

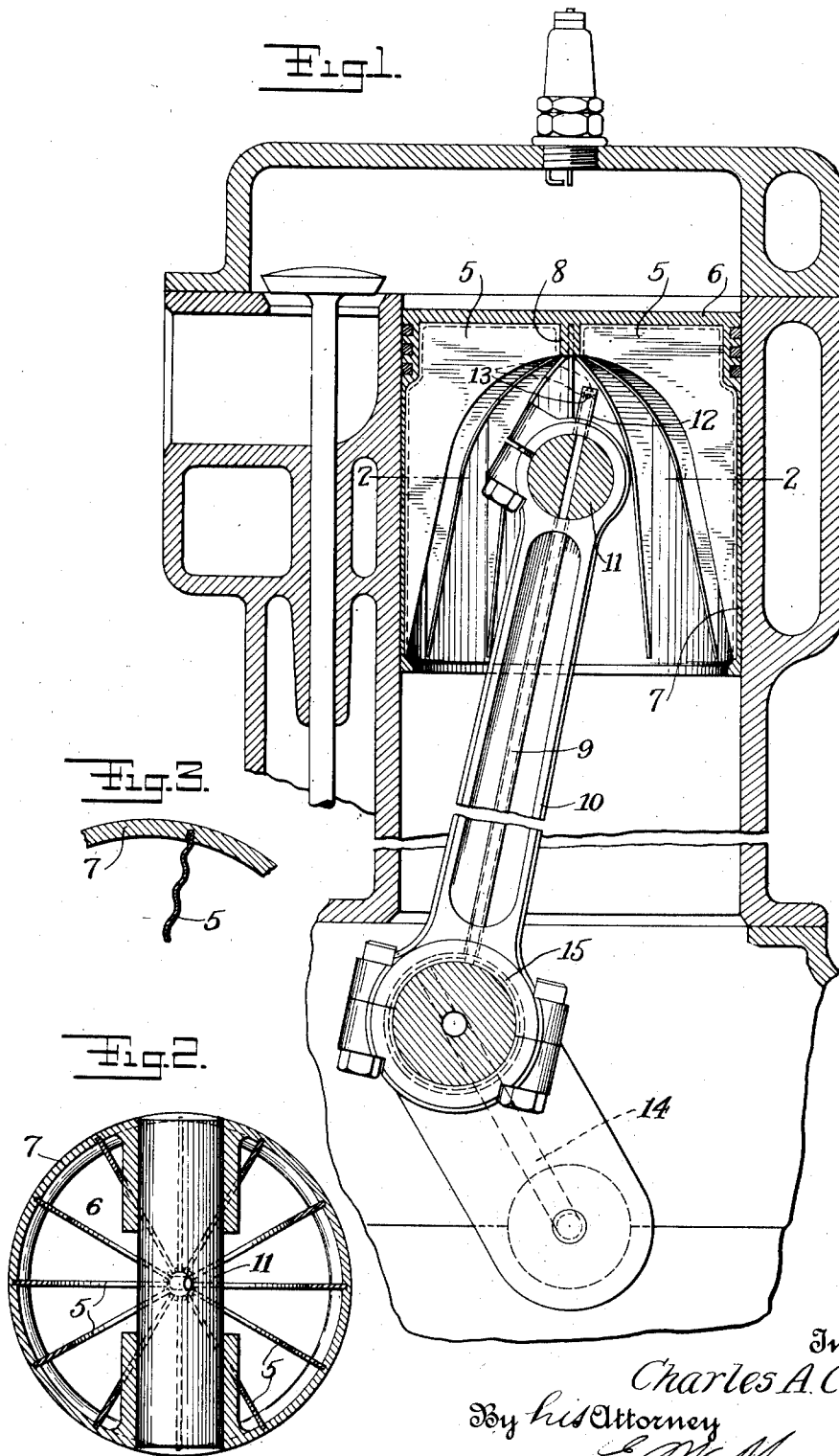
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PISTON CONSTRUCTION

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UNITED STATES PATENT OFFICE.

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PISTON CONSTRUCTION.

Application filed January 28, 1921. Serial No. 440,703.

My present invention relates particularly to internal combustion engines of the heavy duty type.

In large bore engines of this character, where the pistons are of relatively large diameter there is a tendency for the pistons to heat up, because of their size and this ordinarily requires that the engines be operated at relatively low speed so as to give time for the heat to radiate from the center of the piston toward the relatively cooler cylinder walls. These limitations as to speed necessarily limit the power out-put.

The objects of my invention are to overcome these limitations and to provide a practical construction in which a piston of any diameter can be kept at the proper temperature and all difficulties as to hot spots in the center of the pistons and the like be entirely eliminated.

In the accompanying drawing I have illustrated the invention as embodied in one of its practical commercial forms, but wish it understood that the same may be modified in various respects without departure from the true spirit and scope of the invention as hereinafter defined and claimed.

Figure 1 in said drawing is a broken vertical sectional view of the invention as incorporated in an internal combustion engine of the L-head type.

Figure 2 is a cross sectional view of the same as taken on substantially the plane of line 2—2 of Figure 1.

Figure 3 is a fragmentary sectional view illustrating a modification in which the heat radiating fins are corrugated and are thickened at their edges.

Briefly, the invention consists in the elimination of the heat from the center of the piston by the rapid radiation of such heat through paths of high thermal conductivity to the side walls of the piston and hence to the surrounding cylinder walls. In this construction herein disclosed this is accomplished by means of fins or webs of copper or other metal of high thermal conductivity embedded or in heat conducting relation to the head 6 of the piston and extended into heat conducting relation to the side wall or skirt 7 of the piston.

These heat radiating fins may be arranged radially as in the present illustration or they may be placed parallel or otherwise and furthermore they may be straight webs, as shown, or may be corrugated, as in Figure 3,

or otherwise shaped. The corrugated form has certain advantages over the straight or flat webs shown, particularly in that they better allow for expansion and contraction and in that they provide larger radiating surfaces.

In practice, the heat conducting webs are usually secured and associated in permanent relation with the piston body by supporting the webs or flanges in the proper relation within a mold and then casting the iron body of the piston thereabout, the mold being so arranged that the webs will be actually embedded at their edges in the material of the piston body.

At the center the piston body may have a dependent boss 8 forming a further means of bonding the webs with the piston and providing a direct path for conducting the heat from the center of the piston.

In some instances, I find it desirable to assist the radiating effect of the thermally conductive fins by positively cooling the fins during the operation of the engine. The necessity for this extra cooling naturally will depend upon the size of the engine bore, the speed at which it is to operate and other conditions.

In the present disclosure the cooling is effected by providing a duct 9 extending up through the connecting rod 10, running through the wrist pin 11 and terminating at the top of the connecting rod in a tube 12 provided with one or a series of outlets arranged to spray the oil over the radiating fins. The oil may be conducted to the duct in the connecting rod through the oiling passage 14 ordinarily provided in the crank shaft, said passage communicating at the crank pins with annular channels formed in the lower connecting rod bearings and communicating with the lower ends of the ducts 9.

The oil thus supplied to the piston not only cools the piston, but also furnishes lubricant for the wrist pin and cylinder walls. This oil, particularly in the case of marine engines, which ordinarily operate under full load at all times, may be itself cooled in a manner such as I have disclosed in my companion application Serial No. 440,700 filed January 28, 1921, and allowed January 27, 1925, by circulating cooling water there-through and by thus regulating the temperature of the oil it will be seen that the piston can be maintained at all times at the

proper temperature to enable most efficient operation of the engine.

In some instances I find it desirable to thicken the edges of the radiating elements where they are fused to the surrounding wall of cast iron. I have shown in Figure 3 how this may be accomplished by turning over or doubling the edges of the plates as at 15.

10 The oil spray tubing 12 extending as it does above the wrist pin has a swinging or oscillating movement which it will be seen causes the cooling oil to be thoroughly sprayed over all the heat radiating fins.

15 What I claim is:

1. In an engine of the character described, a piston body having thermal characteristics of cast iron and a heat radiating fin or fins of greater thermal conductivity than the material of the piston body incorporated in said piston body in intimate heat conducting relation thereto and extending from the central toward the edge portions of the piston body and said fin or fins being embedded at their edges in the head and skirt portions of the piston body.

2. In an engine of the character described, a piston body having thermal characteristics of cast iron and a heat radiating fin or fins of greater thermal conductivity than the material of the piston body incorporated in said piston body in intimate heat conducting relation with the head and skirt thereof and extending radially from the central to the edge portions of the piston body, said fin or fins having a thickened edge portion embedded in the surrounding part of the piston body.

3. In an engine of the character described, a piston body having thermal characteristics of cast iron and a heat radiating fin or fins of greater thermal conductivity than the material of the piston body incorporated in said piston body in intimate heat conducting relation with the head and skirt thereof

and extending radially from the central to the edge portions of the piston body, said fin or fins being constructed of sheet material having thermal characteristics of copper corrugated longitudinally and having folded edges embedded in the surrounding part of the piston body.

4. In a piston construction, a cast iron piston body having radial heat radiating fins formed of copper-like material extending inwardly from the inner wall of the piston body, a connecting rod and a wrist pin carried thereby and pivotally connected to the piston body, said connecting rod and wrist pin having a duct for conducting cooling fluid therethrough and directing the fluid against said fins.

5. In an engine of the character described, a piston body comprising a head, a central boss projecting inwardly therefrom and a skirt, said piston body being constructed of a material having the thermal characteristics of cast iron, and a plurality of radially disposed heat radiating fins of greater thermal conductivity than the material of the piston body embedded at their edges in the boss, the head and the skirt of the piston body.

6. In an engine of the character described, a piston body comprising a head, a central boss projecting inwardly therefrom and a skirt, said piston body being constructed of a material having the thermal characteristics of cast iron, and a plurality of radially disposed heat radiating fins of greater thermal conductivity than the material of the piston body embedded at their edges in the boss, the head and the skirt of the piston body, and a connecting rod pivotally connected with the piston body and having a cooling duct provided with an outlet or outlets for spraying the heat radiating fins.

In witness whereof, I have hereunto set my hand this 25th day of January, 1921.

CHARLES A. CARLSON.