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A. V. NICOLLE

2,168,103

PISTON

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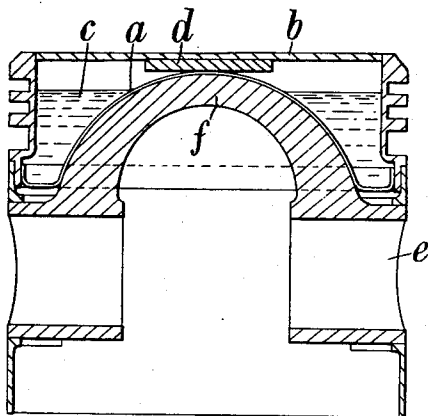


Fig. 1.

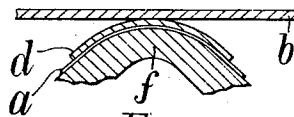


Fig. 2.

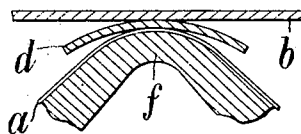


Fig. 3.

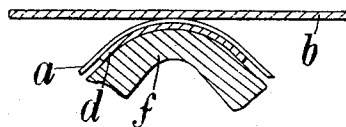


Fig. 4.

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PISTON

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7 Claims. (Cl. 123—176)

This invention relates to pistons for internal combustion engines, and has for its object to provide improvements in the construction of the pistons which enables modern requirements as to lightness to be fulfilled consistent with strength and the dissipation of heat.

The invention consists in a piston formed from thin metal, such as thin steel, and having a chamber therein for containing a cooling medium, such as sodium or sodium salt, and wherein means is provided extending between the crown and the gudgeon pin bosses for transmitting the force imposed upon the piston, characterized by the feature that the portion or area of the crown to which the said means is connected, has a highly heat conducting insertion associated therewith for dissipating the heat in said zone.

The invention also consists in a piston according to the preceding paragraph, wherein the centre of the crown of the piston is supported from the bosses or boss region of the piston as by struts and/or an inner shell or lining, and the interior of the piston adjacent the crown is formed with a chamber or receptacle for containing a cooling medium, such as a readily fusible salt or metal, for example sodium or sodium salt, in which receptacle there protrudes an element which is made from highly heat conducting material, such as copper, aluminium or nickel, and is in contact with the centre of the crown.

This element, therefore, and which may be in the form of a disc and may be hollow and contain a body of the coolant, serves to dissipate heat from the centre of the crown.

Conveniently, the cooling chamber is formed between the piston head and an insert in the form of a dome-shaped stamping or pressing, the base of which is secured to the inside of the head in the region of the gudgeon pin bosses, while the apex extends to the centre of the crown and is secured through the medium of the element or disc above mentioned.

The reference above, and hereafter to "thin metal" or "thin steel", is intended to cover a piston the thickness of the skirt, of which does not exceed 2% of its diameter.

In the accompanying drawing:

Figure 1 is a vertical section of a piston in accordance with the invention; and

Figures 2, 3 and 4 are fragmentary sectional views showing the heat dissipating insertion disposed in different positions.

In carrying the invention into effect in one convenient manner, as illustrated in the drawing,

there is secured within the interior of a piston which may be formed from thin steel, a lining *a* which may be in the form of a thin pressing or stamping of suitable metal such as steel, and which forms with the inside surfaces of the piston, including the crown *b* thereof, a receptacle *c* for containing a cooling medium constituted by a readily fusible salt or metal, such as for example, sodium or sodium salt; and within the piston as shown in the case of Figure 1, so as to protrude into the cooling receptacle, there is provided an element *d* which is secured to the centre of the crown of the piston on the inside thereof, and is formed from a highly heat conducting metal, such as for example, copper, aluminium or nickel.

The lining *a* may conveniently, be of domed form, and have its base secured to the inside surface of the piston head in the region of the gudgeon pin bosses *e*, while its apex extends within the piston to the centre of the crown thereof, between which and the apex of the dome the said element is secured so as in the case of Figures 1, 2 and 3, to be in contact with the crown *b*, and so as to protrude into the cooling chamber, the element being conveniently in the form of a thin disc having its peripheral portion extending into the cooling chamber as shown, or it may be formed of a hollow disc containing a body of the coolant.

Alternatively, and as shown in Figure 4, the heat dissipating disc *d* may be secured to the outside surface of the lining, in the region thereof where the lining is in contact with the crown, and be secured between the lining and an arch-piece *f* containing the gudgeon pin bosses.

I claim:

1. A piston comprising a head, a skirt and gudgeon pin bosses carried by the skirt, the piston being formed from thin metal, such as thin steel, and having an interior chamber containing a cooling medium, such as sodium or sodium salt, means extending between the piston crown and the gudgeon pin bosses for transmitting to the piston skirt the forces imposed upon the piston crown, and a highly heat conducting insertion connected with that portion or area of the crown to which the said force transmitting means is connected, the said insertion serving to dissipate heat from said portion or area of the crown.

2. A piston comprising a head, a skirt and gudgeon pin bosses carried by the skirt, the piston being formed from thin metal, such as thin steel and having an interior chamber containing a cooling medium, such as sodium or sodium

- salt, strut means extending between the inner surface of the piston crown and the gudgeon pin bosses to afford a support for the central portion of the crown, and an element located between the crown and the said strut means so as to contact with both and protrude into the cooling chamber, the said element being of a highly heat conducting material and serving to dissipate heat from the centre of the crown.
3. A piston comprising a head, a skirt and gudgeon pin bosses carried by the skirt, the piston being formed from thin metal, such as thin steel, a cup member secured within the piston interior so as to form a closed chamber therein, the walls of which include the inner surface of the piston crown, cooling means such as sodium or sodium salt within said chamber, a reinforcing member secured within the piston interior so as to connect the gudgeon pin bosses in the piston skirt and having a portion extending to the centre of the piston crown, and a highly heat conducting insertion associated with the said reinforcing member so as to dissipate heat from the central crown portion.
4. A piston as claimed in claim 3, wherein said heat conducting insertion consists of a metallic

disc located between the central portion of the piston crown and the adjacent portion of the reinforcing member, so that the disc is in contact with both, and so that the peripheral portion of the disc extends into the cooling chamber.

5. A piston as claimed in claim 3, wherein the heat conducting insertion is in the form of a thin metallic disc located within the cooling chamber, and the said cup member is of dome shape with its periphery secured to the piston skirt and its apex extending to the centre of the piston crown.

6. A piston as claimed in claim 3, wherein the heat conducting insertion is in the form of a thin metallic disc in contact with the inner surface of the piston crown and with the said cup member.

7. A piston as claimed in claim 3, wherein the reinforcing member is of arch shape with its apex situated opposite the central portion of the piston crown, and the said cup member is of dome shape conforming to the shape of the arch piece which is disposed exteriorly of the said chamber and in contact with the said dome.

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