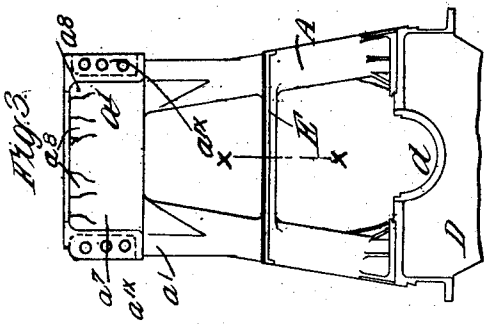
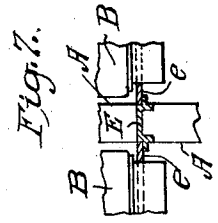
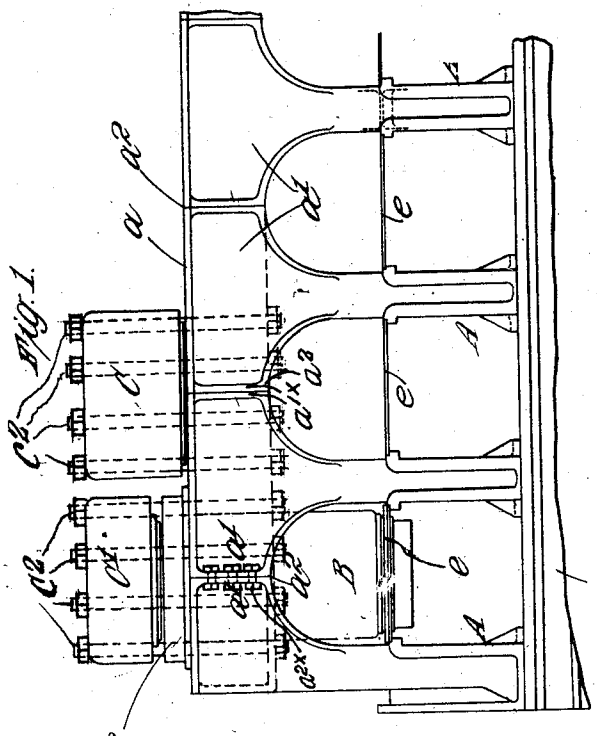
Aug. 11, 1931. W. F. RABBIDGE 1,818,752

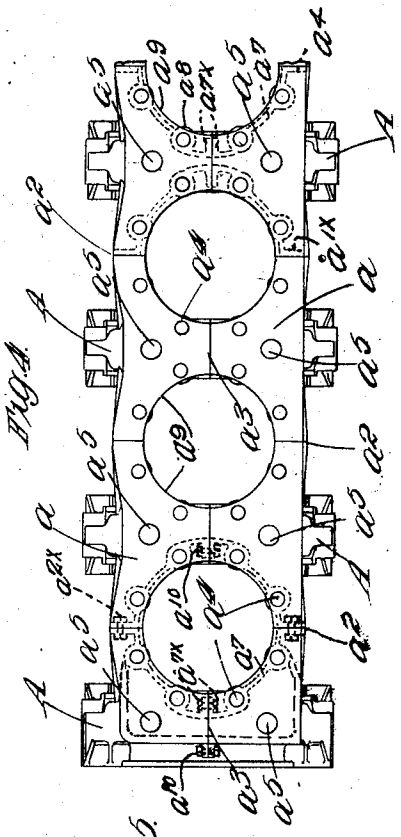
STRUCTURE OR FRAMING OF INTERNAL COMBUSTION ENGINES

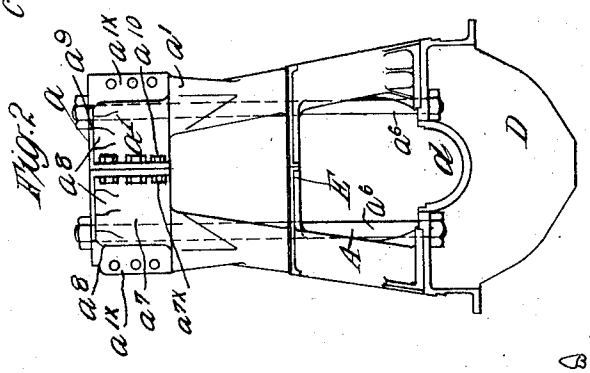
Filed March 27, 1925

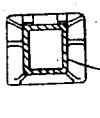


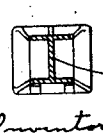












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UNITED STATES PATENT OFFICE

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STRUCTURE OR FRAMING OF INTERNAL COMBUSTION ENGINES

Application filed March 27, 1925, Serial No. 18,756, and in Great Britain November 27, 1924.

This invention relates to the main structure or framing of multi-cylinder internal combustion engines of large size, more especially light weight trunk-piston engines, and has for its chief object to simplify the construction and avoid the necessity for large and difficult castings.

According to this invention the engine structure or framing comprises a number of approximately vertical sections mounted on a separate bedplate and having legs spanning the main bearings, the adjacent frame sections (half arched) meeting at the top in a transverse joint (athwartship) at the centre of each cylinder, where they are bolted together. The frame sections when secured together form a rigid entablature at the upper part of the engine and the cylinder covers may be bolted to the entablature directly or through a sandwich plate.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of an engine of the largest size with framing in accordance with this invention.

Figure 2 is an end elevation of a frame section of the engine.

Figure 3 is an end elevation of a frame section of an engine of smaller size, shown on a larger scale than Figures 1 and 2.

Figure 4 is a plan of the framing shown in Figure 1.

Figure 5 is a cross section of the leg of one form of frame section.

Figure 6 is a cross section of the leg of a modified form of frame section.

Figure 7 is a section on the centre line X—X Figure 3 showing the manner of supporting a guide plate for the lower ends of the cylinders.

Each vertical frame section A consists of a pair of legs disposed one on each side of the engine crank shaft, a half arch a^1 on each side of the upper portion of each leg or, in the case of the end sections, a half-arch on one side of each leg, the half-arches having vertical flanges a^{1x}, and a top plate a cast with and connecting the tops of the legs and half arches. The top plate a is of the shape shown in plan in Figure 4 having a semi-circular recess a^9 in each of the two sides which lies athwartships, and adjacent to the edge of each of which recesses is a downwardly extending flange a^7 integral with the top plate a and enlarged at intervals as at a^8. The back and front legs of the frame sections, on opposite sides of the main bearings d, may for increased stiffness be tied together by a girder E.

In the arrangement shown in Figures 1, 2 and 4, the frame sections are divided longitudinally, the top plate a with its flanges a^7 having a joint a^3 and the girder E a joint e^1. For this purpose the adjacent ends of the flanges a^7 are provided with longitudinally extending portions a^{7x} (Figures 2 and 4) through which bolts a^{10} are passed to secure the two halves of the frame sections together. The other ends of the flanges a^7 are joined to the flanges a^{1x} on the half arches a^1 and the leg, half top plate, half girder E, half-arch a^1 with its flange a^{1x}, and flange a^7 of each half section are formed integrally by casting. The frame sections A are mounted on the bedplate D and span the main bearings d and are secured together at the joints a^2 by bolts a^{2x}, the top plates a forming a ridged platform or entablature, the recesses a^9 of adjacent sections combining to form circular openings for the engine cylinders B, the lower ends of which extend downwardly between the legs of the frame sections A and pass through a guide plate e supported on the girders E. The cylinder covers C, C^1 are secured to the entablature directly, or through a sandwich plate g and by means such as bolts C^2 passing through holes a^4 in the top-plates a forming the entablature the holes a^4 passing into the aforesaid enlargements a^8 of the flange a^7. Figure 7 is a section through one of the intermediate girders E with a pair of adjacent guide plates e which have large apertures through which the cylinders B extend. The guide plates e rest on flanges at the edges of the girders E. The legs of the framing shown in Figures 1, 2 and 4 may be of hollow rectangular cross sec-

tion as indicated in Figure 5. Long tie bars or bolts a^6 are used to tie the entablature to the bedplate, the bolts a^6 passing through the legs of the frame sections as indicated in Figure 2 and through the bolt holes a^5 (Figure 4), the frame sections in such a case being designed to afford the necessary space for the bolts.

In the modification shown in Figure 3, which is an end elevation of a frame section of an engine of smaller size, each frame section is formed in one, that is, there are no longitudinal joints a^3 and e^1. This engine comprises a number of frame sections similar to, and secured together in the same manner as, those of the larger engine above described. Furthermore, in engines of smaller size the legs of the frame might be of an H cross section as indicated in Figure 6. Tie bars or bolts, such as those indicated at a^6 in the construction according to Figures 1, 2 and 4, are not employed in the engine illustrated in Figure 3 as the vertical forces, except in engines of the largest size, are usually resisted by the cast frame sections unaided.

I claim:

1. In a multi-cylinder internal combustion engine structure, a bedplate having bearings for the engine crank shaft, a plurality of vertical frame sections, each comprising two approximately vertical legs mounted on the said bedplate, a top plate connecting the legs and spanning the said crank shaft bearings and half-arched tops on adjacent sections meeting in joints extending transversely to the shaft axis, means for connecting the section tops at the said joints whereby the sections co-operate to form a rigid entablature for the complete multi-cylinder engine, and cylinders passing through and supported upon the said entablature.

2. In a multi-cylinder internal combustion engine structure, a bedplate having bearings for the engine crank shaft, a plurality of vertical frame sections, each comprising two approximately vertical legs mounted on the said bedplate and having transverse extensions at their upper ends meeting in a longitudinal joint and spanning the said crank shaft bearings, and half-arched tops terminating the said legs, which tops of adjacent sections meet in joints extending transversely to the shaft axis, means for connecting the section tops at the said joints whereby the sections cooperate to form a rigid entablature for the complete multi-cylinder engine, and cylinders passing through and supported upon the said rigid entablature.

3. In an engine structure as in claim 1, a girder attached to and tying together the frame section legs at about their middle and a guide plate supported by the said girder and shaped to encircle the lower end of the engine cylinder when the latter is placed in position.

4. In a multi-cylinder engine structure as in claim 1, a plurality of long substantially vertical bolts passing along the frame section legs and bolting the entablature formed by the co-operating sections to the bedplate.

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