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2,712,812

ENGINE CYLINDER

Filed June 26, 1951

Fig. 1

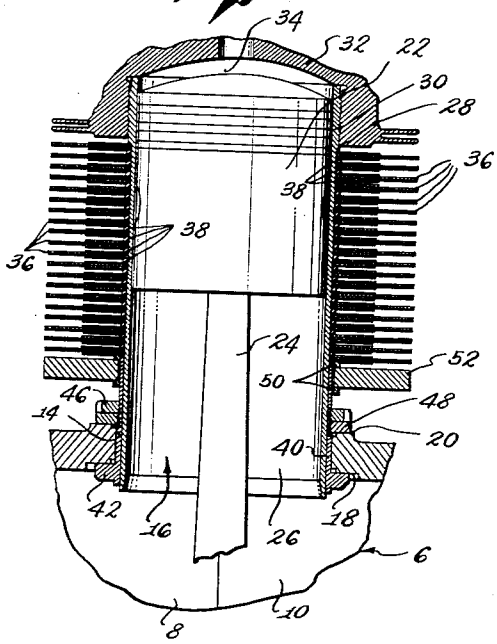


Fig. 2

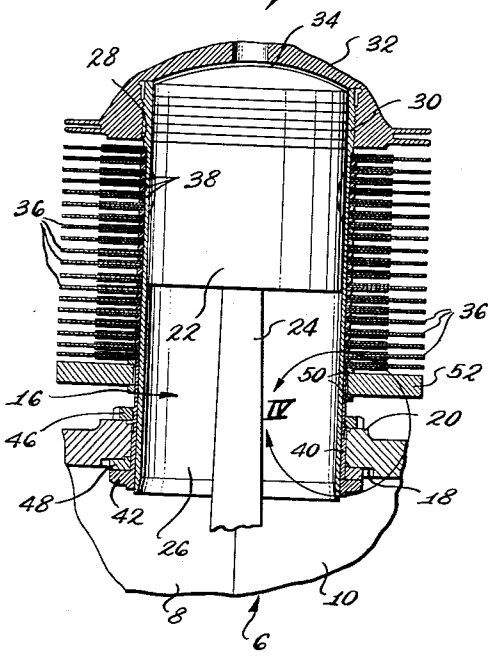


Fig. 3

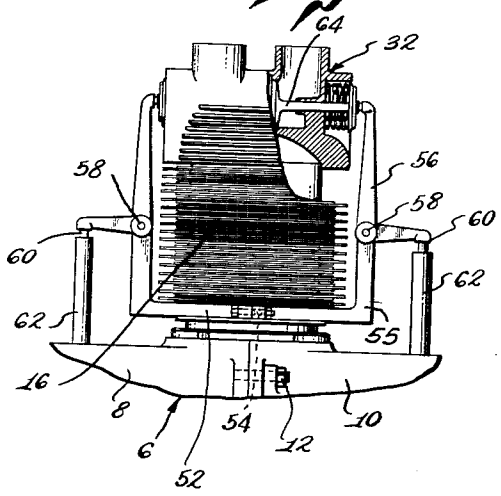
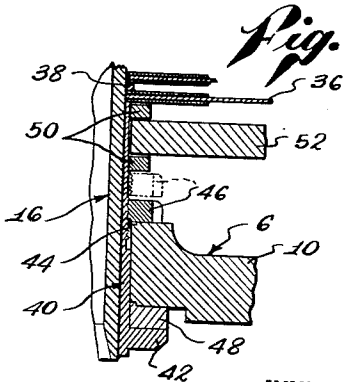


Fig. 4



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ENGINE CYLINDER

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Application June 26, 1951, Serial No. 233,596

5 Claims. (Cl. 121—194)

This invention relates to internal combustion engines and particularly to their cylinders.

Objects of the invention are to provide an internal combustion engine cylinder which is removably mounted on the crankcase and which is adjustable relative to the piston stroke to vary the compression in the cylinder; to provide a cylinder structure which can be readily replaced if damaged or worn; to provide a cylinder which can be adjustably rotated relative to the crankcase; to provide readly alignment of overhead valves carried by the cylinder head with the valve operating mechanism; to provide a cylinder structure including cooling means therefor and a locking mechanism for securing the cylinder in place, wherein the cooling means and locking portion of the mechanism are bonded to the cylinder and to each other, thereby permitting the use of relatively thin cylinder walls and thereby facilitating head dissipation; and to provide a cylinder structure including means for supporting valve operating devices such as rocker arms.

The above and other objects and advantages will more fully appear from the following description made in connection with the accompanying drawing.

Fig. 1 is a vertical sectional view through a cylinder of my invention and a portion of a crankcase.

Fig. 2 is a view similar to Fig. 1 with the cylinder in an adjusted position for securing higher compression.

Fig. 3 is a view on a reduced scale, partially in side elevation and partially in section of an assembly of the cylinder with the valves and rocker arms indicated.

Fig. 4 is an enlarged fragmentary section taken on the line IV of Fig. 2.

In the drawing there is shown a crankcase **6** made up of sections **8** and **10** connected by studs **12**. The crankcase has an opening **14** formed therein which is circular to receive a cylinder indicated generally at **16**. Around the lower part of the opening **14** is a flat annular surface **18** and on the outer side of the crankcase is a complementary flat annular surface **20**.

The cylinder **16** is shown with a piston **22** therein and to which is secured a connecting rod **24**. The lower end of the connecting rod is connected by a suitable bearing not shown to a conventional crankshaft, not shown. The cylinder **16** includes a cylindrical body **26** which comprises a single piece of metal, usually steel. The outer diameter of the cylinder body **26** is uniform from its lower end upwardly to a shoulder **28** which is formed by a thickened upper portion **30**. Said upper portion is threaded as shown in Figs. 1 and 2 to receive a cylinder head **32** having a chamber **34** formed therein and which comprises part of the combustion chamber.

A stack of heat dissipating fins **36** is mounted on the cylindrical member **26**. Each of the fins is laminated as indicated, by spacer rings **38**. The fins **36** and spacers **38** are suitably bonded to the cylindrical body **26** as by brazing and the fins and rings are also bonded to each other. The details of the fin structure are not disclosed herein since they comprise the subject matter of

an invention shown and claimed in my copending application, Serial No. 182,703, filed September 1, 1950, and entitled "Engine Cooling Fin Assembly," now abandoned.

The fins **36** terminate some distance above the lower end of the cylinder **16**. On the lower end of said cylinder is a sleeve **40**, the sleeve being brazed to the cylinder body **26**. The upper end of the sleeve **40** abuts against the lowermost fin **36**, as best shown in Fig. 4, and at the point of contact the sleeve and fins are preferably brazed together. The intimate bonding of the fins **36**, spacer rings **38** and the sleeve **40** as a unit as well as their bonding to the cylinder body **26** provides a strong unitary structure which permits the walls of the cylinder body **26** to be made relatively thin. The advantages are reduction in weight and also a reduction in the thickness of the steel cylinder wall. This permits more efficient heat dissipation since steel is a poor conductor and a thicker steel cylinder wall will retain the heat to a greater extent.

The lower portion of the sleeve **40** is provided with an outwardly extending radial flange **42** which is shown in Fig. 1 to bear against the inner annular flat surface **18** on the crankcase **6**. A portion **44** of the sleeve **40** is externally threaded to receive a nut **46** which is originally placed on the cylinder before the flange **42** is mounted on the lower end of the cylinder. Interposed between the nut **46** and the outer annular flat surface **20** on the crankcase **6** in Fig. 1 is a split shim **48**. When the nut **46** is drawn down it will tightly clamp the cylinder to the crankcase.

In Fig. 2, the split shim **48** is shown inside the crankcase **6** or between the crankcase and the flange **42**. In this position the cylinder is drawn into the crankcase slightly a distance equal to the thickness of the shim **48** and the piston **22** more nearly approaches the inner portion of the cylinder head **32** than in the arrangement of Fig. 1. Thus the engine can be easily converted from one of lower compression when arranged as in Fig. 1 to one of higher compression when arranged as in Fig. 2. This change in compression is valuable in cases where an engine is originally set up to operate on high octane gasoline at high compressions but can be quickly converted in the event the high octane gasoline is not available.

It should appear obvious that when the cylinder is installed and removed it is necessary to loosen the clamping nut **46** and separate the crankcase sections **8** and **10**, whereupon the cylinder is full detached from the crankcase.

In the drawing there is shown, below the fins **36**, a pair of spaced rings **50** which form an annular guide about the lower medial portion of the cylinder **16**. These rings are secured to the upper portion of the sleeve **40** rather than directly to the cylinder body **26**. Located in the space between the rings **50** is a ring-like member **52** which is split and whose halves are connected by a stud **54** as indicated in Fig. 3. Extending outwardly thence upwardly from the ring-like member **52** are brackets **55** which support rocker arms **56** on pivot pins **58**. The horizontal leg of each of the rocker arms **56** rests upon a push rod **60** in a guide **62**. The push rod **60** is actuated in any suitable manner known in the art, usually from a cam shaft. The upper leg of each rocker arm **56** bears against a valve stem **64** mounted for reciprocation in the cylinder head **32**.

Since the engine cylinder **16** is detachable from the crankcase **6** and in view of the fact that it is circular, said cylinder can be rotated in the crankcase opening **14**. Consequently when the cylinder is installed it can be rotatably adjusted in position so that the valve stems **64** will properly line up with the rocker arms **56**. In like manner the ring-like support **52** for the rocker arm brack-

ets 54 can be adjusted about the cylinder. Furthermore, this rotational adjustment permits the same cylinder assembly to be used in engines where the valves reciprocate on axes in line with a bank of cylinders or on axes transverse to a bank of cylinders. It merely requires positioning of the cylinder at one or two points 90° from each other.

It will be seen that I have provided a cylinder construction which has high heat dissipating efficiency coupled with strength and lightness. It is a structure which permits ready adjustment of cylinder compression and it supports rocker arm assemblies in a simple and compact arrangement. The ready adjustment of compression is particularly valuable for use in engines for military purposes due to the fact that it can quickly be accommodated to the use of what is properly termed "high test" or "low test gasoline."

It will, of course, be understood that various changes can be made in the form and details without departing from the scope of the invention.

I claim:

1. The combination with an internal combustion engine crankcase having a cylinder receiving opening, of a cylinder whose lower end is received in the opening, the cylinder having an external radial flange about its lower end of larger size than the crankcase opening, a thread about the cylinder having at least a portion disposed to lie externally of the crankcase wall, a nut on the thread, and a removable shim about the cylinder between the nut and the flange, the shim being capable of placement between the nut and the crankcase to create a lower compression cylinder position, and the shim also being capable of location between the flange and the crankcase to create a higher compression cylinder position.

2. The structure in claim 1, and the crankcase being divided along a plane intersecting the crankcase opening.

3. The structure in claim 1, and said shim being split.

4. In an internal combustion engine cylinder for use with a crankcase having a wall, said wall having an opening therein, said cylinder having a lower open end adapted to be fitted to the crankcase opening and an upper head end which projects from the crankcase when the open end is fitted to said crankcase: a flange projecting radially outward from the cylinder, a threaded portion on the outside of the cylinder between the flange and the head end, and a nut on the threaded portion to grip the crankcase between it and the flange when the nut is tightened, thereby mounting the cylinder to the crankcase.

5. In combination, an engine crankcase having a wall, said wall having an opening therein, said wall being split along a plane intersecting the crankcase opening so that the crankcase can be divided at the opening, and an internal combustion engine cylinder for use with said crankcase having a lower open end adapted to be fitted to the crankcase opening and an upper head end which projects from the crankcase when the open end is fitted to said crankcase, a flange projecting radially outward from the cylinder, a threaded portion on the outside of the cylinder between the flange and the head end, and a nut on the threaded portion to grip the crankcase between it and the flange when the nut is tightened, thereby mounting the cylinder to the crankcase.

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