Aug. 9, 1938. M. G. FIEDLER 2,126,627

PISTON CONSTRUCTION

Filed April 3, 1937

Fig. 2.

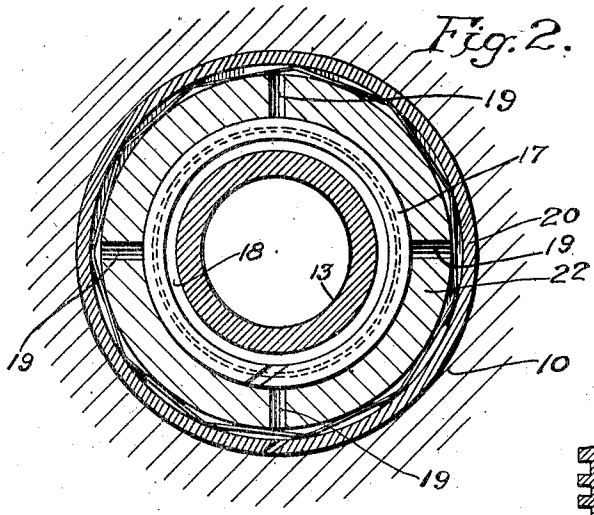


Fig. 3.

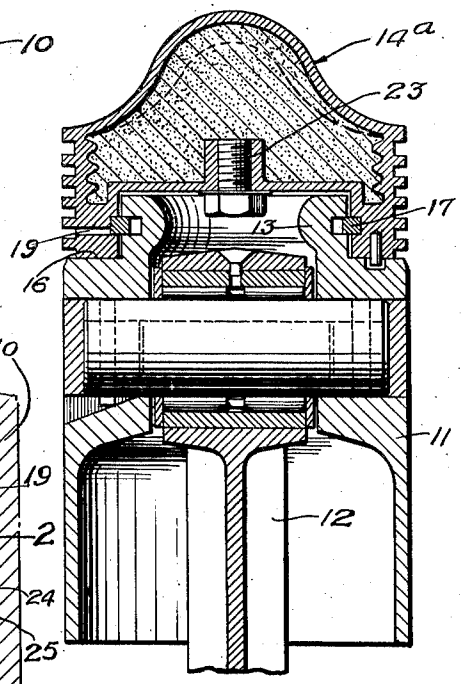
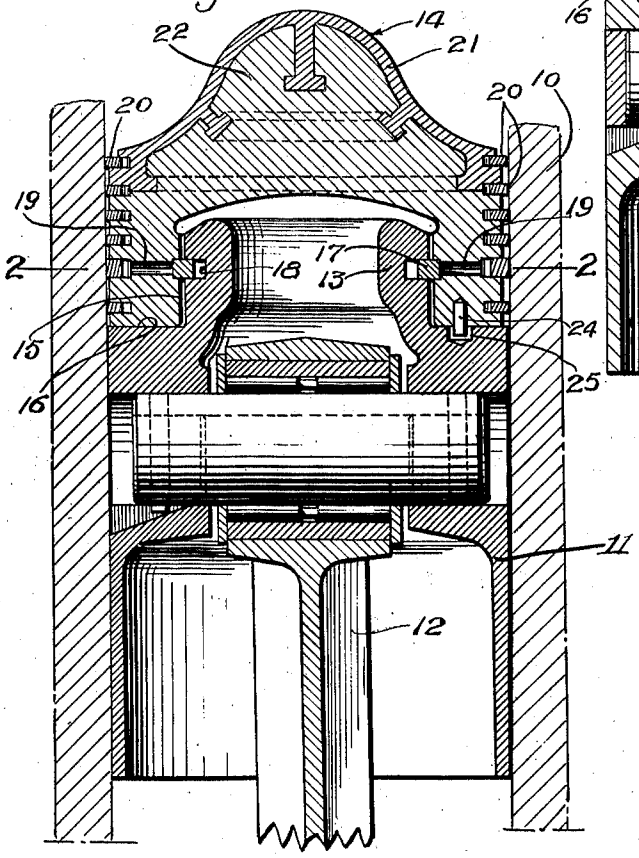


Fig. 1.



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PISTON CONSTRUCTION

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4 Claims. (Cl. 309—15)

This invention relates to pistons for internal combustion engines, and has for an important object thereof the elimination of the difficulties ordinarily arising due to unequal expansion of the head and skirt of the piston.

In the ordinary gasoline engine, the temperature of the piston head ranges between 300° and 500° F., and in the Diesel, or solid fuel injection engine the temperatures are much higher, being seldom below 900° F., and often attaining such heat that projecting portions of the piston are actually burned away.

It has been determined that the heat of the piston head is dissipated principally through the rings due to the fact that these rings have engagement with portions of the wall which are comparatively free from oil. As the rings are ordinarily placed at the upper portion of the piston, this means that the skirt is comparatively cool, with the result that if the piston is made of such diameter including this skirt as to fit the cylinder walls it would tend to bend while the skirt would still be comparatively free. This has led to the use of flexible piston skirts in an endeavor to compensate for the unequal expansion of the head and skirt and still maintain an approximate fitting of the skirt at all times. However, this arrangement is unsatisfactory, particularly in engines operating at high pressures due to the fact that the piston, when cool, has a relatively loose fit in the cylinder permitting cocking which, in turn, destroys the ring formation tending to bevel the rings through their uneven engagement with the walls and, accordingly, permit blow-by in operation. This is particularly serious in solid fuel injection engines which necessarily depend upon the creation of relatively high pressures in the cylinder in order to obtain auto-ignition.

An important object of the invention is the provision of a piston construction in which the axes of the piston and cylinder will at all times remain in parallelism, thus insuring against the destructive action on the rings, and in which, at the same time, provision is made for the expansion of the piston head under the relatively high heat to which it is subjected.

Another object of the invention is the provision in a device of this character of a construction such that it may be economically produced and will tend to further reduce the heat extended between the piston proper and the skirt.

These and other objects I attain by the construction shown in the accompanying drawing wherein, for the purpose of illustration, I have shown a preferred embodiment of my invention and wherein:

Fig. 1 is a vertical sectional view through a piston constructed in accordance with my invention showing the same in position in the cylinder;

Fig. 2 is a transverse section on line 2—2 of Fig. 1; and

Fig. 3 shows a slightly modified piston construction.

Referring now more particularly to the drawing, the numeral 10 generally designates a cylinder, and 11 a cross head having a sliding fit in the cylinder walls and having connected thereto the usual connecting rod 12. This cross head has at its upper end a tubular boss 13, the interior of which is in communication with the hollow interior of the cross head. The numeral 14 generally designates a piston, this piston having an axial cavity 15 in its lower end of slightly greater diameter than the boss and seating at its lower end upon the upper surface 16 of the cross head proper. Connection between the piston and cross head is established by a locking ring 17 engaging in grooves in the confronting side faces of the boss 13 and cavity 15 and fitting therein so that cocking of the piston with relation to the cross head is impossible. The groove 18 in the boss 13 is of sufficient depth to completely accommodate the ring 17 and the ring is accessible for complete disposition in this groove to permit removal of the piston from the cross head through radial openings 19 in the piston, such openings being preferably formed at the base of a ring groove. Piston 14 is made of appreciably less diameter than the cross head and the rings 20 employed therein should be equipped with expanders, as more clearly shown in Fig. 2.

The piston itself is so constructed that it will efficiently conduct heat to these rings. In the construction of Fig. 1, this piston comprises a cast iron cap 21 cast upon a body 22 of aluminum, while in the construction shown in Fig. 3, the piston 14a is a hollow body formed of any heat-conducting material and having a plug-closed opening 23 through which sodium or some other suitable salt may be introduced to act as a heat-conducting medium.

It will be obvious that in operation, the cross head which, as noted, is relatively elongated, will, since it has a sliding fit in the cylinder, remain coaxial therewith. The connection between the piston and cross head being such that the piston may partake of transaxial displacement with re-

lation to the cross head, but is at all times maintained with its axis in parallelism to that of the cross head, the piston will operate at all times in axial parallelism to the cylinder, floating on its rings 20. Cocking being absolutely prevented, a proper fit of the cross head may be maintained at all times without regard to the expansion of the piston.

Oily vapors from the engine base will be transmitted through the hollow boss and keep the connection lubricated so that it will at all times be free to move and assume its proper position with relation to the cylinder wall. Additionally, the floating connection between the piston and cross head serves as an insulation, as there will, at all times, be an oil film therebetween. This results in relatively low temperatures in the cross head enabling a fit of the same in the cylinder walls to be more closely approximated even though this skirt be made of aluminum or some other relatively highly expansible material.

In some cases a pin 24 extending from the bottom of the piston and engaging in a socket 25 in the upper end wall of the cross head should be employed to prevent relative rotation of the piston and cross head.

Since the construction is obviously capable of considerable modification without in any manner departing from the spirit of the invention, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

1. A piston and cylinder construction for combustion engines comprising the combination with a cylinder of a cross head having a sliding fit therein, a connecting rod connected thereto, a piston of smaller diameter than the cross head and a connection between the piston and cross head constructed and arranged to permit relative transaxial displacement and prevent axial displacement of said piston and cross head while maintaining the axes of said piston and cross head in parallel relation.

2. A construction as set forth in claim 1 wherein the cross head has a boss extending into a socket formed in the piston base, the socket and boss having in their confronting side walls grooves coacting to receive an expansible ring.

3. The construction as set forth in claim 1 wherein the piston is seated upon the cross head and the cross head has a boss extending into a socket formed in the base of the piston, a ring and groove connection between the boss and the confronting wall of the piston socket, the boss being tubular and in communication with the hollow interior of the cross head.

4. The construction as set forth in claim 1 wherein means are provided for conducting crank case vapors to the confronting surfaces of the piston and cross head, thereby insuring lubrication of the same and reducing heat transmission to the cross head.

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