston and cylinder constructed in accordance with the present invention will be readily understood and although a preferred embodiment is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:

1. An engine comprising a cylinder having longitudinal grooves therein, a piston operable in the cylinder and having longitudinal grooves therein opposed to the first named grooves, said grooves being substantially semi-circular, the lands between the cylinder grooves and between the piston grooves tapering to substantially knife edges, ball bearings mounted on the piston in the

grooves therein and operable in the cylinder grooves, and means for retaining said ball bearings against longitudinal movement in the piston grooves.

- 5 2. An engine comprising a cylinder having longitudinal grooves therein, a piston operable in the cylinder, said piston being longitudinally split and having longitudinal grooves therein opposed to the piston grooves, a tapered head threadedly

mounted in one end portion of the piston, ball bearings mounted in the grooves of the piston and operable in the cylinder grooves, and means for retaining the ball bearings against longitudinal movement in the piston grooves, the head 5 constituting means for expanding the piston in the cylinder.

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