June 23, 1936. J. RADLOFF 2,045,493

WELDED FRAME FOR COMBUSTION ENGINES

Filed Nov. 27, 1933

Fig. 1.

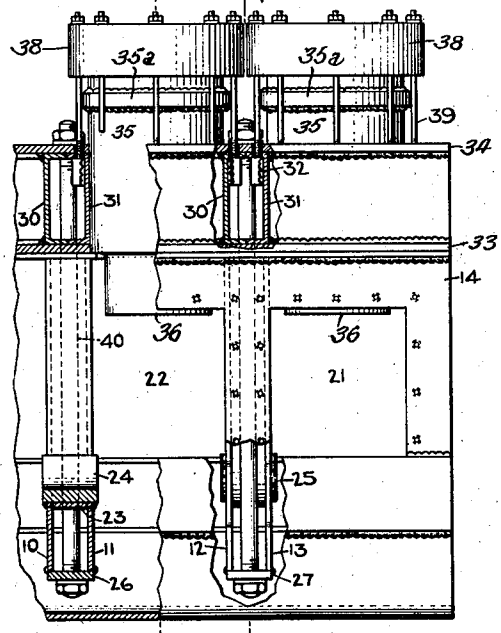


Fig. 3.

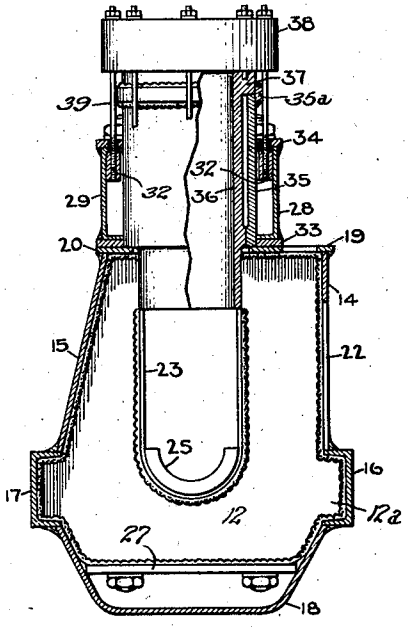


Fig. 2.

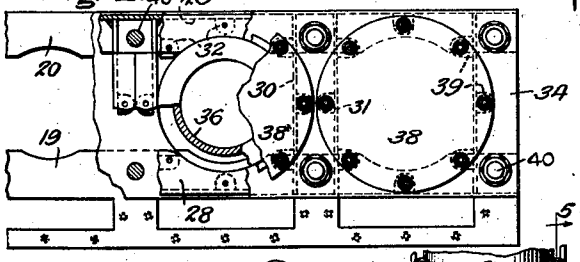


Fig. 4.

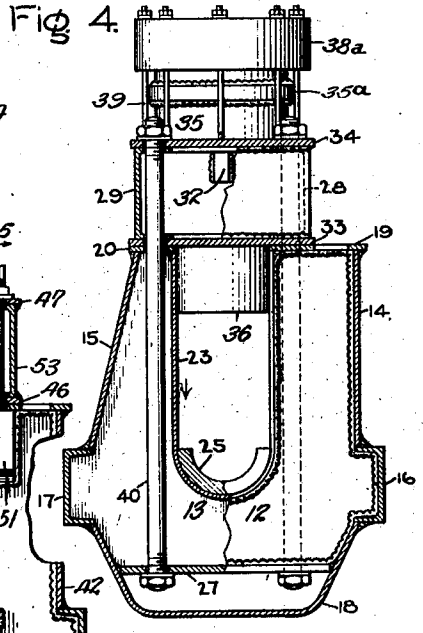


Fig. 5.

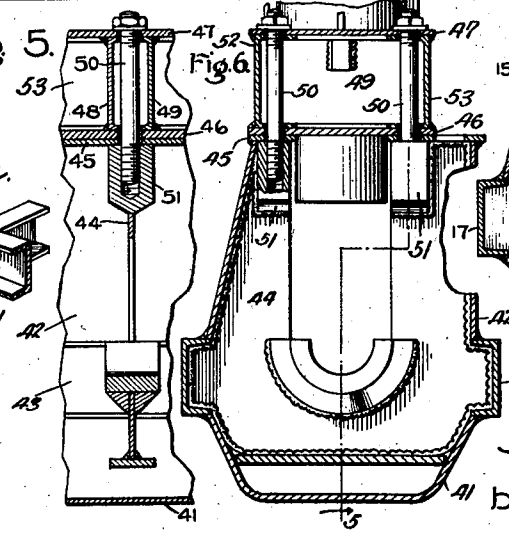
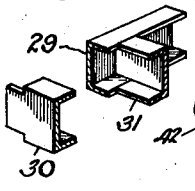


Fig. 6.

Fig. 4a.



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UNITED STATES PATENT OFFICE

2,045,493

WELDED FRAME FOR COMBUSTION ENGINES

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2 Claims. (Cl. 121—194)

The present invention relates to welded frames for combustion engines. In order to reduce the manufacturing cost of engines, particularly of special engines, not manufactured in mass production, such as turbines and large generators, it has been suggested to make the frame of such engines from parts welded together. Such welded frames are less expensive and they can be made lighter than cast frames, a factor to be considered whenever machines have to be shipped long distances.

One object of the present invention is to provide an improved construction and arrangement for welded frames of combustion engines whereby these frames may be made of standard structural shapes at considerably less cost than cast frames. In accordance with my invention I make a frame for combustion engines which comprises two separate parts, a base or crank case having a lower portion forming an oil chamber and including means for supporting a crank shaft, and a cylinder frame or support which is fastened to the base portion by means of anchor rods or studs. The arrangement according to my invention is such that forces due to the weight of the masses and the explosions in the cylinders are transmitted by the anchor rods or studs directly to structural shapes forming parts of the base frame without exerting excessive forces onto the welded seams between the different parts. This is accomplished by providing the structure of the base frame with a plurality of transverse walls made of forged steel plates projecting into recesses of structural shapes such as channel irons of the side walls of the base. The cylinder support in a preferred arrangement of my invention comprises longitudinal and transverse structural shapes which are fitted into each other and are provided with lugs in the joints for fastening the cylinder heads thereto.

For a better understanding of what I consider to be novel and my invention, attention is directed to the following description and the claims appended thereto in connection with the accompanying drawing which forms a part of my specification.

In the drawing Fig. 1 represents a front view partly broken away of a combustion engine frame embodying my invention; Fig. 2 is a top view partly broken away of Fig. 1; Figs. 3 and 4 are sectional views along lines 3 and 4 respectively of Fig. 1; Fig. 4*a* is a perspective view of a detail of Figs. 1 to 4; Fig. 5 represents a sectional front view partly broken away of a modified form of my invention; and Fig. 6 is a sectional side view of Fig. 5, which latter is a section along lines 5—5 of Fig. 6.

The base or crank casing of the frame comprises sheets or plates 10, 11, 12 and 13 for carrying the crank shaft bearings, side walls 14, 15, standard structural shapes 16, 17 in the present instance shown as channel irons which form a means for supporting the engine, and finally an oil pan 18 having side portions welded to the lower parts of the channel irons. By "channel irons" I mean any standard structural shapes such as U-irons, I-irons, TT-irons, etc. which define a channel. The bearing supporting plates or sheets 10, 11, 12 and 13 have the same shape and they may be burned or cut out for the entire length of the machine in the same pattern. These sheets may be used without any machining or finishing. They are welded together with other parts of the base and to this end they are provided with lateral projections 12*a* (Fig. 3) which fit into the channel irons 16 and 17. The projections fit the inner sections of the channel irons completely. This is an important feature of my arrangement because it permits the transmission of forces, due to the masses of the different elements and the explosions in the cylinders, directly to the heavy channel irons 16 and 17 without seriously affecting the welded seams between the sheets or plates 10, 11, 12, 13, and the channel irons 16 and 17. The crank case of the machine frame is completed by the longitudinal walls 14, 15 welded to the channel irons and cover plates 19 and 20. The front wall 14 is provided with openings 21 and 22 permitting access to the crank shaft and the bearings. These openings may be closed by doors or plates (not shown). Each set of two sheets 10, 11 and 12, 13 respectively is united by means of bent strips of sheet metal 23, which latter serve to carry bearing brackets 24 and 25 respectively. Each set is furthermore united by bottom pieces 26 and 27 respectively. The latter are located within the oil pan. The strips 23 and the bottom pieces 26 and 27 are welded to the plates 10, 11 and 12, 13 respectively.

The upper part of the machine frame, that is, the cylinder support, comprises longitudinal structural shapes or channel irons 28 and 29 and two transverse structural shapes or channel irons 30, 31 between each pair of adjacent cylinders. In the present instance, U-irons have been used for structural shapes but other forms of structural shapes may be used. Lugs 32 are welded into the corners of the transverse and longitudinal structural shapes. The longitudinal chan-

nel irons 28, 29, which extend along the entire length of the machine are welded together with bottom and cover plates 33 and 34 respectively and with the transverse channel irons 30 and 31. The ends of the latter are partly cut away to fit into the recesses defined by the longitudinal channel irons 28 and 29 (Fig. 4a). Tubes 35 defining cooling water jackets are welded to the plates 33 and 34 of the cylinder support. Tubes 36 defining cylinder walls are concentrically arranged within the tubes 35. The tubes 36 have upper flanged portions 37 resting on the upper ends of the tubes 35 with the outer surfaces centered by rings 35a welded to said tubes. Each cylinder has a head 38 fastened thereto by means of studs 39 held in threaded bores of the lugs 32.

The transmission of explosion forces takes place through the cylinder head studs 39 to the lugs 32. These lugs in accordance with my invention are so fitted into the channel irons 28, 29, 30 and 31 and welded thereto that the welded seams are not seriously affected by tensional forces due to explosions in the cylinders. These lugs, as pointed out above, are preferably provided in the joints between the longitudinal and transverse channel irons. With this arrangement the explosion forces are directly transmitted through the cylinder head bolts 39 to the longitudinal and transverse channel irons 28 to 32 inclusive. The base and the cylinder support are held together by means of anchor rods 40, projecting through holes near the joints of the longitudinal and transverse channel irons, and projecting through the spaces defined by the sets of plates 10, 11, and 12, 13 respectively. It will be noted that the transverse structural shapes or channel irons 30, 31 form vertical walls in alinement with the walls 10, 11 and 12, 13 respectively. The forces transmitted through the cylinder bolts 39 and the lugs 32 to the transverse and longitudinal structural shapes or channel irons are transmitted from the latter through the anchor rods 40 to the plates 10 to 13, whence they are finally transmitted to the channel irons 16 and 17. These forces also during their transmission from the lugs 32 to the channel irons 16 and 17 do not seriously affect the welded seams between the different elements forming the crank case.

The modification shown in Figs. 5 and 6 differs from the arrangement illustrated in Figs. 1 to 4 in that studs are used instead of anchor rods for bolting the cylinder frame to the crank case and in the use of single transverse sheets instead of the sets of sheets 10, 11 and 12, 13 in Fig. 1. More specifically, the arrangement comprises a pan portion 41, side plates 42 and channel irons 43 welded together, and a transverse sheet or plate 44 between adjacent cylinders having projections filling the free section of the channel irons 43 similar to the arrangement shown in Figs. 3 and 4. A top plate 45 is welded to the side walls 42. The cylinder frame comprises a bottom plate 46 and a top plate 47 welded to structural shapes shown as U-irons 48 and 49 corresponding to the irons 30 and 31 of Fig. 1, and U-irons 52 and 53 corresponding to U-irons 28 and 29 of Fig. 2. The cylinder support is fastened to the base or crank case by means of studs 50 screwed into a reinforced portion 51 of the upper part of sheet 44. In all other respects the arrangement is similar to that described above in connection with Figs. 1–4.

With my invention I have accomplished an improved construction of welded combustion engine frames. The frame is manufactured from commercial, standard structural shapes and plates which are welded together and arranged so that forces due to the weight of the masses of the different elements and explosions in the cylinders are transmitted directly to the main structural shapes for supporting the engine without affecting the welded seams between the different parts. This feature increases the safety and the life of the engine.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a combustion engine a welded frame comprising a base and a cylinder support, the base having a casing comprising side walls made of plates and longitudinally extending channel irons, transverse plates having projections located in recesses defined by the channel irons, said plates being welded along their edges to said channel irons and side-wall plates, and anchor-rods for fastening the cylinder support to the base, the anchor-rods being fastened to the transverse plates whereby forces from the cylinder support are transmitted to the channel irons of the base without seriously affecting the welded seams along the edges of said transverse plates.

2. In a combustion engine, a welded frame comprising a base and a cylinder support bolted together, the base having an outer casing comprising side walls made of plates and longitudinally extending channel irons, transverse plates having projections located in the channels defined by the channel irons, the cylinder support comprising two longitudinal channel irons and two transverse channel irons between adjacent cylinders having ends fit into the recesses of the longitudinal channel irons and being welded thereto, and bolts for securing the cylinder support to the base arranged to compress said transverse plates, thereby eliminating the transmission of considerable tension forces through welded seams between the different parts.

JOHANNES RADLOFF.