Oct. 8, 1929. S. D. HARTOG 1,730,885

PISTON

Filed June 24, 1927

Fig. 1

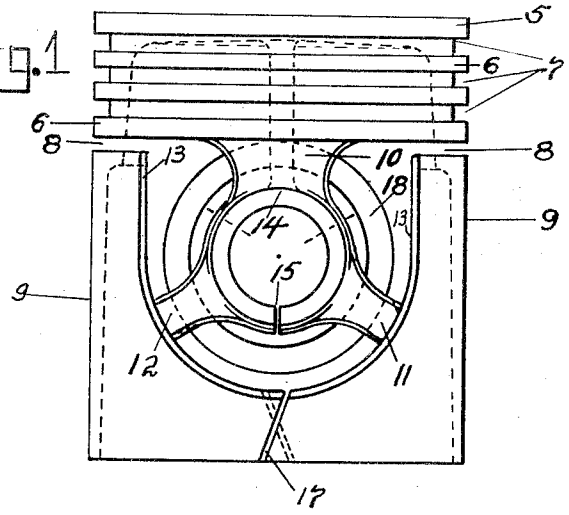


Fig. 2

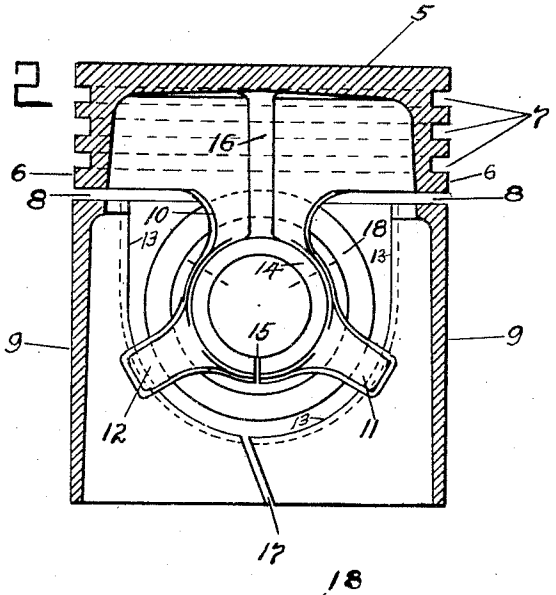


Fig. 3

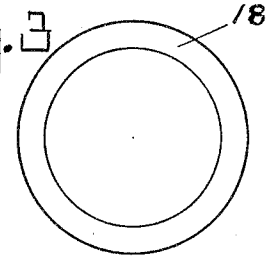


Fig. 4



Inventor

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UNITED STATES PATENT OFFICE

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PISTON

Application filed June 24, 1927. Serial No. 201,169.

My invention relates to improvements in pistons and more particularly to pistons made of a high expansion material such as aluminum or aluminum alloy and adapted for use in internal combustion engines.

Aluminum, aluminum alloy and similar materials are desirable for use in pistons because of their light weight but these materials have a relatively high thermal expansion ratio, and this characteristic must be overcome by the construction of the piston. An important object of the present invention is to provide a piston of light weight material, the expansion of which will not interfere with the successful operation of the piston.

Other objects and advantages of my invention will be apparent during the course of the following description.

In the drawings which form a part of this specification and wherein like characters of reference denote like or corresponding parts throughout the same,

Figure 1 is a side elevation of a piston embodying my invention,

Figure 2 is a longitudinal sectional view therethrough,

Figure 3 is an elevation of one of the hub embracing rings, and,

Figure 4 is a transverse sectional view thereof.

In the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 5 designates the head of my improved piston provided with a depending rim 6 having the usual piston ring grooves 7. The skirt 9 is separated from the rim 6 by a space 8 which extends entirely around the piston and opens into diametrically opposed substantially U-shaped cutaway portions or openings which extend from a point spaced from the bottom of the skirt to the top thereof. The edges of the openings or cutaway portions are beveled as at 13.

The piston pin hubs 14 are arranged substantially centrally of the cutaway portions and are integrally connected to the rim 6 of the piston by means of a vertically arranged strut 10. Similar struts 11 and 12 connect the hubs 14 with the skirt 9 of the piston and are arranged at an angle of substantially 120 degrees with respect to the strut 10 and with each other. The hub is preferably split at 15, on its lower side between the struts 11 and 12. Reinforcement ribs 16 are arranged on the inner side of the struts 10 and extend from the head 5 to the hubs 14. Inclined slits 17 are also provided in the portion of the skirt below the U-shaped cutaway portions and are in alignment with the vertical axes of the piston pin hubs and with the splits 15 and extend from the bottom of the skirt to the cutaway portions. It will be seen that a resiliently yieldable skirt is formed, due to the slits 17 and splits 15.

Steel rings 18 are cast with the piston and are arranged concentrically with the hubs 14. The rings 18 are cast in the struts and are spaced from the hubs and from the piston skirt.

The rings 18 have a very low coefficient of expansion and will therefore limit the expansion of the aluminum alloy or other metal employed, which is embraced by the rings. In addition to controlling the expansion of the metal embraced by the rings, a restraining effect on the expansion of the metal adjacent the rings but outside thereof, is also obtained.

The rings 18 serve the additional function of strengthening the split hub and struts, and also strengthen the lower portion of the skirt which would otherwise be greatly weakened by the slits 17. While these portions of the skirt are not embraced by the rings, they are indirectly affected through the connection of the skirt with the rings by the struts 11 and 12. These struts also serve to resist the side thrust incident to the operation of the piston. It will be seen that the piston is formed with a like metallic composition throughout with the exception of the rings 18 which are made of a metal having a low coefficient of expansion, such as steel.

While I have shown and described the preferred embodiment of my invention it is to be understood that various changes in the size, shape and arrangement of parts may

be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A piston comprising a head, skirt and piston pin hubs, joining means for said head, skirt and hubs, each of said hubs being split, and a member embracing each of said hubs, said embracing member having a thermal expansion capacity less than that of the metal with which said member is engaged.

2. A piston comprising a head, skirt and piston pin hubs, joining means for said head, skirt and hubs, each of said hubs being split, and a member embracing each of said hubs and engaging said joining means, said members having a metallic composition of low thermal expansion capacity and adapted to maintain constant the size of the aperture within said hubs.

3. A piston comprising a head, skirt and piston pin receiving hubs, said skirt being spaced from said head, each of said hubs being split, joining means for said head, skirt and hubs, and members engaging said joining means and embracing said hubs, said members having a metallic composition of less thermal expansion capacity than the metal of the piston.

4. A piston comprising a head, skirt and piston pin hubs, said skirt being spaced from said head, each of said hubs being split, joining means for said head, skirt and hubs, members encased within said joining members and embracing said hubs, said members having a metallic composition of lesser thermal expansion capacity than the material of the piston.

5. A piston comprising a head, skirt and piston pin receiving hubs, said skirt being spaced from the head of the piston, each of said hubs being split, said skirt being split beneath the piston pin hubs, joining means for said head, skirt and hubs, members engaging said joining means and embracing said hubs, said members having a thermal expansion capacity less than that of the metal of which the piston is made, whereby the normally constituted size of the apertures within said hubs is maintained constant under the varying temperatures to which the piston is subjected.

6. A piston comprising a head, a skirt having diametrically opposed openings, piston pin hubs arranged in said openings and spaced from the head and from the skirt, means joining the hubs with the head and skirt, and a member embracing each hub and engaging the joining means, said members being spaced from the hubs and from the piston skirt.

7. A piston comprising a head, a skirt having diametrically opposed openings therein, said skirt being spaced from the head of the piston, piston pin receiving hubs arranged in said openings and spaced from the head and from the skirt, struts joining the hubs with the head and skirt, and a member embracing each hub and engaging the joining struts, said members being spaced from the hubs and from the piston skirt, and having a lesser thermal expansion capacity than the material of the hubs and skirt.

8. A piston comprising a head, a skirt having diametrically opposed openings therein, piston pin receiving hubs arranged in said openings and spaced from the head and from the skirt, said hubs being split, struts joining said hubs with the head and with the skirt, and members embracing the hubs and engaging the joining struts, said members being spaced from the hubs and from the skirt.

9. A piston comprising a head, a skirt spaced therefrom and having diametrically opposed openings extending from the top thereof to a point spaced from the bottom thereof, piston pin receiving hubs arranged in said openings and spaced from said head and said skirt, said hubs being split, struts joining the hubs with the head and with the skirt, and members embracing said hubs and engaging said struts and spaced from the hubs and from the skirt, said members having a lesser thermal expansion capacity than the skirt and hubs.

In confirmation hereof I affix my signature.

STEPHEN D. HARTOG.