May 2, 1933. W. H. KLOCKE 1,906,273

METHOD OF MAKING BEARINGS

Original Filed Dec. 28, 1928

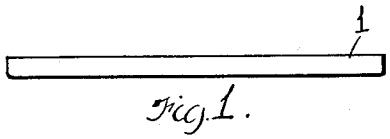


Fig. 1.

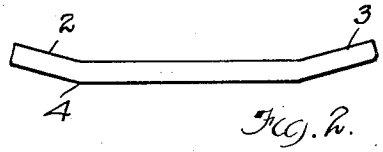


Fig. 2.

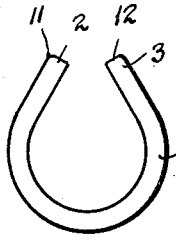


Fig. 3.

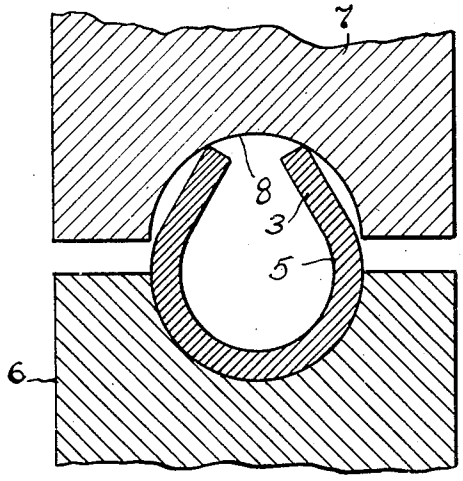


Fig. 4.

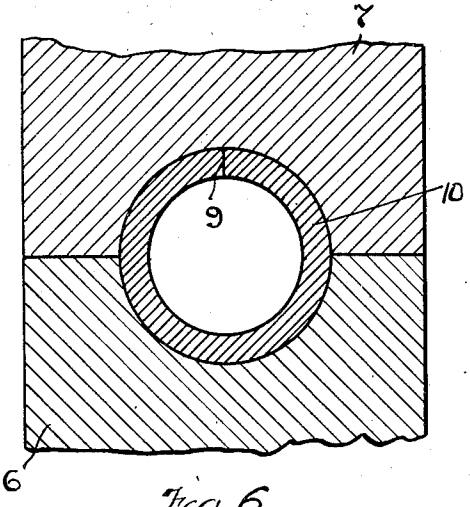


Fig. 6.

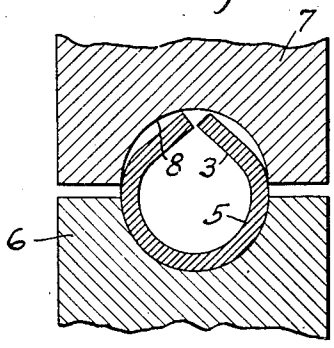


Fig. 5.

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UNITED STATES PATENT OFFICE

WILLIAM H. KLOCKE, OF WOODHAVEN, NEW YORK, ASSIGNOR TO THE CLEVELAND GRAPHITE BRONZE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

METHOD OF MAKING BEARINGS

Application filed December 28, 1928, Serial No. 328,967. Renewed August 24, 1932.

The present invention, relating, as indicated, to a bearing and method of making same is particularly directed to a new and improved method of manufacturing cylindrical shells from flat stock where either the material employed is particularly stiff and unyielding either by reason of its thickness or its composition, or where the thickness of the stock is high with respect to the diameter of the shell to be formed. The principal object of the invention is the provision of a method which may be employed on relatively thick stock where it is extremely difficult to form the stock in the manner described in my Patent No. 1,691,073, issued November 13, 1928.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means and steps hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain means and one mode of carrying out the invention, such disclosed means and mode illustrating, however, but one of various ways in which the principle of the invention may be used.

In said annexed drawing:—

Fig. 1 is a side elevation of a blank cut from flat stock from which a cylindrical shell is to be formed; Fig. 2 is a similar view showing the blank after the initial forming operation; Fig. 3 is a similar view showing the blank after the second forming operation; Fig. 4 is a transverse sectional view showing dies employed for forming the blank of Fig. 3 into a cylindrical shell; Fig. 5 is a similar view showing the shell as just prior to being completed and formed; Fig. 6 is a similar view showing the shell after completion.

In my patent referred to above I form strips of flat stock into cylindrical shells by initially bending the ends of the blanks to a slight curvature, after which the blank is formed into approximately U-shape and is then bent into a complete cylinder in one or more final forming operations. The method there described is entirely successful when applied to flat stock of the thickness usually used and also to relatively thick stock where the diameter of the shell is considerable with respect to the thickness of the blank. It requires, however, extremely heavy power to successfully carry out that method when used on thick blanks or where the blanks are to be formed into shells of small diameter, due of course to the extremely short leverage which is obtained in bending the end portions of the metal to the desired curvature. The present invention consists in a modification of the method previously described and is particularly adapted to the formation of heavy thick blanks. As applied to this type of stock it requires considerably less power than with previous methods.

In the present method I employ a rectangular blank 1 of such material as steel, although other metal may also be employed, and initially bend the ends 2 and 3 of this blank away from the plane of the blank at angles, while leaving the bent-up ends relatively straight. The blank is then bent between suitable dies into the U-shape form shown in Fig. 3, and during this operation the ends 2 and 3 are unchanged and project upwardly in a straight or flat condition.

In the final forming of the blank into a shell, which is illustrated in Figs. 4 and 5 the U-shaped blank 5 is placed in suitable dies 6 having a semi-cylindrical recess therein in the position shown, and the upper ends of the blank are then forced inwardly by means of a second similar and complementary die 7 having a semi-cylindrical recess 8 therein. As the dies approach each other the walls of the recess 8 in the upper die engage against the straight ends of the blank 5 and act, first, to seat the blank firmly in the lower die and to then bend the straight ends of the blank toward each other until they meet as

shown in Fig. 5, after which further movement of the dies causes a crumpling of the metal in the straight portions upwardly into engagement with the walls of the upper die and a flowing of the metal in these ends toward each other to produce a fluid-tight joint 9 in the final shell 10 (see Fig. 6).

In order to prevent undue wear on the engaging wall of the upper die by the ends of the straight portions 2 and 3 of the blank the outer edges 11 and 12 of the blank may be initially rounded very slightly as shown in Fig. 4 in order to avoid the abrasive action of the sharp edge on the inclined surface of the die. Only the extreme edge should have to be taken off as otherwise a recess may be produced at the butt in the final shell, which of course reduces the wall thickness across the butt and detracts from the tightness of this joint against leakage during the subsequent operation of casting bearing metal under pressure against the interior of the shell to form a bearing lining therefor.

Other forms may be employed embodying the features of my invention instead of the one here explained, change being made in the form or construction, provided the elements stated by any of the following claims or the equivalent of such stated elements be employed, whether produced by my preferred method or by others embodying steps equivalent to those stated in the following claims.

I therefore particularly point out and distinctly claim as my invention:—

1. In a method of making lined bearings, the steps which consist in bending the end portions of a rectangular blank along a sharp line and away from the plane thereof while maintaining such end portions in a straight flat condition, forming said blank into substantially U-shape and then forming such U-shaped blank into a cylindrical shell by applying pressure and forcing the straight ends of said blank into engagement with each other, and then increasing said pressure and forcing said ends radially outward to produce a fluid-tight joint across the butt thus formed.

2. In a method of making lined bearings, the steps which consist in bending the end portions of a rectangular blank along a sharp line and away from the plane thereof while maintaining such end portions in a straight flat condition, forming said blank into substantially U-shape, then forming such U-shaped blank into a cylindrical shell by applying pressure and forcing the straight ends of said blank into engagement with each other, and then increasing said pressure and forcing said ends radially outward to produce a fluid-tight joint across the butt thus formed, and then lining the interior of said shell with a suitable bearing metal.

3. In a method of making lined bearings, the steps which consist in rounding the longitudinal edges on one side of a rectangular blank, bending the end portions of said rectangular blank away from the plane thereof while maintaining such end portions in a straight flat condition, forming said blank into substantially U-shape and then forming such U-shaped blank into a cylindrical shell by forcing the straight ends of said blank into engagement with each other and then radially outward to produce a fluid-tight joint across the butt thus formed.

Signed by me, this 22nd day of December, 1928.

WILLIAM H. KLOCKE.