July 15, 1941. A. G. JOHNSON ET AL 2,248,998

BORING MACHINE

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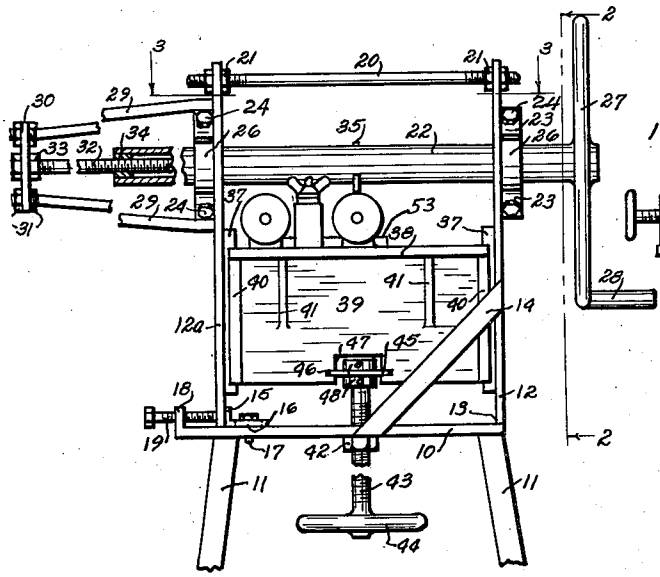


FIG. 1

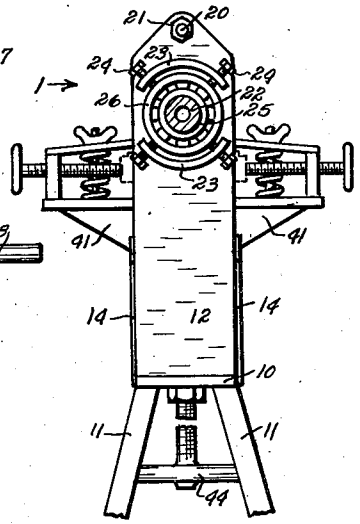


FIG. 2

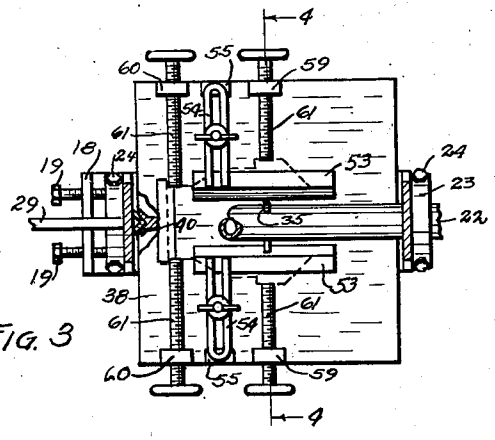


FIG. 3

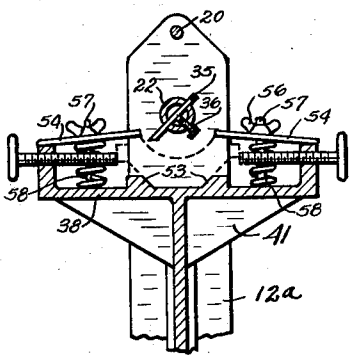


FIG. 4

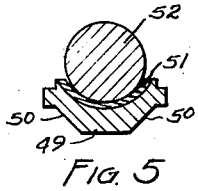


FIG. 5

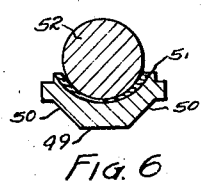


FIG. 6

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BORING MACHINE

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4 Claims. (Cl. 77—3)

This invention relates to improvements in boring machines and has reference more particularly to a portable boring machine for use in connection with the boring of axle bearing blocks or brasses used in connection with railway cars.

In railway cars, the weight is supported entirely by the upper bearing block and the upper surface of the axle and due to the hard service the axles wear quite rapidly and must, from time to time, be turned so as to renew the surface.

A railway axle of the ordinary type is five inches in diameter when it is new and can be worn and refinished until the diameter reaches a minimum of four and one-half inches. The bearing blocks or brasses have a babbitt friction surface and are all made to fit a five-inch diameter axle and it is therefore evident that when such a bearing block is associated with an axle having a diameter less than five inches, the axle and the bearing surface of the block will engage only along a narrow line, wherefore the pressure on the babbitt becomes very great per unit area and it often happens that before the ordinary wear of the bearing changes its contour to conform to that of the axle, the babbitt will crystallize and break.

It is the object of this invention to produce a boring machine of a simple and substantial construction by means of which bearing blocks can readily be bored to fit the diameter of the axle with which they are to be used.

When a new bearing block is fitted to an axle, the exact diameter of the axle is ascertained after which the boring tool is adjusted to cut a bearing surface of the same diameter as the axle and the bearing block is adjusted in the machine and bored to conform to the diameter of the axle.

In order to describe this invention so that its construction and mode of operation can be readily understood, reference will now be had to the accompanying drawing in which the invention has been illustrated in its preferred form, and in which:

Figure 1 is a side elevation of the machine looking in the direction of arrow 1, in Figure 2;

Figure 2 is an end elevation, partly in section, taken on lines 2—2, Figure 1;

Figure 3 is a section taken on line 3—3, Figure 1, parts being shown broken away to better disclose the construction;

Figure 4 is a section taken on line 4—4, Figure 3, a bearing block being indicated by dotted lines;

Figure 5 is a section through a bearing and a car axle showing the relationship of the parts when the bearing is used with an axle of smaller diameter than that for which the bearing block is made; and

Figure 6 is a section similar to that shown in Figure 5, but shows the relationship of the parts after the block has been bored.

In the drawing reference numeral 10 designates a base which may be a steel plate or a casting. Extending downwardly from the base are four legs 11 by which the base is supported from floor or other suitable supporting surface. Extending upwardly from the right end of the base when viewed as in Figure 1, is a support 12 whose lower end is preferably welded to the upper surface of the base as indicated by reference numeral 13.

Diagonal braces 14 connect the support 12 with the base and these braces are preferably welded to the base and to the support. Adjacent the lefthand end of the base is another support 12a which is adjustably secured thereto. The lower end of support 12a is provided with two angle brackets 15 that are welded or riveted to it and which extend inwardly over the upper surface of the base. These brackets have elongated openings 16 for the reception of clamping bolts 17. The lefthand end of the base is provided with an upwardly extending bracket 18 which has threaded openings for the reception of bolts 19. The upper ends of supports 12 and 12a are connected by means of a rod 20, which is adjustably attached to the supports by means of nuts 21. To decrease the distance between the guides 37 bolts 17 are first loosened as are also at least one of nuts 21. Screws 19 are then turned in a direction to move support 12a inwardly towards support 12 until the desired adjustment is obtained after which bolts 17 are tightened and the nuts on rod 20 adjusted and tightened. Each support has an opening through which the boring bar 22 extends. Surrounding the opening are arcuate flanges 23, each of which has two adjusting screws 24. A ball bearing comprising an inner ball race 25 that is nonrotatably, but slidably connected with the boring bar and outer ball race 26 which is clamped in adjusted position by means of the screws 24 is provided at each support so as to form rotatable and slidable bearings for the boring bar. The righthand end of the boring bar, when viewed as in Figure 1, is provided with means for turning it, comprising a handwheel 27, which may have a handle 28 formed integral therewith, if desired. Projecting outwardly from the support 12a are two rods 29, whose outer ends extend through a plate 30, which is clamped firmly to the ends of the rods

by means of nuts 31. A threaded rod 32 has its outer end firmly attached to the plate 30 by means of nuts 33 and the other end of this threaded rod extends into the interior of the boring bar which, for this purpose, is made tubular. A nut 34 is secured to the interior of the boring bar and cooperates with the threaded bar 32 for the purpose of moving the boring bar longitudinally whenever it is rotated. The boring bar is provided with a diametrical opening for the reception of a tool 35 that is held in position therein by means of a setscrew 36. The diameter of the cut can be readily determined by means of a gauge that measures the distance of the cutting edge of the tool from the outer surface of the boring bar; for example, if the boring bar is three inches in diameter and the desired diameter of the bearing is four and one-half inches, the tool will project three-quarters of an inch beyond the outer surface of the bar. Suitable gauges can be provided for quickly and accurately setting the tool to any desired diameter of cut.

The inner surfaces of the supports 12 and 12*a* are provided with right angular guides 37 whose vertices lie in a plane coincident with the axes of the boring bar. A work support table 38 is provided with a downwardly extending plate 39 positioned midway between its side edges. Secured to the plate 39 are elongated, grooved guides 40 that cooperate with the guides 37 so as to constrain this supporting table to move in a predetermined direction and to prevent it from tilting. Braces 41 connect the table with the plate 39 and form a rigid assembly that is capable of resisting the action of strong forces. For the purpose of moving the work support table 38 towards and away from the boring bar an adjusting mechanism has been provided which comprises a nut 42 that is welded to the under surface of base 10 and a screw 43 that is threadedly connected with the nut. The lower end of screw 43 is provided with a handwheel 44 and the upper end extends through a plate 45 whose edges project into the notches 46 of the opening 47 in plate 39. Collars 48 secure the screw to the plate 45 so that it may rotate but not move transversely thereof. It is evident that whenever the screw 43 is turned, it will move the work support table 38 upwardly or downwardly as may be found desirable. In order to keep the work support table from moving transversely relative to the guides, from tilting in any direction and to compensate for wear, the support 12*a* has been adjustably connected to the base by the means already described, and this makes it possible to adjust the relationship between the guides so as to prevent any sidewise motion of the work support table and to make necessary adjustments in case the parts wear to such an extent that this becomes necessary.

The bearing blocks which are to be bored by means of the machine above described are shaped somewhat as indicated by broken lines in Figures 3 and 4 and by full lines in Figures 5 and 6. These blocks are made from a suitable metal and have flat surfaces 49 that intersect upwardly inclined surfaces 50 which are usually inclined at an angle of forty-five degrees. The surfaces of the blocks opposite from the surfaces 49 are cylindrical and are provided with a lining 51 of babbitt. The car axles have been designated by reference numeral 52. The upper surface of the work table is provided with two spaced positioning members 53 that are so spaced as to engage the inclined sides 50 of the largest bearing blocks to be operated on. For the smaller bearing blocks shims are provided along the inclined surfaces 50 of the blocks and 53 of the guides. The positioning surfaces 53 facilitate the positioning of the block and the latter is held in place by means of U-clamps 54 whose outer ends rest on projections 55 and which are moved downwardly into engagement with the work to be fastened by means of wing nuts 56 that cooperate with bolts 57. Springs 58 surround the bolts 57 and urge the clamps 54 upwardly so as to hold them in position even when the work is absent. In order to further clamp the work and to adjust it for alignment with the boring bar, the upper surface of the table is provided with upwardly projecting lugs 59 and 60, each of which has a threaded opening for the reception of clamping screws 61. These clamping screws engage the sides of the bearing block in a manner shown in Figure 3 where the block has been indicated by broken lines. By means of the adjusting screws, the block can be moved into axial alignment with the boring bar and positively clamped in adjusted position.

Let us now assume that an axle 52 which was originally five inches in diameter, has been worn to such an extent that it is now four and one-half inches and that it is to be fitted with suitable bearing blocks. The exact diameters of the axle is first ascertained, after which the boring tool is adjusted to cut a bearing of the same diameter. The bearing block is now adjusted on the table and clamped in proper position by means of the U-clamps and the threaded bolts. The boring bar is longitudinally adjusted so that the cutting tool will be in position to begin the cutting operation at one end of the block. When the boring bar is rotated, it will be moved longitudinally by the interaction of the threaded bar 32 and the nut 34 which gives it the proper longitudinal movement at each rotation.

The work table can be adjusted in a vertical direction by the screw 43 and the machine is therefore suitable for use with bearing blocks of various sizes and can be readily adjusted to cut a bearing conforming to the exact diameter of the shaft.

It is, of course, evident that if the bearing block is provided with a bearing surface five inches in diameter and is to be used with a shaft four and one-half inches in diameter, the bearing surface can not extend one hundred eighty degrees, but can be increased by means of this boring operation to such an extent that the pressure per unit area will not cause crystallization of the babbitt.

A machine like the one above described and shown on the drawing can be readily transported, can be secured to a flat car or truck or can be permanently secured in place in a shop.

On the drawing and in the above description, one embodiment of the machine has been disclosed, but it is to be understood that such changes in size and proportions can be made as may be desired without departing from the scope of the invention as defined in the appended claims.

In the drawing a threaded bar 32 and nut 34 have been shown as the means for moving the boring bar longitudinally; it is to be understood that this is illustrative only and that it can be replaced by other mechanically equivalent means if desired.

It is also evident that two screws 43 may be used instead of one as shown.

Having described the invention what is claimed as new is:

1. A device for the purpose specified, comprising, in combination, a base, a support at each end thereof, one of the supports being movable relative to the base each of the supports having a bearing, a boring bar rotatably mounted in the bearings, means at one end of the bar for rotating it, means comprising a threaded member secured at one end to one of the supports and operatively connected with the bar for moving it longitudinally when it is rotated, a work support table positioned between the base and the boring bar, vertically elongated cooperating guides on the bearing supports and on the ends of the work support table, means comprising a screw operatively connected with the base and with the table for moving the table along the guides towards and away from the boring bar, means carried by the work support table for positioning a bearing block thereon, and means for adjusting the distance between the guides on the bearing supports to compensate for wear, the last named means comprising adjusting screws threadedly connected with the base and in engagement with the lower end of one bearing support, and a threaded rod connecting the upper ends of the bearing supports.

2. A device for the purpose specified, comprising, in combination, a base, a support at each end thereof, each of the supports having a bearing, a boring bar rotatably mounted in the bearings, means at one end of the bar for rotating it, means comprising a threaded member secured at one end to one of the supports and operatively connected with the bar for moving it longitudinally when it is rotated, means for supporting the outer end of said threaded member, said means comprising, a bracket projecting outwardly from one of the bearing supports, a work support table positioned between the base and the boring bar, vertically elongated cooperating guides on the bearing supports and on the ends of the work support table, means comprising a screw operatively connected with the base and with the table for moving the latter along the guides towards and away from the boring bar, and means carried by the work support table for positioning and clamping a bearing block thereon, said means comprising upwardly extending lugs on opposite sides of the boring bar, and inwardly extending positioning screws threadedly connected with the lugs.

3. A machine for the purpose described comprising the combination of, a base, a support at each end thereof, one of the supports being movable relative to the base and to the other support, means comprising a screw for adjustably attaching the lower end of the movable support to the base, means comprising a threaded rod for adjustably connecting the upper ends of the supports, a bearing carried by each support, a boring bar mounted for rotation in the bearings, means at one end of the bar for rotating it, means for moving the bar longitudinally when it is rotated, a work support table positioned between the base and the bar, vertically elongated cooperating guides on the bearing supports and on the ends of the work support table, means for moving the work support table along the guides, towards and away from the boring bar, and means for positioning and clamping a part to be bored onto the support table.

4. A machine for boring railroad axle bearing blocks to fit the size of the axles used, comprising, a base having two spaced supports, each of which has a bearing, a boring bar journaled in the bearings and longitudinally movable therein, means for moving the boring bar longitudinally when it is rotated, said means comprising cooperating male and female threaded members, one of which is attached to one of the supports and the other to the boring bar, means for turning the bar, a work support table slidably positioned under the boring bar and between the supports, vertically elongated cooperating guide means on the table and on the supports, means for adjusting the guides to compensate for wear, means comprising a threaded member operatively connected with the base and with the table for moving the table towards and away from the boring bar, and means comprising screws threadedly attached to opposite sides of the table for positioning and clamping a bearing block on the table.

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