S. D. HARTOG.

PISTON FOR RECIPROCATORY ENGINES.

APPLICATION FILED OCT. 20, 1919.

1,398,689. Patented Nov. 29, 1921.

Fig. 1

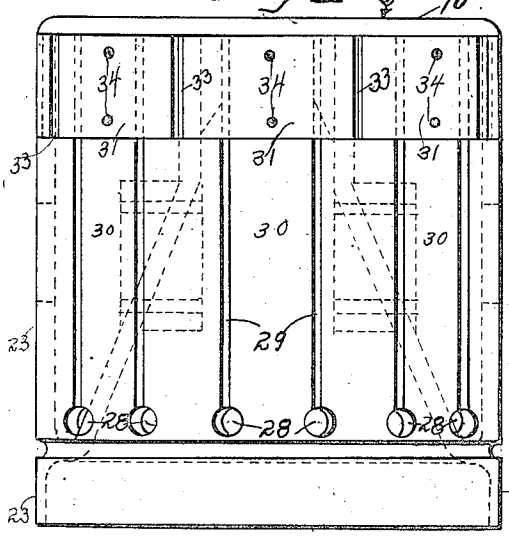


Fig. 2

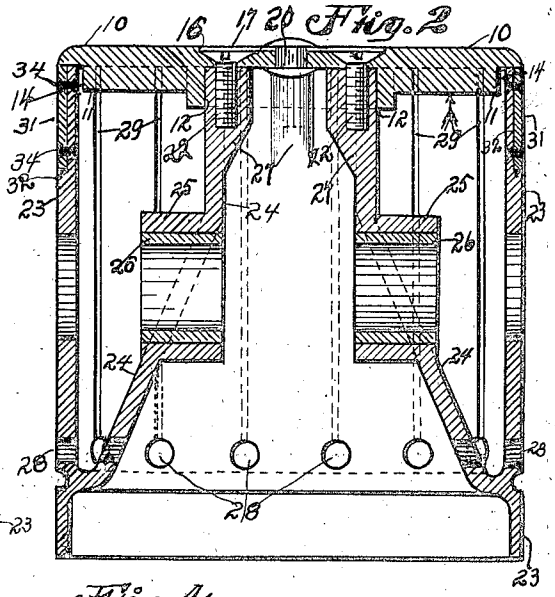


Fig. 3

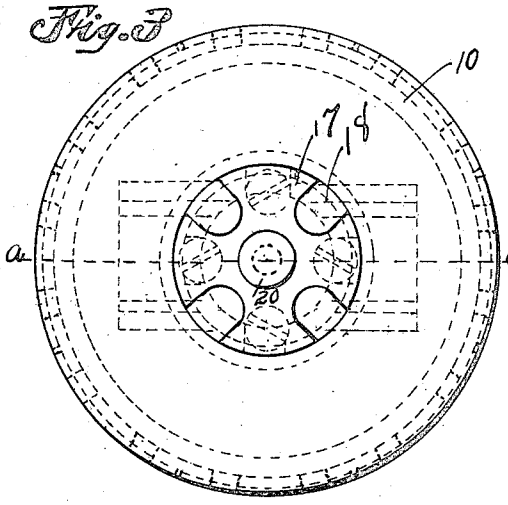


Fig. 4

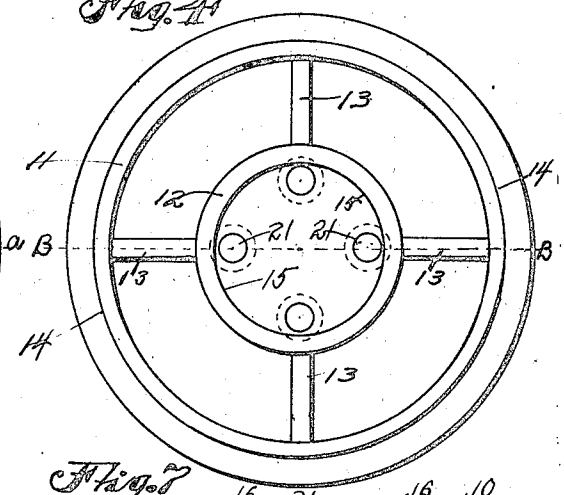


Fig. 5



Fig. 6

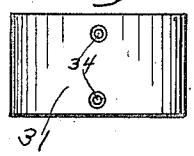


Fig. 7

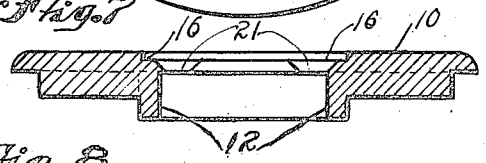


Fig. 8

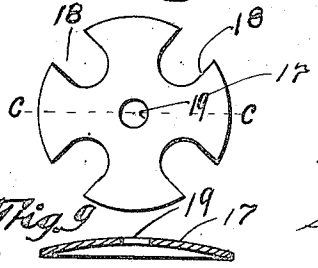


Fig. 9

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PISTON FOR RECIPROCATORY ENGINES.

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To all whom it may concern:

Be it known that I, STEPHEN D. HARTOG, a citizen of the United States, residing at St. Louis, State of Missouri, have invented new and useful Improvements in Pistons for Reciprocatory Engines, of which the following is a specification.

This invention relates to pistons for reciprocatory engines, more particularly for use in internal combustion engines.

Hydro-carbon or the internal combustion type of engine generates heat to a very high degree, consequently, the parts subjected to this high heat temperature are required to expand and contract. The pistons of the type of engines referred to is one of the parts subjected to the high heat temperature and must, therefore, not only be constructed to withstand the force of the explosions which act directly upon the head portion thereof, but also must prevent compression leakage as well as to prevent leakage of the effective explosive force and must therefore be constructed and adapted to automatically expand and contract.

The object of the present invention is to construct the piston in such a novel manner, whereby it is enabled to expand and contract automatically, having the requisite characteristic of resiliency and being compensatory for expansion and contraction, also to prevent leakage, either the compression or the explosive force, and to attain these results without employing the use of split metallic packing rings, using material in the construction of the piston of minimum weight and thickness and to employ such other and further features of novel construction more fully hereinafter described and claimed. illustrated description represented in the accompanying drawing, in which:

Figure (1) is a vertical elevation.

Fig. (2) is a vertical elevation section through line A—A Fig. (3).

Fig. (3) is a plan view of Fig. (1) looking in the direction of the arrow.

Fig. (4) is a vertical elevation of that part of this construction shown more clearly in Fig. (2) and viewed as indicated by the arrow.

Fig. (5) is a plan view of one of the elements employed in this construction.

Fig. (6) is a vertical elevation of Fig. (5).

Fig. (7) is a section view along the line B—B Fig. (4) also being a member part in this construction.

Fig. (8) is a plan view of another member part of this construction.

Fig. (9) is a vertical elevation in section of Fig. (8) along the line C—C.

In the present invention the construction and the member parts thereof as illustrated in the drawing are designated numerically, 10, is the head member having annular flanges 11, and 12, with stiffening ribs 13, formed on its under surface beneath that upon which the force acts. The outer diameter of the flange 11, at 14, and the inner diameter of the flange 12, at 15, are size for the purpose hereinafter explained.

On the top surface of the head 10, there is a countersunk surface 16, formed to receive a thin metal spring disk 17, having apertures 18, and a central hole 19, to receive a stud or rivet 20. In the countersunk surface of the head 10, there are countersunk screw holes 21, to receive the screw 22.

The body part of this construction comprises an outer and inner portion 23 and 24, respectively. The inner portion, 24, more accurately described as an internal web is provided with bosses 25, and in which are bushings 26. At the top part of the internal web 24, an enlarged thickness 27, is formed and into which holes are drilled and tapped to receive the screws 22. The internal web 24, as illustrated is circular in form being somewhat narrower at the top and tapering outwardly toward the bottom, forms its connection with the outer or exterior portion 23, at a predetermined position at the bottom thereof.

In the outer or exterior portion are a series of holes 28, positioned relatively near the bottom thereof and extending in spaced relation circumferentially therearound. Extending downwardly from the top of said portion 23, a series of slits 29, are cut through the exterior portion 23. Cutting through at the top of said portion 23, and extending downwardly the slits terminate at the holes 28, which are positioned relatively near the bottom of the portion 23, but slightly above the position at which the internal web 24, forms its connection with the exterior portion 23.

It is apparently obvious that the holes having a predetermined position from the bottom of the exterior portion 23, and ex-

tending in spaced relation circumferentially therearound and a series of slits or cuts 29, having their beginning at the top of the exterior portion 23, and extending downwardly terminating into the said holes 28, provide the exterior portion 23, with a series of divisions each of which form resilient tongues 30, characterized by the feature that they can be expanded or contracted as conditions may require.

It is a well known fact that the piston when in operative position in the cylinder must not permit of any appreciable leakage of compression or of the effective explosive force in order to perform its function efficiently.

For the purpose of preventing leakage this construction comprises a series of arcuate forms 31, of relatively thin metal positioned at the top end portion of each tongue 30, and seated in an offset seat 32, provided at the end of the head and at the top of each tongue 30, on the exterior portion 23.

These arcuate forms 31, are so positioned in their seat 32, and so arranged circumferentially on the exterior portion 23, that they intercept or close the slits 29, which form the resilient tongues 30.

It is thus to be observed that the arcuate forms 31, have a length which will overlap the width of the tongues 30, and the slits 29, midway of each alternate tongue thereby closing the gaps formed by the slits, with the exception that a slight space 33, is allowed between the adjacent edges of each arcuate form to permit of expansion and contraction.

It is also to be noted that the arcuate forms 31, which act as the sealing means to prevent the leakage of compression and the explosive force are secured to each alternate spring tongue by being riveted at 34, or brazed or electrically welded.

The hea l member 10, is positioned on the portion of the body 23, after having the inner flange 12, at 15, bored to fit snugly over the top of portion 23, and secured thereto by means of the countersunk screws 22.

For the purpose of preventing the screws loosening and backing out of their position a thin metal disk 17, is seated in the countersunk part 16, and being purposely formed with a disk shape providing a spring tension when riveted, not too tightly but just with sufficient tension to permit it to be turned on the rivet or stud 20, when a slight force is applied to turn the apertures 18, so that the solid portion of the disk 17, completely covers the screw 22.

It is finally to be recognized that the outer surface 14, of the flange 11, of the head member 10, is turned to a size which will permit of a small space to be left between the surface 14, of the flange 11, on the body 10, and the inner surface of the resilient portion 23, to allow the head member 10, to expand without engaging the inner surface of the resilient portion 23.

It is obvious from the foregoing that this improved construction of piston has the capacity to fulfil the purpose for which it is intended, and it is to be readily understood that minor changes may be made in the size, form and shape of this structure without departing from the spirit of this invention.

Claims:—

1. A piston comprising a body having integrally connected inner and outer portions, said outer portion provided with a series of slits, a head member for said body, removably attached to said inner portion and locking means on said head member adapted to prevent the unlocking of the holding means for the head member of said piston.

2. A piston comprising a body having integrally connected inner and outer portions, said outer portion provided with a series of slits cut therethrough and extending part of the way lengthwise of its longitudinal axis, said inner portion provided with means for supporting a piston pin, a head member mounted on said inner portion and removably attached thereto, holding means for said head member and locking means on said head member adapted to prevent said head member from detachment.

3. A piston for reciprocating internal combustion engines comprising a body having integrally connected inner and outer portions, said outer portion provided with a series of slits cut therethrough part way of its longitudinal axis, means on said external portion providing a seal at the extremity of the slits, a head member for said piston body adapted for removable attachment with the inner portion of said piston body, retaining means for said head and said portion, and means on said head whereby said head member is held securely from detachment with said inner portion, and means on said inner portion adapted to support a piston pin whereby said piston is adapted for operative connections with operable parts for said piston.

4. A piston comprising a body having outer and inner portions integrally connected with each other at approximately the lower end of said body, the outer portion of said body provided with a series of longitudinal slits, sealing means adapted to seal the opening formed by said slits, a head member supported by the inner portion of said piston body and removably attached thereto, means on said head member adapted to lock the holding means for said head member preventing its detachment, said inner portion provided with piston pin supporting bosses adapted to receive a piston

pin connecting said piston with operable parts for said piston.

5. A piston comprising a body having an internal portion supporting a resilient compensatory external portion, means on said external portion providing a seal, a head member for said portion forming the body of said piston, and means on said head member adapted to lock the holding means for said head member from detachment.

In confirmation hereof I hereto attach my signature.

STEPHEN D. HARTOG.