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W. F. BURROWS ET AL
CYLINDER HEAD

2,858,815

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2 Sheets-Sheet 1

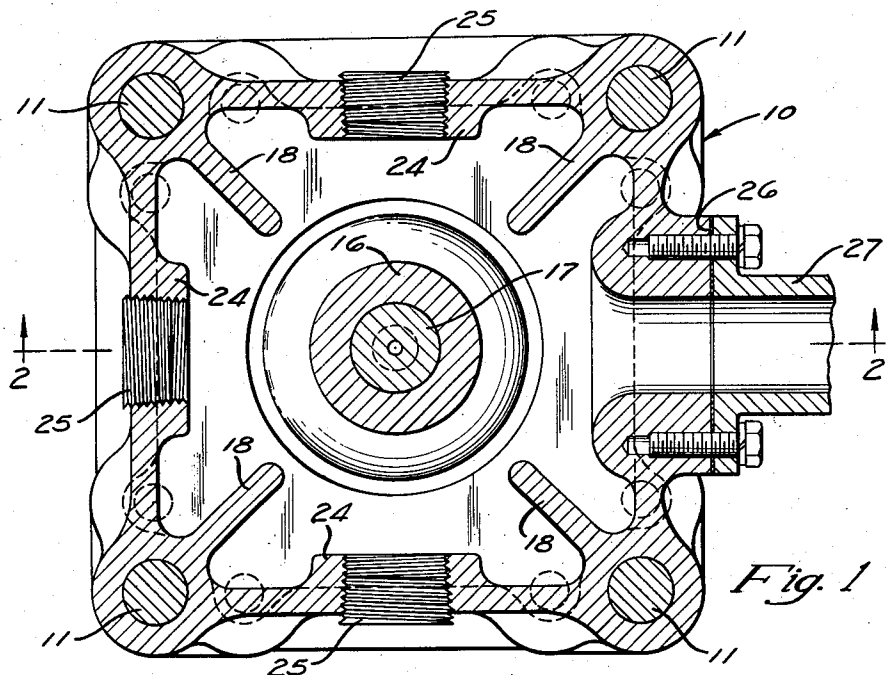


Fig. 1

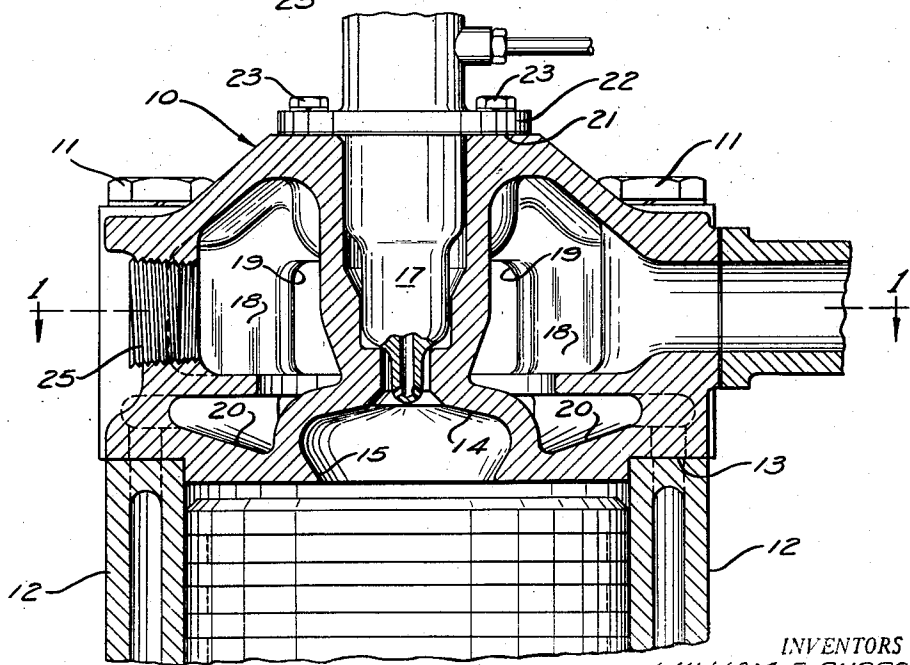


Fig. 2

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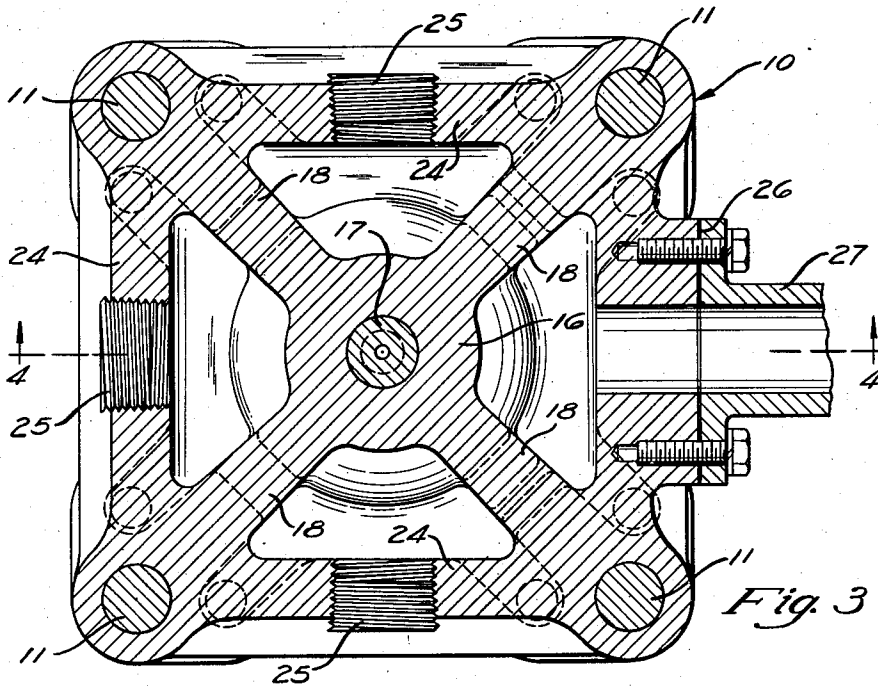


Fig. 3

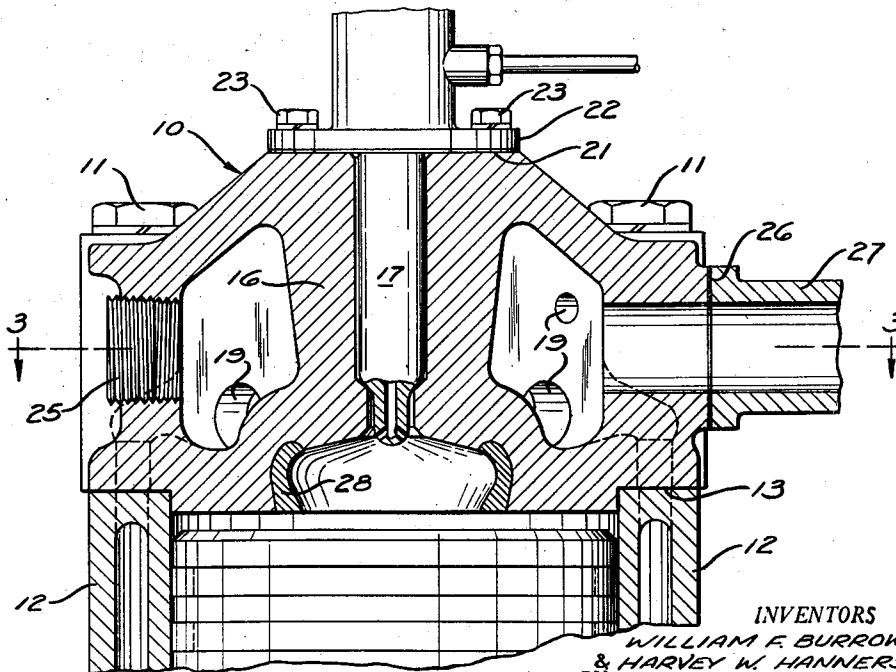


Fig. 4

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CYLINDER HEAD

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3 Claims. (Cl. 123—41.82)

This invention relates broadly to cylinder heads for diesel engines, and more specifically to improvements therein comprising a combustion chamber formed in the head, and an organization of passageways around the combustion chamber for the circulation of a fluidic coolant thereover.

The combustion chambers in diesel engines have, heretofore, been formed in the piston by a deep concave cavity therein and a flat planar wall in the confronting face of the cylinder head. In practice, such structure has been found objectional, since the intense heat of combustion would crack and burn the rim of the cavity and ultimately destroy the piston.

The foregoing difficulty is avoided in cylinder heads formed in accordance with the present invention, since the temperature in the combustion chamber is sufficiently reduced by the circulation of a coolant thereover to eliminate the deleterious action of combustion, moreover, the piston contemplated for use with the improved cylinder head may be made in the conventional manner with a flat or substantially flat head free from thin sections of metal that crack and flake away.

One of the objects of the invention is to provide a combustion chamber in a cylinder head for a diesel engine and a water jacket therefor to effect the dissipation of heat therefrom.

Another object of the invention is to provide a combustion chamber having a circumferential ledge or restricted throat therein to effect a swirling action or turbulence of the fuel injected therein.

Another object of the invention is to provide a piston having a flat planar head for use in combination with the improved cylinder head and combustion chamber.

A further object of the invention is to provide a heat resisting metal ring in the throat of the combustion chamber in order to extend the life of the cylinder head.

Other objects and advantages more or less ancillary to the foregoing, and the manner in which all the various objects are realized, will appear in the following description, which considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a sectional view of the improved cylinder head, the section being taken on a plane indicated by the line 1—1 in Fig. 2;

Fig. 2 is a vertical sectional view thereof, the section being taken on a plane indicated by the line 2—2 in Fig. 1;

Fig. 3 is a sectional view of a modified form of the cylinder head, the section being taken on a plane indicated by the line 3—3 of Fig. 4; and

Fig. 4 is a vertical sectional view thereof taken on a plane indicated by the line 4—4 in Fig. 3.

Referring first to Figs. 1 and 2, the cylinder head comprises a prismoidal casting 10 having bosses adjacent the corners thereof which are drilled for the reception of bolts 11 for holding the head in place on the cylin-

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der block 12. The lower face of the head is machined with a shoulder 13 thereon which is piloted in a counter-bore in the top of the cylinder. The cylinder head is further formed with a concave cavity in the center thereof constituting the combustion chamber 14. The depth of the chamber is approximately one-half the diameter thereof, and is diametrically enlarged between the top and bottom thereof to form a ledge or restricted throat 15 in its open lower edge. The cylinder head is hollow and formed with a boss 16 in the center thereof which is bored for the reception of a fuel nozzle 17 designed to protrude slightly into the combustion chamber 14. The head casting 10 is cored to define diagonal walls 18 radiating from the boss 16 to the corners of the casting, and these walls are formed with transverse ducts 19 therein to facilitate the free circulation of a coolant therethrough. The lower wall of the cylinder head is provided with openings 20 aligned with holes of a similar size in the water jacket in the cylinder block 12. The cylinder head is further provided with a pad 21 on the upper face thereof for the support of a fuel nozzle flange 22 which is retained in place by cap screws 23 mounted in tapped openings in the pad 21. Three of the side walls of the casting are formed with internal bosses 24 having openings therein for the removal of the cores, the openings being closed by pipe plugs 25 threaded therein. The fourth side wall of the head is formed with an external pad 26 drilled and tapped for the reception of the flanged end of a conduit 27 for the discharge of the fluidic coolant circulated through the voids and passageways in the head.

In the alternate design, illustrated in Figs. 3 and 4, the cylinder head is similar in structure to that heretofore described, save only that rings 28, formed of a heat resisting alloy, are cast in place in the throat of the combustion chamber. The cylinder head of this design is also preferably cast of aluminum, and the walls of the head, the cross ribs therein, and the bosses are of a greater width than the like parts of the cast iron head illustrated in Fig. 1.

The diameter of the throat of the combustion chamber is smaller than the diameter of the cylinder, hence, as the piston ascends, the air and commingled fuel injected into the combustion chamber will be highly turbulent and effect complete atomization of the fuel mixture in the combustion chamber.

As combustion occurs, the temperature of the walls of the combustion chamber will be sufficiently lowered by the coolant flowing thereover to restrain deterioration of the metal, though not sufficiently lowered to impede automatic ignition of the highly compressed fuel mixture.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

What is claimed is:

1. A diesel engine cylinder head comprising a hollow body embodying top, bottom and side walls, the bottom wall having a central spheroidal wall therein defining a concave cavity constituting a combustion chamber, an internal flange in said cylinder head integral with said side walls and superjacent said bottom wall, said flange having a central opening therein, the inner edge thereof being concentric to and spaced from the outer face of the wall of said combustion chamber, a boss in the center of the cylinder head integral with said top wall and the combustion chamber wall, and concentric with said opening in said flange, said bottom wall of the cylinder head

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having coolant openings therein communicating with the void defined by the outer wall of said combustion chamber, said boss, said top and side walls, and radial ribs in the cylinder head integral with said top, said side walls of the cylinder head, and said flange whereby a coolant entering said openings in said bottom wall will engage the integral walls that define said void within the cylinder head.

2. A diesel engine cylinder head comprising a hollow prismoidal body embodying top, bottom and side walls, said bottom wall having a central spheroidal wall therein defining a concave cavity constituting a combustion chamber, a transverse flange integral with said side walls of the cylinder head above said bottom wall having a central opening therein of a diameter greater than that of the outer face of the wall of said combustion chamber, radial ribs within the cylinder head integral with said top and side walls and said flange, one of the side walls of the cylinder head having a discharge opening therein, a central boss integral with said top wall and the wall of said combustion chamber, said boss having a bore therein for the reception of a fuel injection nozzle, the opening in said flange being concentric with and spaced from said boss, the bottom wall of said cylinder head having openings therein communicating with the opening in said flange whereby a coolant passing through said openings in said bottom wall is circulated over the outer face of the wall of the combustion chamber before it is discharged through said discharge opening in the side wall of the cylinder head.

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3. A diesel engine cylinder head comprising a hollow body embodying top, bottom and side walls, a spheroidal wall having a concave cavity therein constituting a combustion chamber, a transverse internal flange in said cylinder integral with said side walls and parallel with said bottom wall, said flange having a central opening therein, a boss in the center of the cylinder head integral with said top wall and the wall defining said combustion chamber, said boss being spaced from said opening in said flange, the bottom wall of the cylinder head having coolant openings therein communicating with said opening in said flange, said cylinder head having a discharge opening in one of said side walls superjacent said flange and spaced from said boss so a coolant admitted into the cylinder head through said openings in said bottom wall will flow directly over the entire outer face of the wall of the combustion chamber and directly over the periphery of said boss before egress thereof through said discharge opening.

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