Feb. 28, 1939. G. PIELSTICK 2,148,639

ENGINE FRAME

Filed Oct. 23, 1935

Fig. 1.

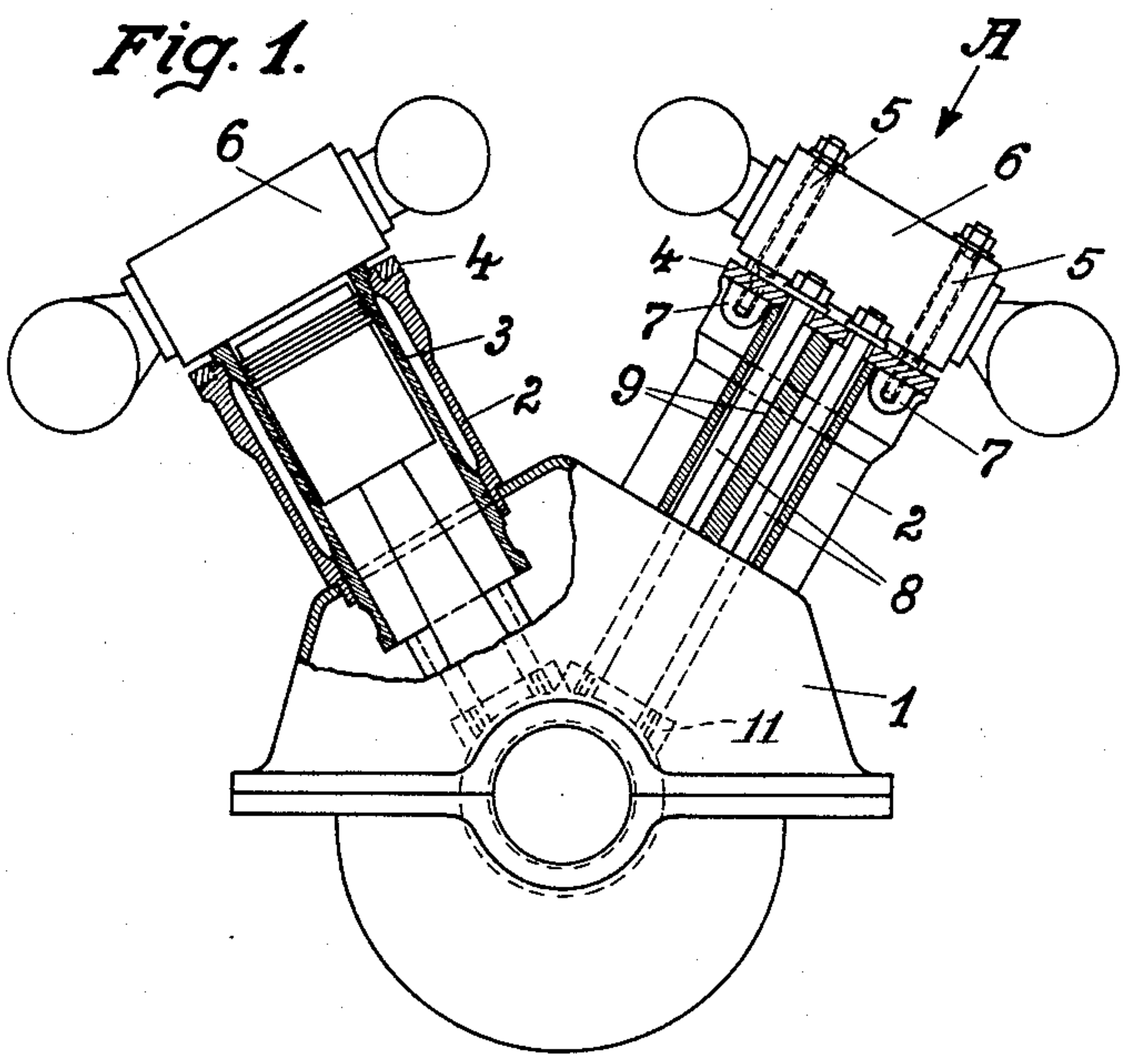


Fig. 2.

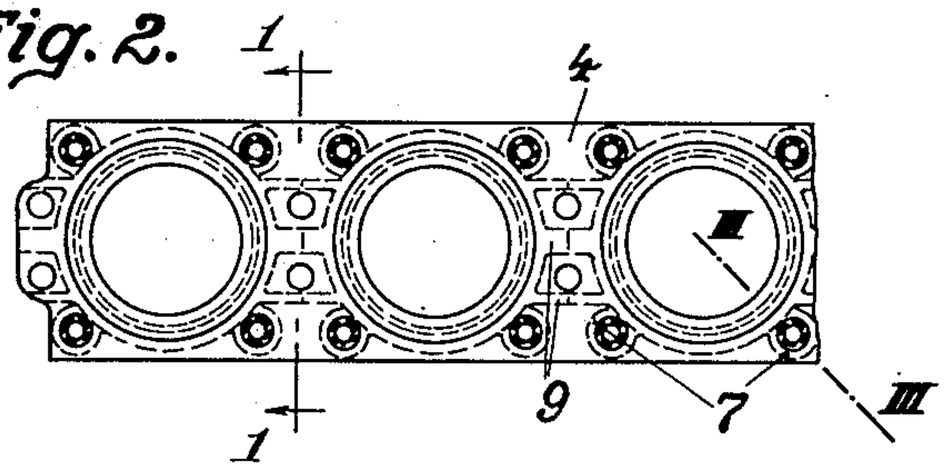
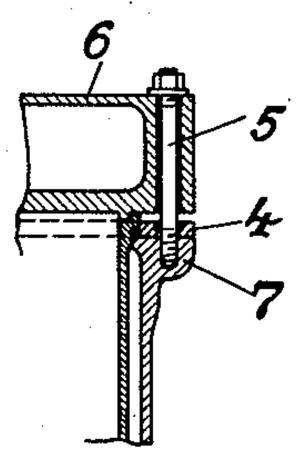


Fig. 3.



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ENGINE FRAME

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4 Claims. (Cl. 121—194)

This invention relates to engine frame construction, and more particularly to engine frames having tension members adapted to assume the forces created by combustion pressures.

One object of the invention is the provision of an engine frame including a crankcase portion, crankshaft bearings and cylinders and cylinder heads, the cylinder heads being connected directly to the cylinders and the cylinders being connected by tension members and a common fastening plate so as to be firmly fixed to the crankcase portion and crankshaft bearings.

Another object of the invention is the provision of an engine frame of the character mentioned in which a common fastening plate is welded directly to the outer portions of a row of cylinder walls and is connected by tension rods to the crankshaft bearings so that the cylinder walls are held in proper position and serve in turn in holding the cylinder heads against the outward forces created by combustion pressures.

Other objects and advantages of the invention will be apparent from the following description, the appended claims and the accompanying drawing, in which—

Fig. 1 is an end view of a combustion engine embodying the present invention, the cylinder portions being shown in vertical section, the section line for the right-hand cylinder being indicated as line I—I of Fig. 2;

Fig. 2 is a plan view showing one of the cylinder series looking in the direction of the arrow A of Fig. 1, showing the common fastening plate, with the cylinder heads removed; and

Fig. 3 is a section on the line III—III of Fig. 2.

Referring more particularly to the drawing the invention has been shown as applied to an internal combustion engine having two banks or rows of engine cylinders arranged in V formation, but it should be understood that the invention is also applicable to other engines in which there is a series of engine cylinders.

As will be apparent from the drawing, the engine cylinders 2 are mounted on a housing or crankcase wall 1 and are arranged in two rows to provide a V arrangement. Each engine cylinder preferably comprises an outer cylinder wall or cover 2 having an inner sleeve 3 suitably fixed therein. A common fastening member in the form of a rigid plate 4 extends longitudinally along each series of cylinders, being applied to the outer ends of the cylinder walls or covers 2 and rigidly fixed thereto as by means of a welded connection directly to the end of the cylinder walls The separate cylinder heads 6 are fastened directly to the cylinder walls 2 by means of bolts or screws 5 which are preferably threaded in lugs 7 which extend outwardly on the cylinder covers or walls 2 as shown in Figs. 2 and 3. These screws 5 pass through clearance holes in the plate 4 so that the cylinder head is not fastened directly to the plate 4.

The plate 4 of each cylinder row is connected directly to the crankshaft bearings 11 which are provided at suitably spaced points on the crankcase housing. This attachment of the plate 4 to the crankshaft bearings is by means of a series of tension rods 8 which may be arranged either singly or in pairs between each adjacent pair of cylinders. These tension rods 8, as shown, are enclosed by longitudinally extending ribs 9 which are provided on the cylinder walls 2 and which project from the cylinder walls of adjacent cylinders in abutting relationship so as to form a box-like column for each tension rod which assists in assuming compression forces that occur during the initial tensioning of these rods. The ribs 9 are welded together.

The forces which result from the combustion pressures tending to force the cylinder heads outwardly away from the crankshaft axis thus pass from these cylinder heads directly through the screws 5 to the cylinder walls 2. The cylinder walls are held rigidly in their proper positions on the crankcase portion by means of the plate 4 and the tension rods 8 so that the forces due to combustion pressures are transmitted from the plate 4 directly inwardly to the crankshaft bearings. The columns formed by the ribs 9 which abut against the under surface of the plate 4, cause the compression forces exerted by the initial tension of the tension rods to be distributed evenly around each tension rod axis and applied to the plate 4, and since each plate 4 is located directly on and welded to the lugs 7 of the series of cylinders no destructive or injurious or bending stresses can occur within the engine frame during the transmission of power forces from the head attaching screws 5 to the tension rods 8. By reason of the described connections of the various parts of the engine frame, the plate 4 is not exposed to excessive bending stresses such as might result in straining the welded connection to the engine cylinder walls 2.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein

without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. An engine frame of the character described comprising a series of engine cylinders, a crank case structure supporting said engine cylinders, a crank shaft bearing supported by said crank case structure, a plate connected directly to the outer portions of all of the cylinders of said series, a cylinder head connected independently of said plate directly to each cylinder and arranged outwardly of said plate, and tension rods connected to said bearing and to said plate.

2. An engine frame comprising a crank case structure forming a means for cylinder support and having crankshaft bearings, a row of cylinder heads, a row of cylinder members bolted to said heads, a fastening plate welded to and overlying end portions of said cylinder members and devoid of direct attachment to said cylinder heads except through the bolted connection between cylinder heads and cylinder members, and tension rods connecting said plate to the crankshaft bearings to secure the cylinder members rigidly on said crankcase structure.

3. An engine frame comprising a crank case structure forming a means for cylinder support and having crank shaft bearings, a series of cylinder heads, a cylinder wall for each head, a common supporting plate extending transversely of the cylinder axes and along the series of cylinder heads and underlying the same, said plate overlying said cylinder walls and having a welded connection therewith, means independent of said plate directly connecting each cylinder head to its respective cylinder wall, and tension rods connecting said plate to said crank shaft bearings to secure the cylinder walls in position on said crank case structure.

4. An engine frame comprising a crank case structure forming a means for cylinder support and having crank shaft bearings, a series of cylinder heads, a cylinder wall for each head, a common supporting member extending along said series of cylinder heads beneath the same and connected to said cylinder walls, means connecting each head independently of said supporting member to its respective cylinder wall, and tension rods connecting said supporting member independently of said heads to the crank shaft bearings to secure the cylinder walls in position on said crank case structure, and means on said cylinder walls enclosing said rods and transmitting compression strains from said common supporting member to said crank case structure.

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