Nov. 6, 1923.

1,472,893

P. G. TISMER

PISTON CONSTRUCTION

Filed Aug. 25, 1921

Fig. 1

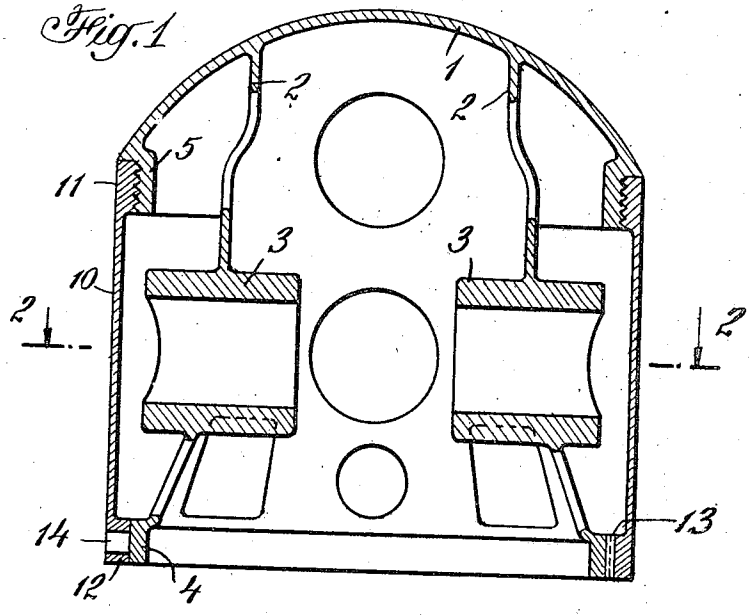


Fig. 3,

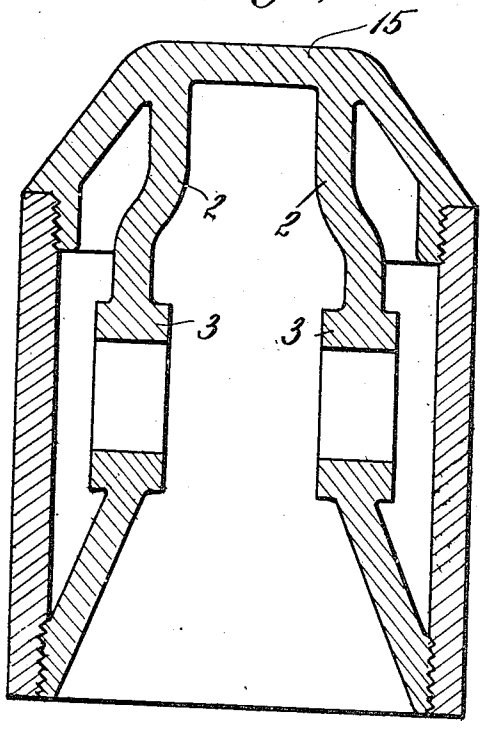
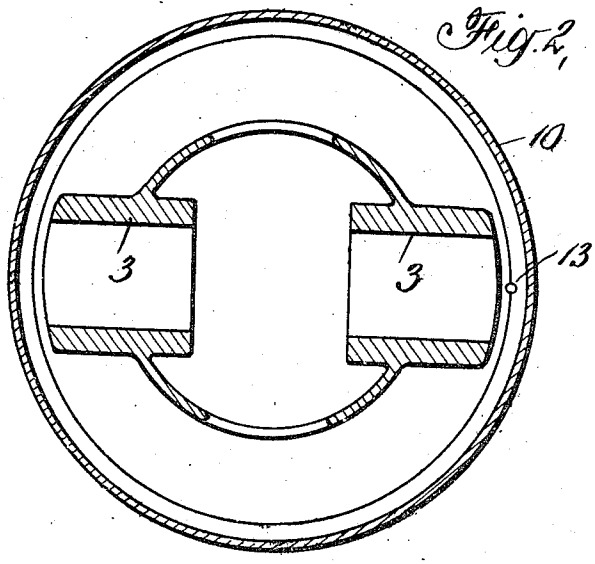


Fig. 2,



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UNITED STATES PATENT OFFICE.

PAUL GERHARD TISMER, OF NEW YORK, N. Y., ASSIGNOR TO RINGLESS PISTON COMPANY, A CORPORATION OF DELAWARE.

PISTON CONSTRUCTION.

Application filed August 25, 1921. Serial No. 495,317.

To all whom it may concern:

Be it known that I, PAUL G. TISMER, a citizen of the German Republic, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Piston Constructions; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The patent to Paul G. Tismer No. 1,272,578, issued July 16, 1918, describes a ringless piston, an important point in the elimination of the piston ring being that there is maintained between the piston and the cylinder wall a continuous oil film. The maintenance of this continuous oil film is made possible by the elimination of the piston rings and consequent elimination of their scraping action, and of course, eliminates all friction due to piston rings. This oil film between the piston of the cylinder wall does two things; it separates the piston from the cylinder wall so that there is no metal-on-metal contact, but instead only metal-on-oil contact, whereby friction is very much reduced; it acts as a packing or seal between the piston and cylinder, whereby a gas-tight fit is maintained at all times between these parts. Due to the fact that the explosion pressure is exerted only on the upper edge of an attenuated oil film, that the time element is short and that capillary attraction exists between the oil and metal, the oil film or oil seal does not blow out, but is at all times effectively maintained.

The invention in this case relates to an improved piston construction of the ringless type which is light, strong, and easy to manufacture.

The piston shown in the Tismer patent is of the concave head type. The piston of this invention, however, is of the convex head type and is made in two parts; one part, the centrally disposed frame, comprises a convex head, a lower rim, and webs extending lengthwise of the piston and connected respectively to the said head and rim; the other part, the cylindrical shell, is a cylinder of substantially uniform thickness, that engages with the frame only at its upper and lower edges; it is not provided with piston rings.

The mentioned webs have two particularly important functions. They support the wrist pin bearings, whereby there is no necessity of providing bosses on the interior of the shell for such bearings. The presence of such bosses is particularly objectionable because the extra metal causes unequal expansion of the shell. The avoidance of unequal expansion is an important feature of the Tismer ringless pistons. Uniform expansion is attained by making the shell of substantially uniform thickness throughout, so that it will expand uniformly in all directions and by supporting the wrist pin bearings on the lower frame, separate from the shell. The other important function of the webs is to conduct heat away from the head of the piston. These webs are preferably made integral with the upper central part of the piston where it is hottest and where there is need for cooling action. The excess heat is conducted away through the webs and is radiated from their inner and outer walls.

Other advantages and structural details will be apparent from the subsequent description. The drawings illustrate a preferred embodiment of the invention, but it will, of course, be understood that the invention is not limited to the specific structural details shown but may be carried out in other ways as defined within the scope of the appended claims. While the described piston construction is particularly applicable to a piston of the ringless type, piston rings could be used, if desired.

In the drawings, in which corresponding reference characters indicate corresponding parts, Fig. 1 is a vertical sectional view through one form of piston; Fig. 2 is a section on the line 2—2 of Fig. 1; and Fig. 3 is a view similar to Fig. 1, of another form of piston.

Referring now to the drawings, the frame comprises a convex head 1, here shown as shaped substantially like the segment of a sphere. Longitudinally extending webs 2, preferably cast integral with the head 1, support the wrist pin bearings 3, and continue downwardly to the rim 4, which may be integral with the webs. The outer part of the convex head 1 may be provided with an exteriorly threaded flange 5. The shell comprises a body portion 10 which is cylindrical and of substantially uniform thickness throughout and is

provided with upper and lower rims 11 and 12. The said upper and lower rims 11 and 12 engage with the flange portion 5 of the head and the lower rim 4 so as to complete the piston. The precise manner of this connection may be varied; in Fig. 1 the connection between the upper rim and flanges 5 is a threaded one, while there is a sliding fit between the lower edge of the shell and the rim 4. After the frame and shell are assembled, a hole 13 is drilled between the rims 4 and 12 in which a cotter pin is put for preventing relative rotation of the shell and frame. A keying pin may be also used in hole 14 to prevent relative rotation of the two parts.

The piston shown in Fig. 3 is very similar to that shown in Fig. 1, the main difference being that the head 15 is polygonal in shape rather than spherical and the general construction heavier. The heavier construction does away with the necessity of providing the flanges 11 and 12, shown in Fig. 1. In Figs. 1 and 3 the shells 10 are not provided with piston rings.

The pistons described are light, strong, and work with a minimum of friction, because they ride at all times on a film of oil and because the scraping friction of the piston rings is eliminated. The bearings for the wrist pin are supported entirely by the inner frame so that any expansion of the metal in the wrist pin or bearings has no effect on the shell. Therefore, there can be no distortion of the shell due to expansion of such bearings. Another advantage is that the head of the piston is cooled by conduction through the longitudinally extending webs. Any expansion or contraction of webs takes place longitudinally of the piston and therefore has no tendency to cause the piston to seize.

Having thus described my invention, I claim:—

1. In a piston for an internal combustion or other engine, a centrally disposed frame including a convex head and longitudinally extending webs engaging the head at a point well above the lower point thereof, wrist pin bearings carried by the said webs, in combination with a cylindrical shell that engages with the frame at the upper and lower edges of said shell, said bearings being out of contact with said shell.

2. A ringless piston for an internal combustion or other engine, comprising a centrally disposed frame including a convex head, longitudinally extending webs continuously converging toward the top of said frame, wrist pin bearings carried by said webs, and a cylindrical shell, of substantially uniform thickness, that is not provided with piston rings, the shell being connected to the frame at its upper and lower edges, said bearings being out of contact with said shell.

3. In a piston for an internal combustion or other engine, a centrally disposed frame including a convex head, a lower rim, longitudinally extending webs connected to the top of the head and to the lower rim, respectively, wrist pin bearings carried by the said webs, in combination with a cylindrical shell that engages at its upper and lower ends with the outer part of the convex head, and said lower rim, respectively, said bearings being out of contact with said shell.

4. In a piston for an internal combustion or other engine, a centrally disposed frame including a convex head, a lower rim, longitudinally extending webs connected to the top of the head and to the rim, respectively, wrist pin bearings carried by the said webs, in combination with a cylindrical shell that engages at its upper and lower ends with the outer part of the convex head and said lower rim, respectively, said shell being of substantially uniform thickness and not provided with piston rings, said bearings being out of contact with said shell.

In testimony whereof I affix my signature.

PAUL GERHARD TISMER.