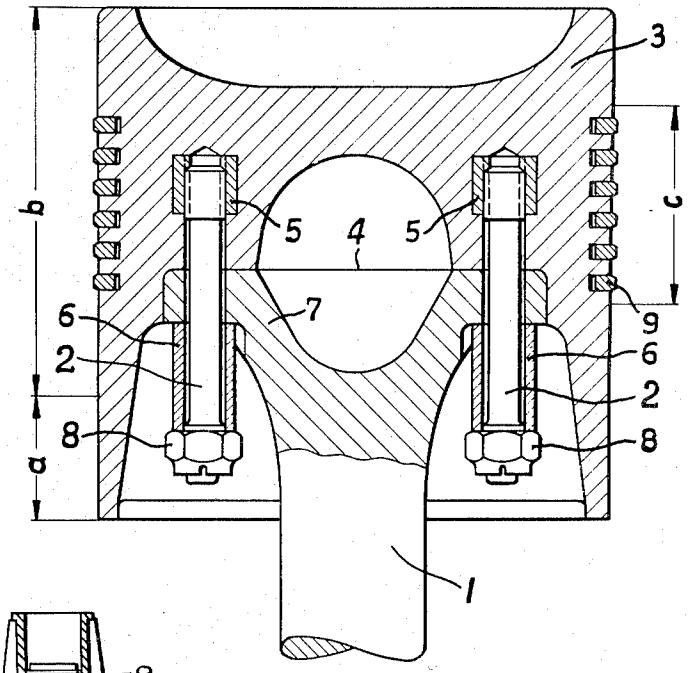
Jan. 3, 1956 D. VON LASSBERG ET AL 2,729,523

PISTON FOR INTERNAL COMBUSTION ENGINES

Filed March 8, 1952

Fig. 1



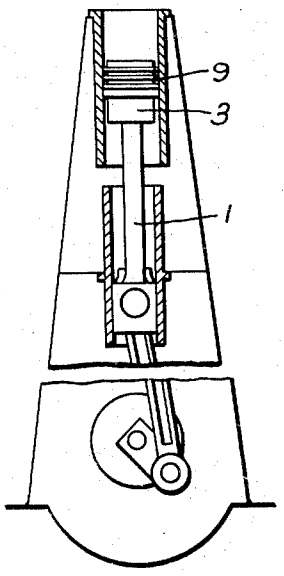


Fig. 2

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United States Patent Office 2,729,523 Patented Jan. 3, 1956

2,729,523

PISTON FOR INTERNAL COMBUSTION ENGINES

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Application March 8, 1952, Serial No. 275,572

Claims priority, application Germany March 15, 1951

3 Claims. (Cl. 309—17)

This invention relates to a piston for internal combustion engines, more particularly, diesel engines, of the crosshead type.

The conventional crosshead type diesel engines which are always of larger dimensions, have steel or cast iron pistons. Such engines are almost exclusively provided with pistons which are cooled with water or oil. This, of course, requires a considerable expenditure of means for supplying and discharging the cooling agent and for re-cooling the same, whereby the engine of course becomes complicated and liable to disturbances.

It is the object of the present invention to provide a construction by which these disadvantages are avoided.

With this and further objects in view, according to the present invention a piston body of light metal is used which is connected to a piston rod of steel. Light metal pistons are already used in smaller internal combustion engines without crosshead, but the opinion has been generally accepted that with larger internal combustion engines, especially of the crosshead type, it is absolutely necessary to provide a cooled piston. Although it was realized that with light metal pistons owing to their better heat conductibility more heat is transmitted from the combustion chamber into the cylinder wall, substantial difficulties were caused in regard to the connection between the piston and the piston rod, since the piston rod of steel has a smaller coefficient of thermal expansion than the attached light metal piston and reaches lower temperatures in operation than the piston.

In the conventional mode of fastening the piston rod to the lower end of the piston of a crosshead type diesel engine, the piston under action of higher temperatures is liable to a larger thermal expansion between the fixing screws than over the rest of its outer surface, whereby the bearing length of the piston may become oval and bear non-uniformly in operation. This will be particularly true in light metal pistons of larger dimensions.

Therefore, according to a further important feature of the invention the fixing flange is arranged at a part of the piston whose diameter is smaller than the maximum diameter of the bearing length of the piston, i. e. in a region where the piston owing to its taper does not bear on the cylinder liner, so that detrimental effects owing to ovalization of the piston at the point of its connection with the piston rod are avoided. Of course, it is not necessary for the piston to be conically shaped at the point where the piston rod is connected to the piston, provided only that the respective portion of the piston is smaller in diameter than the maximum diameter of the piston so that the same is prevented from engaging the cylinder liner as a result of a deformation caused by the non-uniform thermal expansion of piston and piston rod. Moreover, the piston has a substantially higher stiffness in this region than at its bearing end so that it cannot so easily follow its tendency of ovalization as it would be the case in the relatively thin-walled part forming the bearing length of the piston.

In the drawing,

Fig. 1 is an axial section through a piston embodying this invention; and

Fig. 2 is a diagrammatic showing in section of an engine having a piston embodying this invention and used with a crosshead.

In the drawing, the piston 3 is fastened on its piston rod 1 with the aid of several threaded bolts 2 which are made longer and thinner than normally necessary so as to permit a considerable elongation thereof under tension, as is known per se. Threaded sleeves 5 of steel are embedded in the light metal piston body 3 to provide a reliable anchoring of the screws 2 in the female thread of the piston, and spacing sleeves 6 are inserted between the flange 7 of the piston rod 1 and the nuts 8 of the threaded bolts 2. The transverse plane of connection 4 between the piston rod 1 and the piston body 3 is located in the annular zone which has a smaller diameter than the cylindrical part *a* of the piston body 3. The piston body 3 may be conical over the length *b* or it may be cylindrical for the major part thereof, with a short transitional portion between the maximum diameter of the bearing length *a* and the reduced diameter of the part *b* which does not bear on the cylinder liner. Piston rings 9 are arranged in the zone *c*.

While the invention has been described in detail with respect to a now preferred example and embodiment of the invention it will be understood by those skilled in the art after understanding the invention that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. In an internal combustion engine having a crosshead, the combination which comprises a piston made substantially of light metal, said piston having a main body portion and a skirt portion of greater diameter than said main body portion, a connecting rod for said piston having a different coefficient of thermal expansion than said piston, and means providing an expansion compensating connection between said piston and said piston rod, said connection being positioned within said lesser diameter main body portion of said piston preventing distortion of said greater diameter skirt portion by thermal expansion of said piston rod.

2. In an internal combustion engine having a crosshead, the combination which comprises a piston made substantially of light metal and having a main body portion and a skirt portion of greater diameter than said main body portion, a piston rod having a different coefficient of thermal expansion than said piston, connecting flange means at one end of said piston rod, a recess in said piston for receiving said flange means, said recess being positioned within said lesser diameter main body portion of said piston preventing distortion of said greater diameter skirt portion by thermal expansion with respect to said flange means, and means for connecting said piston rod flange means to said piston, said means being substantially wholly in said recess and maintaining a rigid connection during said differing thermal expansions of said piston and said piston rod.

3. In an internal combustion engine having a crosshead, the combination which comprises a piston made substantially of light metal and having a main body portion and a skirt portion of greater diameter than said main body portion, piston rings around said main body portion of said piston, a steel piston rod having a substantially different coefficient of thermal expansion than said piston, a steel flange at one end of said piston rod, a recess in said main body portion of said piston and

within the area of said piston rings, a plurality of bolts for connecting said piston rod flange to said piston in said recess, sockets in said main body portion of said piston for receiving said bolts, steel linings in said sockets for securing said bolts therein, tension sleeves on said bolts for maintaining an expansion compensating connection between said flange and said piston during said different heat expansions thereof, said greater diameter skirt portion of said piston being free of contact with said bolts and said piston rod preventing deformation of said skirt portion during said different thermal expansions of said light metal piston and said steel piston rod.

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