Aug. 27, 1935. J. H. S. GARDNER 2,012,383

CYLINDER HEAD OF INTERNAL COMBUSTION OIL ENGINES

Filed Sept. 12, 1934 2 Sheets-Sheet 1

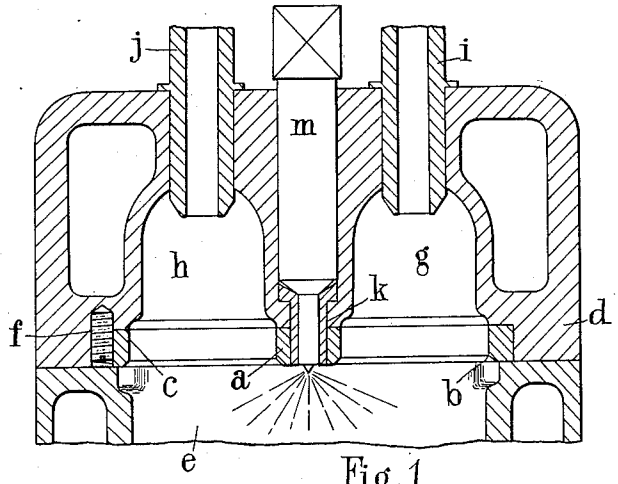

Fig. 1.

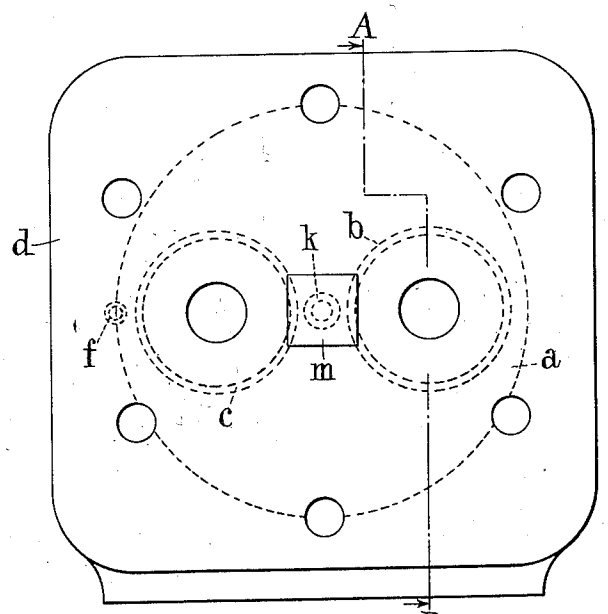

Fig. 2.

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Fig.3

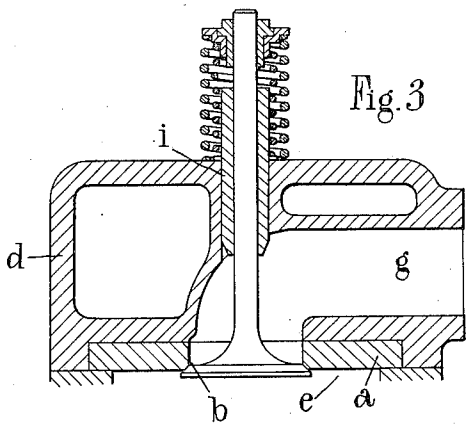
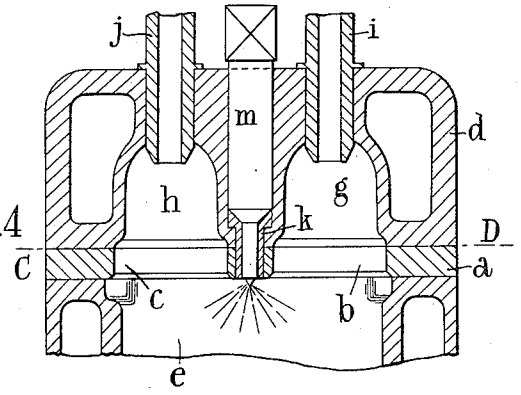


Fig.4



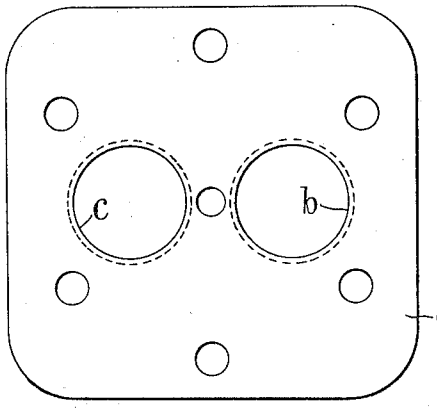


Fig.5

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Patented Aug. 27, 1935 2,012,383

UNITED STATES PATENT OFFICE

2,012,383

CYLINDER HEAD OF INTERNAL COMBUSTION OIL ENGINES

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Application September 12, 1934, Serial No. 743,757
In Great Britain September 20, 1933

7 Claims. (Cl. 123—31)

In connection with cylinder heads of compression ignition type internal combustion engines, difficulties arise if attempts be made to utilize aluminium or like relatively soft light metal alloys due to the necessity of providing more durable metal for the inlet and exhaust valve seats and for the seating of the fuel sprayer or injector, when such is situated in the cylinder head.

The object of my present invention is to provide the valve seats and the fuel injector seating in a simple and convenient manner and in a form which permits of the ready renewal of the said parts without discarding the aluminium or like light alloy cylinder head.

My invention comprises the improved cylinder head of the type which is complete in itself so far as the cooling water passages are concerned, but as a durable metal plate with the valve seats therein secured thereto, characterized in this that a bushing or seating for the fuel sprayer or injector is passed through the cylinder head into the durable metal plate so as to make a gas tight joint with the plate and to hold or assist to hold the plate to the head during manipulation prior to assembly in the engine, after which the plate is clamped between the head and cylinder to make gas tight joints therewith.

My invention further comprises a cylinder head with a plate of a durable metal having the valve seats therein and receiving the injector bushing or seating as a gas tight fit therein, the said plate being located by a screw or screws or by the bushing or seating in a machined recess in the cylinder head and being clamped in position between the head and the cylinder to make gas tight joints therewith when the head is secured upon the cylinder.

My invention further comprises the provision of the durable metal plate with the valve seats therein between adjacent surfaces of the cylinder head and the cylinder, the said plate being located in position upon the head by the injector bushing and then clamped between the head and the cylinder to make gas tight joints therewith by the usual cylinder head holding down bolts or studs which pass through the plate.

My invention further comprises the arrangement in which the fuel sprayer bushing or seating is a press fit in or screws into the durable metal plate.

Referring to the accompanying sheets of explanatory drawings:—

Figure 1 is a sectional elevation, Figure 2 a plan view and Figure 3 a sectional elevation on the line A B of Figure 2 illustrating a cylinder head constructed and arranged in one convenient form in accordance with my invention.

Figure 4 is a view similar to Figure 1 and Figure 5 a plan view on the line C D of Figure 4 illustrating a modified construction of cylinder head in accordance with this invention.

The same reference letters in the different views indicate the same or similar parts.

In the application of my invention illustrated at Figures 1–3, the separate detachable plate *a* which contains the inlet and exhaust valve seats *b* and *c* may be made of a hard bronze alloy or other suitable metal and may be a press fit in a machined recess in the light alloy cylinder head *d*, the face of the plate *a* being flush with the face of the head and of larger diameter than the bore of the cylinder *e* so that when the head is secured upon the cylinder by the usual holding down studs or bolts, the plate is held tightly in position and makes a gas tight joint with the head and cylinder. A locating screw *f* in the periphery of the plate prevents it turning. If the plate *a* is not a press fit in the recess in the head, locating screws may be used to secure it to the head and facilitate handling and machining but the maintenance of gas tight joints between plate, head and cylinder is due to the holding down pressure of the studs or bolts. The cylinder head has the usual inlet and exhaust passage *g* and *h* therein and the valve guides *i* and *j*. The fuel sprayer or injector is positioned as usual in the cylinder head so that the spray is delivered into the engine cylinder. A headed bushing *k* which provides a seat for the sprayer or injector *m* may be pressed through the sprayer recess in the head into the plate *a* in which it is a good press-tight fit so that there is no pressure leakage from the cylinder along the bushing. Or the bushing may be threaded through the sprayer recess and screwed into the plate *a* and serve as additional means for holding the plate to the head to make the desired gas tight joint at the bushing. The bushing, if not concentric with the plate, may also serve as the plate locating means.

The plate with the valve seats therein can be withdrawn from the cylinder head and renewed when desired without damaging the head.

In the application of my invention illustrated in Figures 4 and 5, the plate *a* with the valve seats *b* and *c* therein is located between the cylinder head and the cylinder *e* and is held in place by the usual holding down studs. In this case a single plate may serve for a multi-cylinder engine. The bushing *k* for each cylinder of the engine is pressed or screwed into the plate *a* through the head in the manner before described. In this application of my invention, the plate for a series of cylinders may be located in position upon the head by the bushings *k* together with if desired screws to facilitate handling and machining as with the previous construction.

My invention is not concerned with engines in which the cylinder head is of built up construction with a durable metal wall for the valve seats and fuel valve bushing. In my improvement, the durable metal plate is applied to a head which is already complete so far as its cooling water passages are concerned.

What I claim is:

1. A cylinder head for a compression ignition internal combustion engine complete in itself so far as the cooling water passages are concerned and having secured thereto a durable metal plate located at the face of the cylinder head abutting against the cylinder block, a bushing or seating for a fuel injector passing through said cylinder head and making a gas-tight de-mountable joint with said plate.

2. A cylinder head for a compression ignition internal combustion engine complete in itself so far as the cooling water passages are concerned and having secured thereto a durable metal plate, valve seats formed in the said metal plate, the said plate being located at the face of the cylinder head abutting against the cylinder block, a machined recess in said cylinder head wherein said plate is contained and which it completely fills and a bushing or seating for a fuel injector passing through said cylinder head and making a gas-tight de-mountable joint with said plate.

3. A cylinder head for a compression ignition internal combustion engine complete in itself so as the cooling water passages are concerned and having secured thereto a durable metal plate, valve seats formed in the said metal plate, the said plate being located at the face of the cylinder head abutting against the cylinder block, a circular machined recess in said cylinder head wherein said plate is contained and which it completely fills and a bushing or seating for a fuel injector passing through said cylinder head and making a gas-tight de-mountable joint with said plate, together with means to restrain said plate from rotational movements in said recess.

4. A cylinder head for a compression ignition internal combustion engine complete in itself so far as the cooling water passages are concerned and having secured thereto a durable metal plate, valve seats formed in the said metal plate, the said plate being located at the face of the cylinder head abutting against the cylinder block, said plate having apertures therein for passage of cylinder head holding-down bolts or studs, and a bushing or seating for a fuel injector passing through said cylinder head and making a gas-tight de-mountable joint with said plate.

5. A cylinder head for a compression ignition internal combustion engine comprising cooling water passages enclosed therein, a machined recess in the lower face of said cylinder head, a flat, solid plate of durable metal receivable within and completely filling said recess and formed with valve seats, and a bushing or seating for a fuel injector passing through part of said cylinder head and making a gas-tight push-fit within an aperture in said plate, thereby securing said plate to said cylinder head.

6. A cylinder head for a compression ignition internal combustion engine comprising cooling water passages enclosed therein, a machined recess in the lower face of said cylinder head, a flat, solid plate of durable metal receivable within and completely filling said recess and formed with valve seats, and a bushing or seating for a fuel injector passing through part of said cylinder head and screw threaded into an aperture in said plate, thereby securing said plate to said cylinder head.

7. A cylinder head for a compression ignition internal combustion engine comprising cooling water passages enclosed therein, and a flat, solid plate of durable metal formed with valve seats therein and contacting with the lower face of said cylinder head, a bushing or seating for a fuel injector passing through part of said cylinder head and making a gas-tight engagement within a hole in said plate with said plate and removably securing said plate to said cylinder head, and a series of apertures for the passage of cylinder head holding-down bolts or studs in said cylinder head and in said plate in register one with another.

JOSEPH HUGH STOTT GARDNER.