PUBLISHED
JUNE 1, 1943.
BY A. P. C.

W. WERNER

WELDED CRANK CASE

Filed April 25, 1941

Serial No.
390,240½

3 Sheets-Sheet 1

Fig. 1

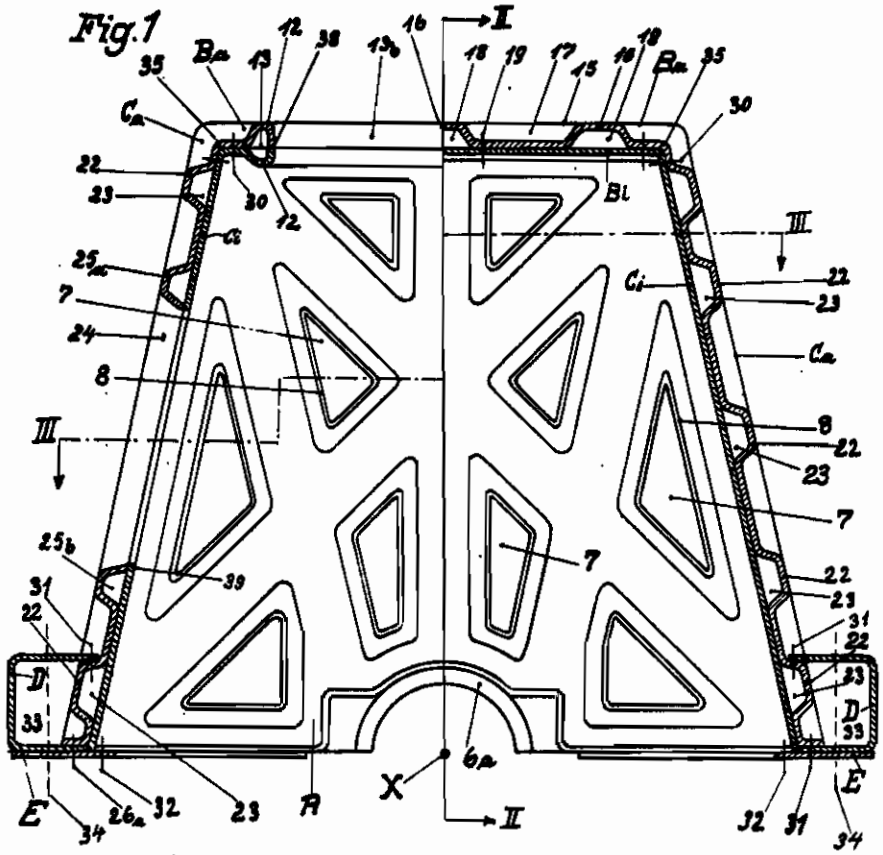

Fig. 3

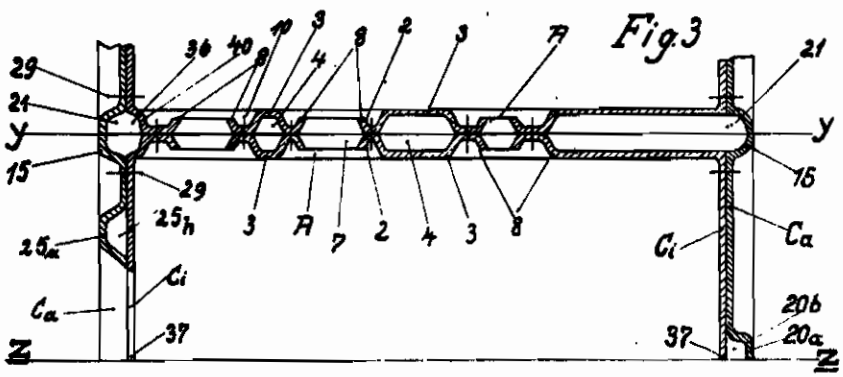

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Fig. 2

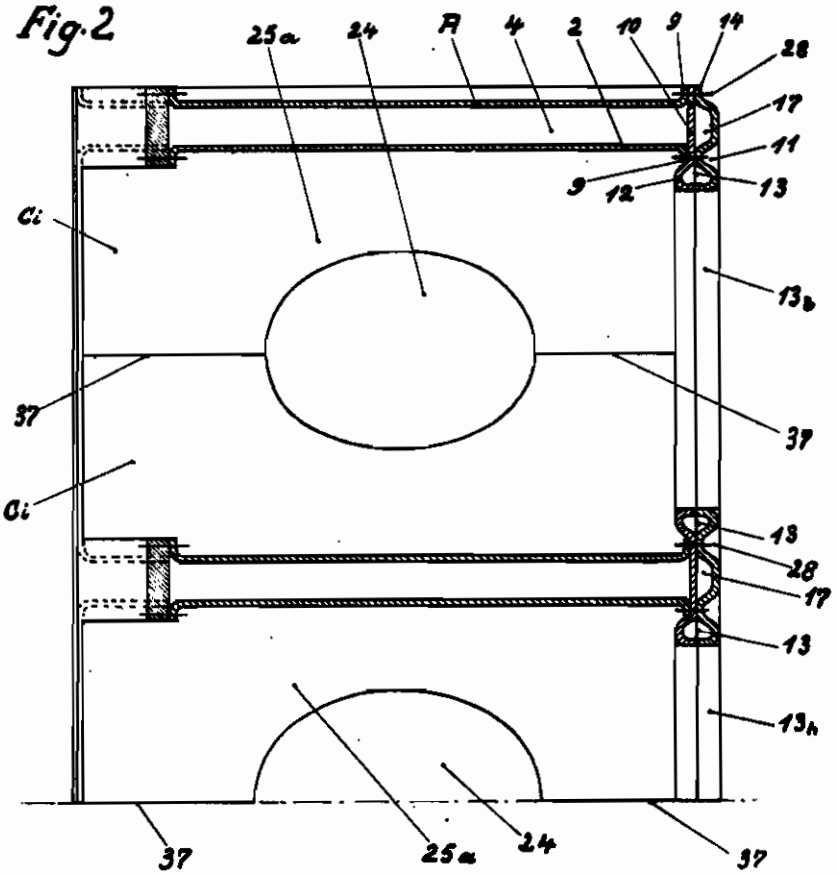
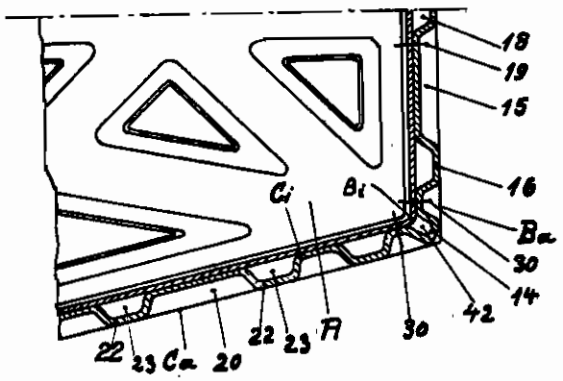


Fig. 6



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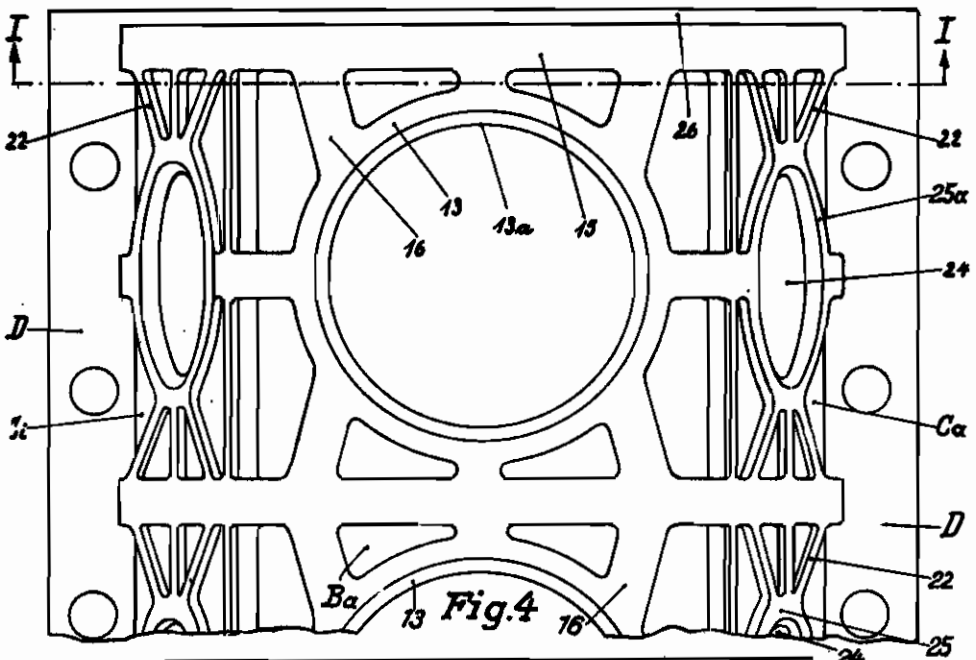

Fig.4

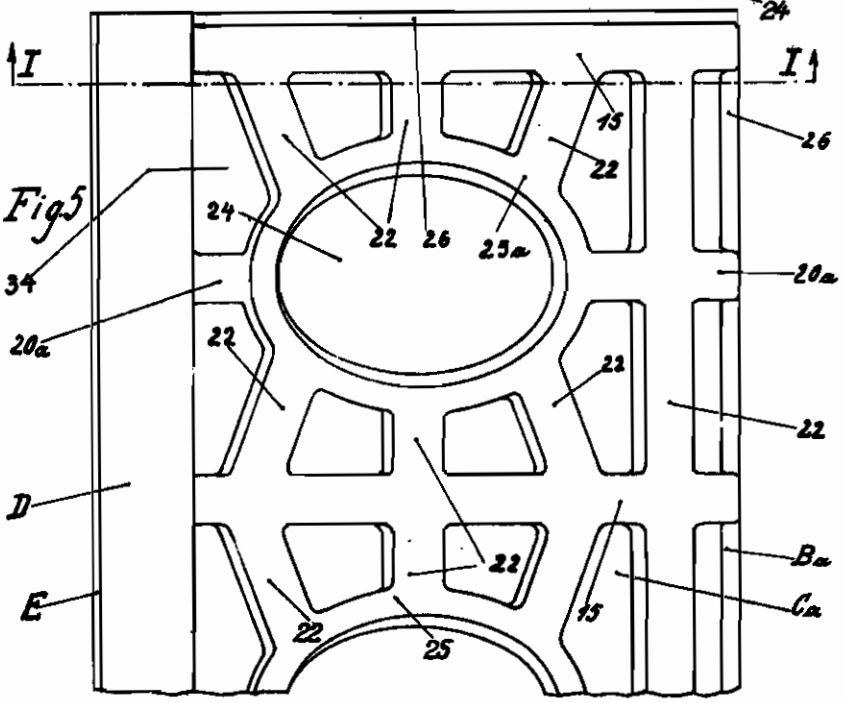

Fig5

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ALIEN PROPERTY CUSTODIAN

WELDED CRANK CASE

William Werner, Chemnitz, Germany; vested in the Alien Property Custodian

Application filed April 25, 1941

The invention relates to a welded crank case especially for multi-cylinder piston engines, the engines being arranged in a row, the crank case being composed of several transversely directed web walls and of several longitudinally directed cover and side walls at the ends of these transverse walls, every two or three sheet metal walls consisting of one single pressed part, which is bent off either at one angle in L-shape or at two angles in U-shape.

In the known crank cases of this type the pressed parts bent off in L-shape or U-shape form directly the case walls, the adjacent arms of the pressed parts being either overlap- or butt-riveted or blunt welded at their joints. Sheet metal plates of comparatively great thickness must be used for these one-wall cases, said thick sheet metal plates requiring considerable bending work and after the bending also considerable adjusting work, in order to be adapted the one to the other. The simplification of the production by uniting several case walls in one pressed part is therefore only apparent as the saving in welding work is more than compensated by the subsequent bending work and by the increased adjusting work.

Compared herewith the invention consists therein, that the pressed parts bent off in L-shape or in U-shape are pushed together crosswise or parallel the one to the other and welded together in forming double walls. Hereby an extremely light and stable but also cheap case can be produced from comparatively thin sheet metal plates, about 1 to 1.5 mm thick. In this instance the sheet metal plates themselves are no longer decisive for the stresses occurring in the service, but the hollow girders formed by the putting together of these sheet metal plates, so that the final strength of the completed case amounts to a multiple of the internal strength of the individual pressed parts. By the possibility, to employ extremely thin sheet metal plates, not only the pressing out of the case walls but also the subsequent bending work is much simplified; the saving in welding work due to the simultaneous pressing out of several case walls in continuous shape can, in this instance, not be consumed any more by the additional bending work. Owing to the fact that the pressed parts are built of rather thin sheet metal plates the subsequent adjusting work can be restricted to simple calibrating.

An embodiment of the invention is illustrated by way of example in the accompanying drawings, in which

Fig. 1 shows a vertical section through the crank case, in the left hand half along the central cylinder plane Z and in the right hand half along the line I—I of Fig. 4.

Fig. 2 a section along line II—II and

Fig. 3 a section along line III—III of Fig. 1,

Fig. 4 is a top plan view of the crank case,

Fig. 5 a side elevation of the crank case and

Fig. 6 a part section similar to Fig. 1 for a slightly different construction.

The crank case consists of several transversely directed web walls A—A and of several longitudinal walls, i. e. a cover wall B_1—B_a, two side walls C_1—C_a at the ends of these web walls, these longitudinal walls being double walls of thin sheet metal plates. The outer side plates C_a are united in this instance with the outer covering plate B_a, and the inner side plates C_1 each one with a web plate A to form a U-shaped pressed part. These pressed parts C_a—B_a—C_a and C_1—A—C_1 are each stamped plane from a piece of sheet metal, the apertures, such as windows **7**, holes **24**, and bulges **13b** being formed, the plates being then pressed plane, in forming the bulges **3**, **15**, **16**, **20***a*, **22**, grooves **12**, **25***a* and ribs **8**, **9**, **26***a*, and are finally bent off twice at an angle at **35** or **36** respectively, so that the plates assume the shape suited for building in. In this shape they are cut to accurately similar sizes, calibrated, and then pushed together crosswise, in order to be connected the one with the other by welding in forming double walls.

The putting together of the pressed parts is effected in the following manner:

Every two pressed sheet metal parts C_1—A—C_1 having outwardly directed arms C_1 are joined in that they are point-welded in the transverse central plane Y of the web, with formation of hollow girders **4** between the bulges **3** and the ribs **6** and **10**. Hereby individual transverse bulk heads are provided, which can then be placed in a row, their adjacent arms C_1 joining the one the other in the transverse central plane Z of the cylinder. By butt-welding along their joints **37** the transverse bulk heads are united to form an inner frame which, considered alone, evidently possesses only little stiffness.

The inner covering plate B_1 is then placed on the web B_a of the pressed part C_a—B_a—C_a and both sheet metal plates are point-welded in forming hollow girders **17**, **18** along the bulges **15**, **16** at **18**; both sheet metal plates are further blunt-welded at **38** with formation of carrying rings **13** for the cylinder inserts. An outer frame is

thus produced which, considered alone, possesses also only little stiffness.

Finally, the outer frame is pushed from above over the inner frame, so that the sheet metal plates C_1, C_a supplement each other to double walls. Both parts are then connected the one with the other by repeated point-welding, on the one hand with formation of the hollow girders **23**, at both sides of the bulges **22**, and on the other hand with formation of the hollow girders **21**, **20**$_b$, at either side of the bulges **15**, **20**$_a$, and besides by simple blunt-welding at **39** with formation of the carrying ring **25**$_a$. The frames thus united supplement the one the other as regards strength to a space-stiff bond, which can withstand all stresses occurring in the service.

On the crank case two U-shaped bars D are then placed from the sides and point-welded at **31** the one with the other to form a box-shaped hollow girder **23**. The bars D have vertical bores for the foundation sinkers **34**. The crank case is then closed at the bottom by bottom plates E which are point-welded at **32**. No subsequent treatment of this crank case is necessary.

Instead of uniting the sheet metal plates C_1, C_a to one pressed part C_1—A—C_1, the sheet metal plates C_1, B_1 may be united, as shown in Fig. 6, to a U-shaped pressed part C_1—B_1—C_1, which is pushed parallel into the pressed part C_a—B_a—C_a and welded with the same in forming double walls.

As shown in Fig. 3 the bending edges **36** of the pressed parts C_1—A—C_1 may be equipped with longitudinally extending bulges **40**, which are closed to form hollow girders **21** by connecting with the pressed part C_a—B_a—C_a, which especially stiffens the case in the transverse direction. As shown in Fig. 6, the bending edge **35** of the pressed part C_a—B_a—C_a may be equipped with a longitudinally extending bulge **41**, which is closed to form a hollow girder **42**, by its connection with the pressed part C_1—B_1—C_1, this hollow girder especially stiffening the case in the longitudinal direction.

WILLIAM WERNER.