May 3, 1927. 1,626,760

R. SCHNEIDER

ENGINE BED PLATE

Filed April 19, 1921

Fig. 1,

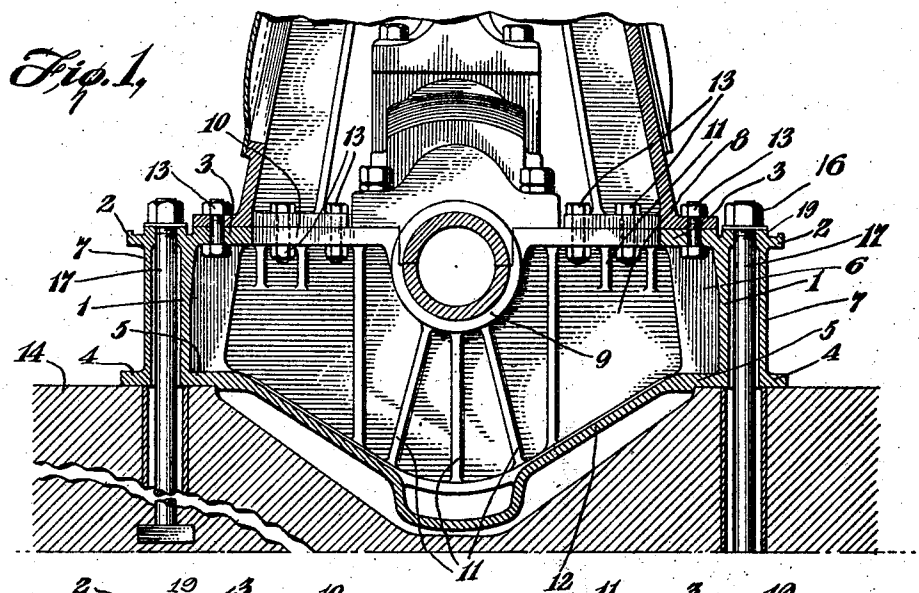


Fig. 2,

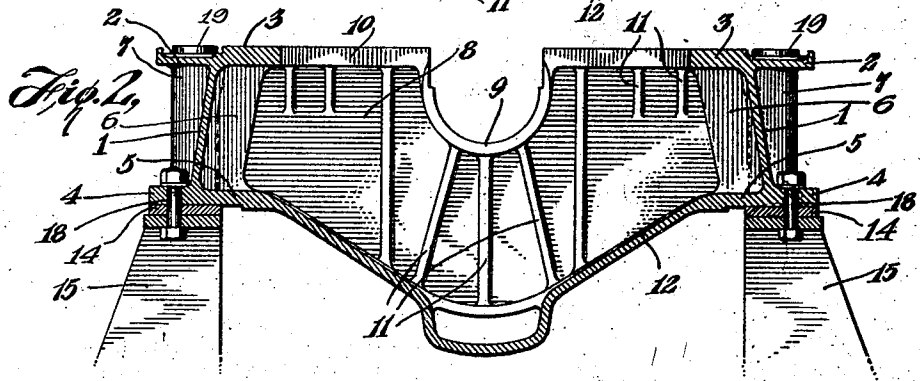
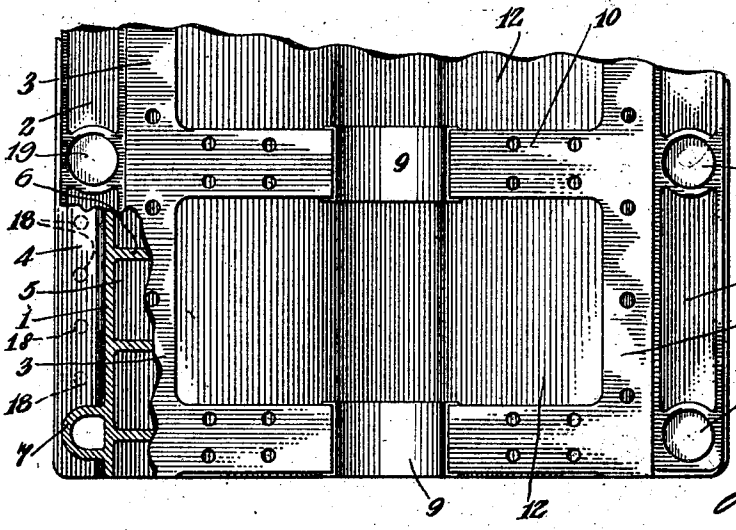


Fig. 3,



INVENTOR

Rudolph Schneider

BY

Jeffery Hamilton & Brayton

ATTORNEYS

Patented May 3, 1927. 1,626,760

UNITED STATES PATENT OFFICE.

RUDOLPH SCHNEIDER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO BUSCH-SULZER BROS.-DIESEL ENGINE CO., OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

ENGINE BEDPLATE.

Application filed April 19, 1921. Serial No. 462,754.

The object of this invention is a bed plate for large combustion engines, having facilities for attachment either to a masonry foundation or a structural steel foundation so as to enable a single base casting to be used for either purpose. It has heretofore been customary for manufacturers of large engines to employ different designs of bed plate structure for the two situations, the engineering considerations in the two cases being quite different. The double function bed plate construction of this invention obviates the need of such special designing and works corresponding and obvious economies in the cost of production.

The accompanying drawings illustrate a double function bed plate according to my invention: Fig. 1 is a vertical section showing the bed plate anchored to a concrete or masonry foundation, a part of a vertical engine being also shown. Fig. 2 is a similar section showing the plate mounted on structural steel bearings, and Fig. 3 a plan of one end of the bed plate in its rudimentary form, that is to say before any bolt holes for the holding down bolts are drilled, a part of its top flange being broken away to show the lower flange.

The bed plate shown consists of a massive casting having girder type side and cross members, of which the side wall portions are constituted of relatively deep and substantially vertical web plates 1 and top and bottom horizontal flanges marked 2 and 3, and 4 and 5 respectively, giving such side portions a conventional I-beam or girder cross section. The cross-plate members 8, of which there may be any suitable number, are also similarly shaped having top flanges 10 and also bottom flanges which, however, are merged into and formed as a part of the floor or bottom wall 12 of the structure. Such bottom wall is depressed at the center to accommodate the engine cranks and serves as a receptacle for oil as customary. Each cross member is formed with a suitable recess in its upper margin to serve as a pillow block for the crank shaft bearing as indicated at 9 and all of the flanges are braced by angle ribs or cross-webs such as 6 and 11 where the mechanical stresses require. The upper surface of the bed plate structure is machined to receive and carry the engine superstructure as indicated in Fig. 1 and this superstructure is bolted to the top girder flanges 3 and 10 by bolts shown at 13. This connection obviously constitutes the bed plate as an organized part of the engine frame structure contributing thereto the strength and stiffness of the girder design.

The longitudinal or side girder portions are formed at intervals along their length, and preferably at points coinciding with the junction of the cross-girder members 8 with deep bolt sockets 7 adapted to receive the large holding-down bolts 17 such as are commonly used for bolting engines to masonry foundations. Such bolts are embedded or anchored in the masonry 14 before the engine is installed. The bolt sockets 7 are formed in and constitute a part of the vertical web 1 of the side girder construction, and their depth or length coincides with the vertical dimension thereof so that the holding-down nuts 16 may thus find a bearing on the top cord of the girder construction of the bed plate. The bolt socket is formed as a cored aperture in a tubular column of metal immediately adjacent to and surrounding the bolt, and as cast the aperture is preferably covered over by a thin layer of metal as shown at 19 in Fig. 3 and which is drilled out to admit the bolts 17. For installing the engine on a ship or other structural steel foundation such as indicated by the members 15, sufficient of the projecting bottom flanges above referred to as constituting part of the side girder construction (the flanges 4 in the drawing), and which either rest directly on the structural foundation 15 or through the interposed shims or chocks 14, are provided with a row of closely spaced bolt holes 18, very much smaller in diameter than the bolt sockets 7, to receive the correspondingly smaller attachment bolts as indicated in Figs. 2 and 3. The relatively large number of bolts used for this style of installation serves not only to bind the bed plate securely to the foundation, but also, specially, to resist the tendency for the engine to slip on the foundation under the conditions of marine and similar uses. In this respect the small bolts 18 have the function of dowels, and therefore they fit their holes snugly and it is desirable that they be received in the bottom of the bed plate structure. In the case of the larger bolts these considerations do not apply to the same extent and the bolt sockets can be made and are made by corings of considerably larger

diameter than the holding-down bolts they accommodate. As a matter of economy of labor as well as for appearances the bolt holes 18 are not drilled through the flange in the case of bed plates which are to go on masonry foundations. Neither are the coverings of the sockets 7 drilled out when the bed plate is to go on ship board. Both sets of bolt-receiving means are nevertheless potentially present in the rudimentary bed plate as cast (Fig. 3) in the sense that requisite provisions therefor are initially incorporated in the casting and can be completed or finished with no difficulty as needed and even on the job if desired.

The distinguishing characteristic of my bed plate structure, it will now be observed, is that it is arranged to receive numerous small holding-down bolts in accessible positions adjacent its bottom where they may act effectively as dowels, and at the same time it is arranged to receive a less number of relatively large holding-down bolts in accessible positions on its top cord, the structure being further arranged to efficiently sustain the stresses of both types of bolts so that either may be used. To this end outwardly projecting flanges like those at 4 conveniently provide for the reception of the smaller bolts, and tubular socket columns 7 extending between the upper and lower flanges, eliminate the danger of distorting the casting by over tightening the nuts on the large bolts as well as strengthen the structure at these points where the holding-down stresses are especially severe when the large holding-down bolts are used. The cored columns 7 conveniently provide cross-webs immediately at the sides of the large bolts as well as webs outside these bolts but other appropriate arrangements of metal or angle braces may be substituted and however constituted, if located entirely at one side of the vertical web 1, are desirably accompanied by cross-webs or angle braces immediately opposite on the other side of the vertical web and these are preferably provided, as shown, by the cross-girder members 8 which are particularly adapted for the function. Obviously therefor, the structure herein before illustrated and described is subject to modification within the terms of the appended claim. I have not attempted to describe various features and devices commonly found in bed plates but not directly related to the invention, such for example, as a step bearing for the lay shaft that connects the cam shaft to the engine crank shaft, oil reservoirs for the shaft bearings and pipes for the lubricating system, drains for the oil pits, passages for water for cooling the oil, and, in marine engines, the thrust bearing which is sometimes incorporated in the bed plate, for the designer skilled in this art will readily understand that a bed plate embodying the invention is adaptable to such and other conditions. It will also be understood that while I have referred to the whole bed plate of an engine as consisting of a single integral structure the same may, in accordance with common practice for high power engines, be made of assembled parts constituting what I have referred to above as a complete bed plate.

Claim.

A double function bed plate for vertical internal combustion engines comprising longitudinal and transverse cross-girder members and bolt sockets, closed at their tops, connecting upper and lower flanges of each longitudinal girder member, whereby the bed plate may be adapted to structural steel foundations by forming holes in the lower flanges of the longitudinal girder members or may be adapted to masonry foundations by opening the closed tops of said bolt sockets.

In testimony whereof, I have signed this specification.

RUDOLPH SCHNEIDER.