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J. S. CLARKE

3,209,735

PISTON AND CYLINDER CONSTRUCTION FOR INTERNAL COMBUSTION ENGINES

Filed June 6, 1963

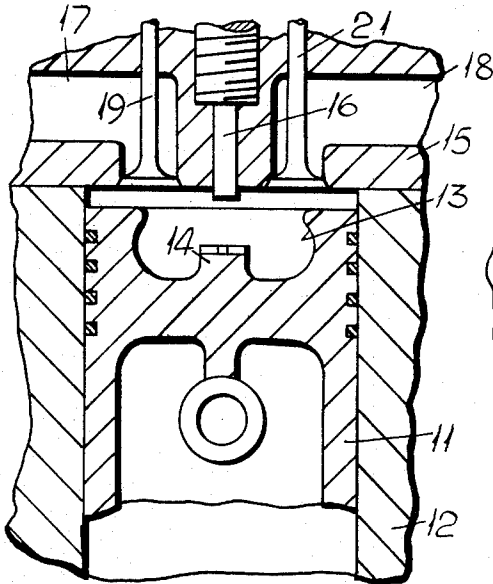


FIG. 1.

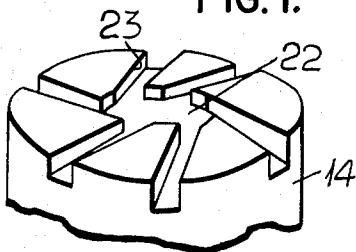


FIG. 2.

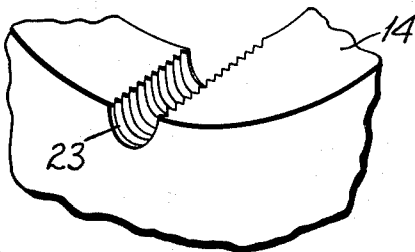


FIG. 3.

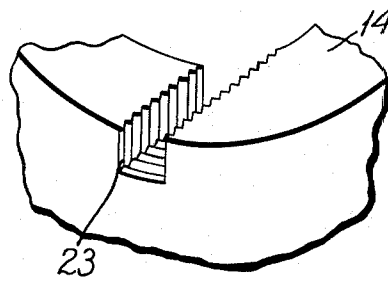


FIG. 4.

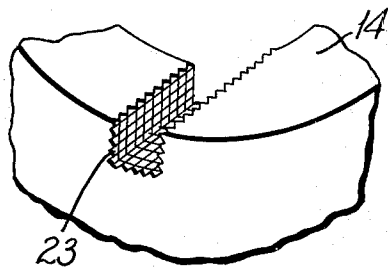


FIG. 5.

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PISTON AND CYLINDER CONSTRUCTION FOR INTERNAL COMBUSTION ENGINES

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22,476/62

3 Claims. (Cl. 123—32)

The object of this invention is to provide an internal combustion engine piston and cylinder construction, the piston having a recess with a pillar within it, onto which fuel can be sprayed from a fuel nozzle disposed in a cylinder head at the end of the cylinder adjacent to the piston recess, the pillar having a central recess and a plurality of generally tangentially extending open topped slots, the arrangement being such that the air flow resulting from movement of the piston towards said cylinder head will entrain fuel sprayed from the pillar slots to form a substantially toroidal air-fuel vortex within the recess.

In the accompanying drawings, FIGURE 1 is a sectional view illustrating sufficient of one example for an understanding of the invention, FIGURE 2 is an enlarged view of the pillar, and FIGURES 3 to 5 respectively illustrate possible alternative forms of the slots in the pillar.

Referring to FIGURE 1, there is provided a piston 11 slidable within a cylinder 12 and having in its inner face a circular and generally toroidal recess 13 of depth approximately equal to the radius thereof. At the central point of the base of the recess is a pillar 14 which is formed integrally with the piston and extends axially towards the cylinder head 15 for about half the axial depth of the recess. Moreover, in the cylinder head and axially aligned with the pillar is a fuel nozzle 16 for directing fuel in an unatomised condition onto the top of the pillar. The head 15 further incorporates a gas inlet 17 and outlet 18, and associated valves 19, 21.

The arrangement is such that as the piston 11 moves towards the cylinder head, unatomised fuel is directed onto the pillar 14 and is thus sprayed into the recess in an atomised condition. Simultaneously, air is forced from the region between the upper annular face of the piston 11 and the cylinder head 15 into the recess, this air entraining the fuel and forming a fuel-air vortex which is of substantially toroidal form and circulates substantially within the recess.

In FIGURE 2, the form of the pillar is illustrated, the fuel being directed onto a central portion 22 of the pillar and is directed into the air stream through slots 23 in the pillar. As shown the slots 23 are generally tangential

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with parallel sides, but their sides may diverge from the portion 22.

Preferably, these slots are formed with interrupted surfaces, and three possible forms of such surfaces are shown in FIGURES 3 to 5. It is found that these interrupted surfaces act to atomise the fuel more effectively.

With constructions as described above there is a more effective intermixing between the fuel and air than with conventional constructions in which fuel is injected directly into the cylinder. Moreover, since fuel is atomised by impingement against the pillar, the nozzle size can be increased as compared with conventional systems, so that nozzle calibrations will be less sensitive.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An internal combustion engine construction comprising a cylinder, a piston slidably mounted in the cylinder, a cylinder head closing one end of the cylinder, a fuel nozzle in the cylinder head for directing unatomized fuel onto the adjacent end of the piston, the piston having defined therein, in said adjacent end, a recess, a pillar within said recess and extending over part of the depth of the recess, said pillar being disposed to receive on its end, fuel from said fuel nozzle, said end of the pillar being formed with a central depression and with a plurality of angularly spaced open-topped slots extending generally tangentially with respect to said central depression, to the edge of said pillar.

2. A piston for an internal combustion engine and having at one end a central recess, a pillar formed integrally with the piston and extending within the recess from the centre thereof over part of the depth thereof, the pillar having a central depression and also having a plurality of open-topped slots extending generally tangentially with respect to the depression, to the edge of said pillar.

3. A piston according to claim 2 in which the surfaces of the generally tangential slots are interrupted.

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