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FRAME FOR DUAL SHAFT INTERNAL COMBUSTION ENGINES OF THE OPPOSED PISTON TYPE

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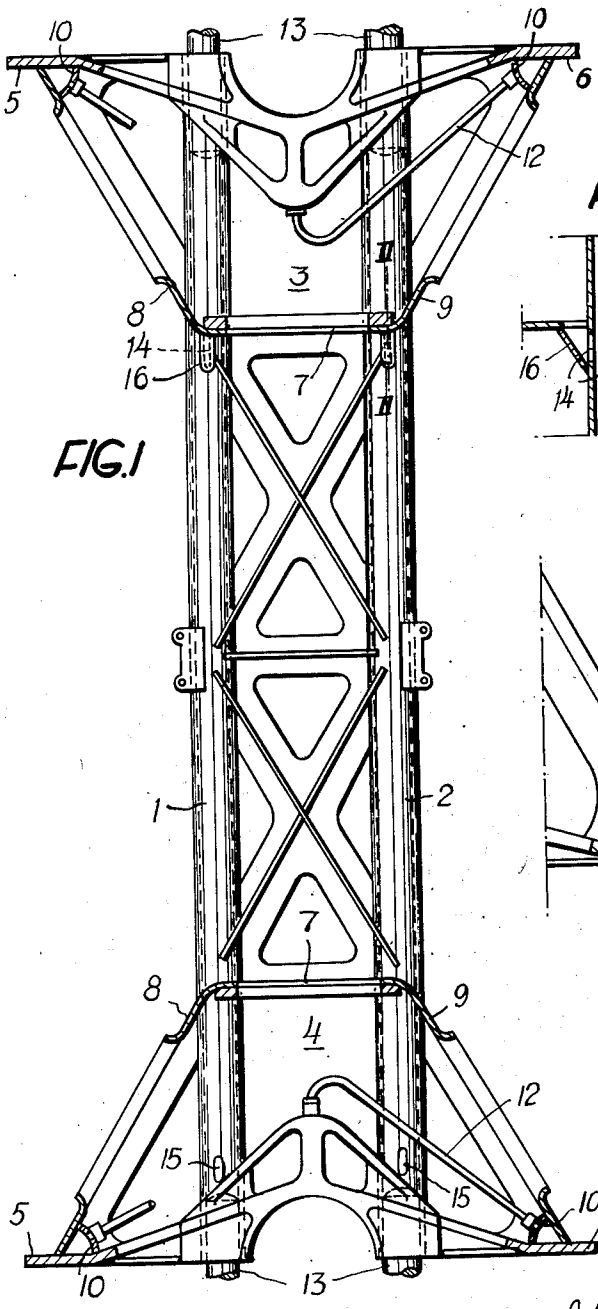


FIG. 1

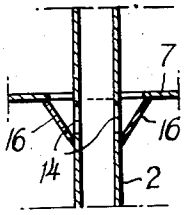


FIG. 2

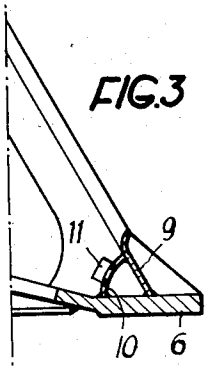


FIG. 3

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3 Claims. (Cl. 123—195)

This invention relates to a welded frame for a multi-cylinder dual shaft internal combustion engine of the opposed piston type having an upper crank case and a lower crank case common to a plurality of engine cylinders and supporting members arranged between adjacent cylinders and inter-connecting said crank cases. In a frame of this type, great bending and torsional stresses occur both in vertical and longitudinal direction, the longitudinal stresses acting especially along the longitudinal outer edges of the crank cases. In the design of the frame due consideration has to be taken to these stresses. In the operation of the engine various fluids, such as lubricant, cooling liquid and the like, have to be distributed among the various cylinder portions and to be collected and withdrawn into common reservoirs. It is difficult to arrange the required distribution ducts for these fluids in the engine and to connect the ducts to various parts of the frame in such a manner that they will not be hindrances or likely to be damaged if other parts of the engine are to be dissembled. It is the object of the invention to design a frame of the type referred to in which the above named difficulties are avoided. This object is attained by structure illustrated in the annexed drawing, in which—

Fig. 1 illustrates a cross-sectional view of the frame between two cylinders, Fig. 2 a detail of construction in a section along the line II—II of Fig. 1, and Fig 3 an enlarged sectional view of the lower right-hand corner of the frame shown in Fig. 1.

The frame generally comprises supporting members or uprights 1 and 2 provided between adjacent cylinders and crank case portions 3 and 4 common to a plurality of cylinders and interconnected by the uprights. Each crank case portion consists of horizontal longitudinal beams 5 and 6 and a trough-shaped member comprising a bottom 7 and two side walls 8 and 9.

The side walls merge at an acute angle into the lower faces of the longitudinal beams and are welded thereto. The frame further comprises stiffening and reinforcing means which form no part of the invention and need not be described.

At the place of the frame where the side walls of the trough-shaped member merge into the longitudinal beams there occur very high stresses. In order to reinforce these parts, a sheet-metal strip 10 arcuate as viewed in cross-section is inserted between each beam and the appertaining side wall, the sheet-metal strip being common to a plurality of cylinders and welded to said parts. The beam, side wall and strip constitute a longitudinally extending re-inforced joint at each outer corner of the crank cases of the frame and confine a longitudinally extending passage which is triangular in cross-section. At least one of these passages may be used for the distribution of a fluid, such as lubricant, cooling liquid or the like, necessary in the operation of the engine.

Each passage extends throughout the entire length of the frame. If the frame on account of its size is

divided into minor units, the passage extends through each of the units, the various parts of the passages being suitably interconnected. At a suitable place, such as at one end of the frame, the passage is connected to a supply duct. At each cylinder there is provided an outlet opening having a connecting flange 11. According to Fig. 1, two of the passages are used for the distribution of lubricant and communicate with the inner parts of the crank shaft bearings by means of ducts 12. The other passages may be suitably connected to other parts of the engine requiring lubricant, for instance for cooling the pistons.

As mentioned above, uprights 1 and 2 are provided between the various cylinders, these uprights constituting vertically extending reinforced joints. The uprights are hollow, and short bolts 13 are screwed into their upper and lower ends for securing thereto the caps of the crank shaft bearings. In accordance with a further development of the invention in connection with engines of this type, the two crank case portions are interconnected by the hollow uprights in a manner such that oil used for lubrication of the upper bearing or for cooling the pistons and leaking oil is permitted to flow down from the upper to the lower crank case portion.

In the uprights there are provided upper apertures 14 through which oil can enter the uprights from the upper crank case, and lower apertures 15 located immediately above the lower bearing bolts 13 and permitting flow of lubricant from the uprights into the lower crank case at the bottom of which such oil is collected for renewed use.

The upper crank case portion which in contrast to the lower one is not supported by a base, is the weaker one of the two crank cases and should be provided with additional reinforcing means. To render possible effective draining of the upper crank case, the apertures 14 in the uprights are located below the bottom 7 of the crank case. Reinforcing members constructed as double-walled brackets 16 are provided to permit flow of oil from the crank case into the uprights, as shown in Fig. 2 which illustrates a section of an upright at the place where it passes through the upper crank case portion.

The above described and illustrated construction is merely an example of the invention the details of which may be varied within the scope of the appending claims. For instance, passages in different parts of the frame may be used for the flow of different fluids. It is not necessary to use both longitudinal passages in each crank case or all of the uprights for the distribution of a fluid.

What I claim is:

1. In a welded frame for multiple-cylinder two shaft internal combustion engines of the opposed piston type, an upper crank case and a lower crank case common to a plurality of cylinders, uprights arranged between adjacent cylinders and interconnecting said crank cases, each of said crank cases comprising substantially horizontal outer longitudinal beams and side walls connected at an acute angle with the beams and connecting said beams to said uprights, a reinforcing member consisting of a sheet metal strip arranged in opposite relation to the apex of said angle and connecting said beam to said side wall, said strip extending longitudinally of the crank case and being common to a plurality of cylinders, a passage defined by said beam, said wall and said strip, means for supplying a lubricant to said passage, and further means adjacent each cylinder for conveying lubricant from said passage to various engine parts requiring lubrication.

2. In a welded frame for multiple-cylinder two shaft internal combustion engines of the opposed piston type,

an upper crank case and a lower crank case common to a plurality of cylinders, hollow uprights arranged between adjacent cylinders and interconnecting said crank cases, said uprights having upper and lower apertures in their side walls for establishing connection between the interior of the uprights and the upper and the lower crank cases, said upper apertures being located near the bottom of the upper crank case draining surplus lubricant from said upper crank case to said lower crank case by way of the hollow uprights.

3. In a welded frame for multiple-cylinder two shaft internal combustion engines of the opposed piston type, an upper crank case and a lower crank case common to a plurality of cylinders, hollow uprights arranged between adjacent cylinders and interconnecting said crank cases, said uprights having upper and lower apertures in their side walls for establishing connection between the interior of the uprights and the upper and the lower crank cases, said upper apertures being located below the bottom of the upper crank case, further apertures in the bottom of said upper crank case, frame reinforcing members designed as double walled brackets connecting said bottom and said uprights, said upper and said further apertures communicating by way of said double walled bracket so as to drain surplus lubricant from said upper crank case to said lower crank case by way of the hollow uprights.

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