Dec. 24, 1929. I. R. ROBISON 1,740,836

BEARING ALIGNING TOOL

Filed Jan. 23, 1929

Fig. 1

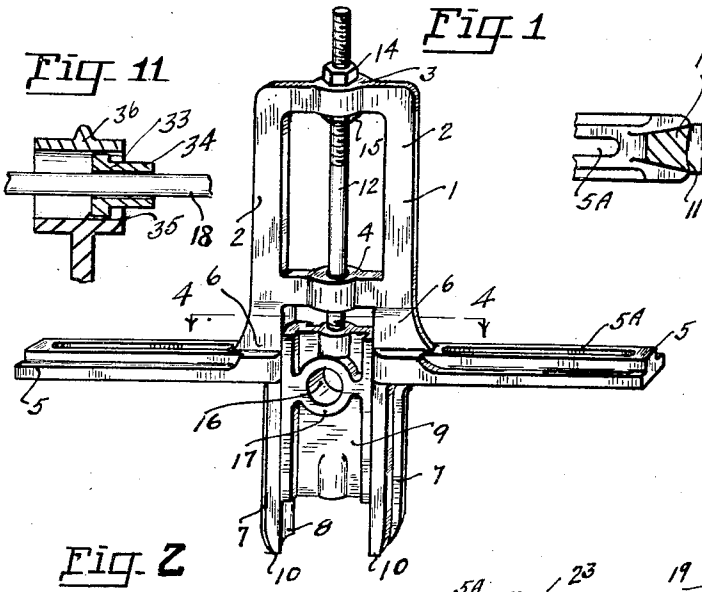


Fig. 11

Fig. 4

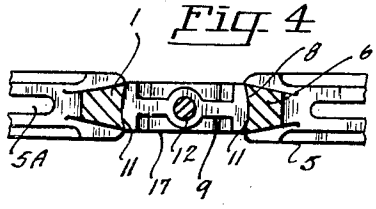


Fig. 6

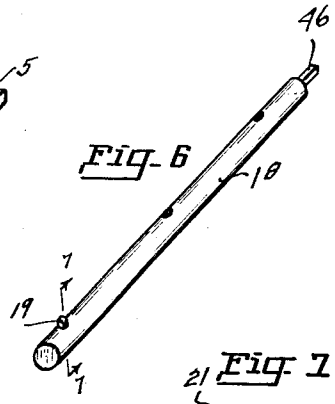


Fig. 2

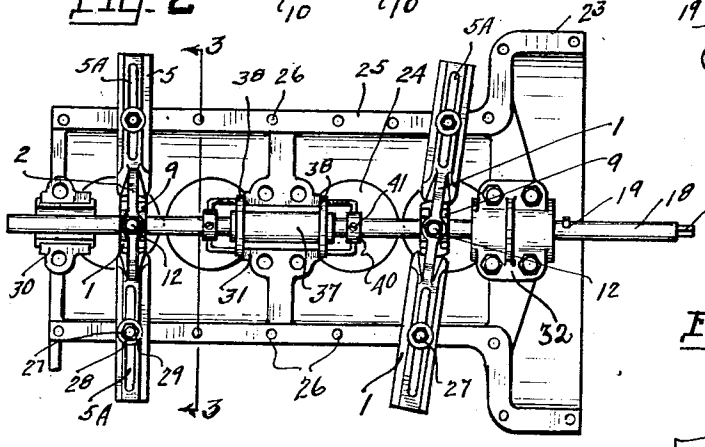


Fig. 7

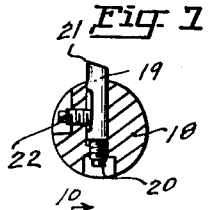


Fig. 8

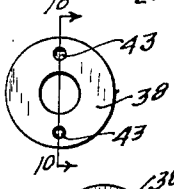


Fig. 3

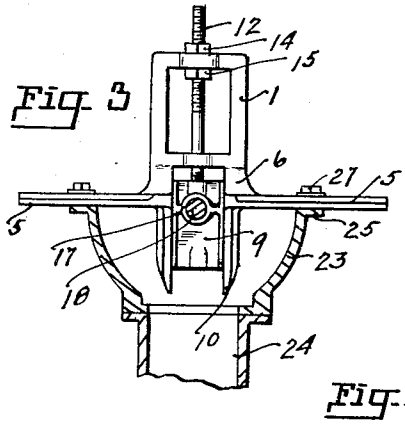


Fig. 9

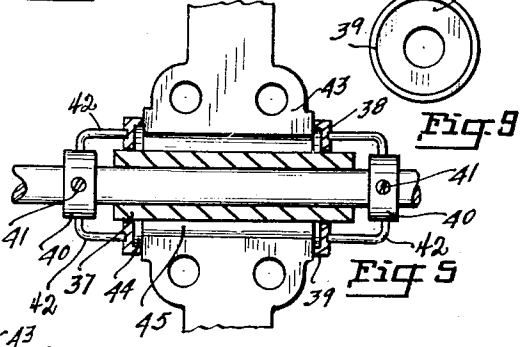
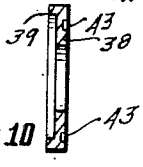


Fig. 5

Fig. 10



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UNITED STATES PATENT OFFICE

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BEARING-ALIGNING TOOL

Application filed January 23, 1929. Serial No. 334,426.

This invention has to do with a device for aligning bearings for shafts, and particularly has to do with the pouring, aligning and cutting or reaming of the main or crank shaft bearings of internal combustion engines. The invention consists of a shaft provided with means for coring or reaming either one bearing or two or more bearings simultaneously, and also includes improved means or supporting members for rigidly supporting such shaft during either of the two foregoing operations.

A particular object of this invention is the provision of a device for pouring or casting, and reaming the main bearings of practically all of the present types of motor blocks and engine crank cases.

Another particular object of this invention is to obviate complexity, in other words, it is the purpose of this invention to provide a device both simple to operate and inexpensive to construct, one, at the same time, retaining to itself a flexibility that readily adapts it for use in the different types of individual jobs for which it is primarily intended.

The objects of this invention are attained by the means illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation of one of the supporting and centering members utilized in this invention;

Fig. 2 is a view looking down upon an inverted crank case of a combustion engine, and illustrates the application of the invention thereto;

Fig. 3 is a cross section view taken on the section line 3—3 of Figure 2, looking in the direction the arrows point;

Fig. 4 is a cross section view taken on the section line 4—4 of Figure 1, looking in the direction the arrows point;

Fig. 5 is a fragmentary view partially in section, illustrating how the invention is utilized for pouring or casting bearings;

Fig. 6 is a perspective view of the reaming and aligning shaft;

Fig. 7 is a cross section view taken on the section line 7—7 of Figure 6, and illustrates a reamer embodied in the shaft illustrated in the preceding figure;

Fig. 8 is a front elevation of one of the caps or washers utilized in pouring bearings;

Fig. 9 is a rear elevation of the member shown in the preceding view;

Fig. 10 is a cross section view taken on the section line 10—10 of Figure 8, looking in the direction the arrows point; and

Fig. 11 is a fragmentary view, partially in section, illustrating a centering sleeve.

Similar numerals indicate similar parts throughout the several views.

In Figure 1, the numeral 1 indicates in its entirety one of the supporting and aligning members utilized in this invention. The member 1 consists of two spaced upright members 2, integrally joined at their upper ends by the cross bar or web 3, and approximate their mid portions by the cross bar or web 4. The upright members 2 are each integrally joined to a bed or arm 5. The arms 5 are in alignment, the undersurfaces of which are flat and in the same plane. The upright members 2 in the region where they join their respective arms 5 are increased in width, as indicated by the numeral 6, to give the device added strength.

Each upright member 2 extends a substantial distance below its arm 5 as indicated by the numeral 7. The opposing faces 8 of the two upright members below the web 4 are arcuate or concave in cross section as indicated in Figure 4. These faces are parallel from the web 4 to the lower extremities 10 of the arms 2, and constitute a guideway for a bearing block 9. The bearing block 9 is a somewhat elongated member held upright between the arcuate or concave faces of the upright members. The bearing block has two oppositely directed faces 11, which are arcuate in cross section, and which are convex with regard to the concavity of the faces 8 of the upright members, so that they may be received thereby. Each end of the bearing block 9 is provided with a threaded aperture, (not shown), into the upper one of which is threaded the rod 12. The rod 12 passes through apertures provided for it in the webs 3 and 4. The upper end of the rod 12 is provided with threads, to which are threaded two nuts, the nut 14 engaging the upper side of

web 3, and nut 15 engaging the underside of web 3. There is sufficient space between the upright members 2 to allow a wrench to be used on the nut 15. Threading and unthreading the nuts 14 and 15 on the rod 12 will raise and lower the rod 12 and at the same time will raise and lower the block 9.

The block 9, proximate one end which is the upper end in this instance as the block may be reversed, is provided with an aperture or bearing 16. The block 9 is strengthened in the locality of the bearing 16 by the increased thickness thereof or webbing 17. It will be seen that the block 9, by reason of the fact that it has convex faces engaging concave faces of the upright members 2, is capable of movement about a vertical axis as well as vertical movement between the faces.

Figure 6 illustrates a shaft or bar 18 used in connection with the supporting and aligning members just described. This bar is provided with one or more reamers or cutters 19, which rest in sockets provided in the shaft 18. The inner end of each cutter rests upon a set screw 20 threaded into the shaft, which set screw controls the amount of projection of the cutter. The cutter 19 is provided with a cutting edge or bit 21. Another set screw 22 is threaded in the shaft 18 in a position to engage the intermediate portion of the cutter 19 and secure it against movement. When in use the shaft 18 is carried within the bearing 16 of the block 9.

To carry the description of the apparatus further it is necessary to describe the mode of operation thereof. This will be done by aid of Figure 2, and by other figures. In Figure 2, and in Figure 3, is shown an inverted crank case 23 surmounting an inverted cylinder or engine block 24. The crank case is provided with a flanged bottom edge 25 which has apertures 26 for the passage of bolts or like means for fastening a bed or pan (not shown) thereto. Two members 1 are utilized in this instance, and they are so positioned that the under surfaces of the arms 5 rest upon the flange 25. Each arm 5 is provided with an elongated slot 5^A. Each slot 5^A is positioned over an aperture 26, a bolt 27 is passed through the slot and aperture, and a nut 28 is threaded thereto. If desired a washer 29 may be placed between the nut 28 and the arm 5. The bearings 16 must of course be aligned in order to carry the shaft 18, but this can be easily done, regardless of whether the supporting members 1 are positioned parallel to one another or not, by slightly rotating one or the other, or both blocks 9 about their vertical axis as before explained. In Figure 2, the two supporting members are not parallel, but the blocks 9 are.

In Figure 2, the numerals 30, 31 and 32 broadly indicate bearings. The bearing 30 has been poured and reamed and is ready to receive the crankshaft. Previous to pouring and reaming the bearings, the shaft 18 is centered therein. This is accomplished in the following manner. The members 1 are positioned upon the crank case as shown in Figure 2, but the nuts 28 on bolts 27 are not tightened. Not until the shaft is centered are the nuts 28 tightened so as to prevent movement of the members 1, which support the shaft 18. The shaft 18 carries centering sleeves 33, the internal diameter of which are such that they may slide freely upon the shaft. The sleeves 33 are provided in various outside diameters to accommodate them to bearing boxes. A sleeve is used that completely occupies a bearing box or saddle. To aid in moving the sleeves 33 back and forth and in and out of the boxes or saddles, the outside diameters thereof are decreased to form a hand hold portion 34. Figure 11 illustrates the centering operation, wherein the bearing box is composed of the saddle or bed 35 and a cap 36, and shows the shaft 18 centered therein by means of the sleeve 33. After the shaft is centered, nuts 28 are threaded down on the bolts 27 to prevent movement of the supporting members 1. During the operation of centering shaft 18, it may be moved transversely of the crank case by so moving the members 1, or up and down by so moving the block 9. After the shaft has been centered, and the members 1 secured firmly to the crank case, it may be removed from the bearings 16 and reinserted as often as necessary.

The shaft 18 is temporarily removed from the bearings 16, the centering sleeves 33 are removed therefrom, and one or more mandrels or sleeves 37 are substituted. The sleeves 37 are used for cores in pouring the Babbitt bearings, and like the sleeves 33 may be readily slipped over the shaft 18. The external diameter of each sleeve 37 is slightly less than the diameter of the bearing after it has been cut or reamed. It is immaterial whether or not the sleeve 37 is longer than the bearing. Over each end of sleeve 37 is slipped a washer or cap 38. Cap 38 has a projecting annular rim 39 on one side thereof, which abuts the ends of the bearing box, in this case the seat or saddle 43 as shown in Figure 5. The caps 38 are held in position by means of sleeves 40 which are held from movement on shaft 18 by the set screws 41. To allow for a considerable extension of the sleeve 37 beyond the caps 38, the sleeves 40 are provided with angular arms 42, which extend over the ends of the sleeves 37, and the tips of which enter the eyes or cups 43 of caps 38. The rim 39 as it abuts the saddle 43 provides a space 44 offset from the space 45 between sleeve 37 and saddle 43. Into these two spaces the molten Babbitt metal for the bearing is poured. The Babbitt metal that flows into the offset space 44, when cooled, forms a lip or lug over the ends of the saddle

that holds the bearing against lengthwise movement therein. After the bearing has become cool or set the sleeve 37, sleeve 40 and caps 38 are removed, and thereafter the bearing is ready to be cut or reamed.

In Figure 2, the bearing 32 is ready to be reamed or cut. This is accomplished by the reamer or cutter 19 heretofore described. The cutter 19 is positioned by the set screw 20 to cut the bearing to the desired depth. The shaft 18 is then moved lengthwise to cause the cutter to engage the bearing, at the same time the shaft is caused to rotate. The shaft 18 may be rotated by means of a crank or by power means. In this connection it may be stated that one of the most satisfactory means for rotating shaft 18 is by means of a compressed air or electric portable drill, especially if the shaft is provided with a reduced or squared end 46 for entering the chuck of such a tool.

Having described the invention, what is claimed is:—

1. A bearing aligning tool including a pair of upright members spaced apart, webs joining said upright members at their upper ends and proximate their mid portions, an arm extending from each upright and in alignment with regard to one another, said uprights extending substantially below said arms, a bearing block clasped upright between the lower portions of said upright members, and means for raising and lowering the bearing block.

2. A bearing aligning tool including a pair of upright spaced members, webs joining said upright members at their upper ends and proximate their mid portions, an arm extending from each upright and in alignment with regard to one another, said uprights extending substantially below said arms, a bearing block clasped upright between the lower portions of said upright members, a rod extending upright from said bearing block and passing through said webs, said rod being threaded at its upper end, and nuts threaded to said rod, one engaging the underside of one of said webs, and the other engaging the upperside thereof.

3. A bearing aligning tool, including a pair of upright members spaced apart, webs joining said upright members at their upper ends and proximate their mid portions, an arm extending from each upright and in alignment with regard to one another, said uprights extending substantially below said arms, the lower portions of said upright members having concave faces, and a bearing block having convex faces engaging and slidable upon the concave faces of the upright members.

4. A bearing aligning tool including a pair of upright members spaced apart, webs, the first joining said upright members at their upper ends and the second joining said upright members proximate their mid portions, an arm projecting from each upright member, said arms being in alignment and their undersurfaces being in the same plane, said arms constituting a support for said upright members, said upright members projecting substantially below said arms, the opposing faces of the arms below the second web being concave in cross section, a bearing block provided with an aperture to receive a shaft, said block having two oppositely directed faces each convex in cross section, said block being positioned between said upright members, the convex faces of the one abutting the concave faces of the other, said block thereby being capable of movement about a vertical axis, and means for raising and lowering said block while clasped between said upright members.

5. A tool of the class described, comprising a bed, members integral with said bed constituting a vertical guideway, a shaft supporting member, said guideway having concave faces, said shaft supporting member having convex faces engaging the concave faces of the guideway permitting such shaft supporting member to be moved both vertically and about a vertical axis.

6. A tool of the class described, comprising a bed, members integral with said bed constituting a vertical guideway, a shaft supporting member, said guideway having concave faces, said shaft supporting member having convex faces engaging the concave faces of the guideway permitting such shaft supporting member to be moved both vertically and about a vertical axis, and means for moving the shaft supporting member vertically.

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