No. 652,844. Patented July 3, 1900.

J. B. HALIFAX.

BEARING.

(Application filed Mar. 6, 1899.)

(No Model.)

FIG. 1

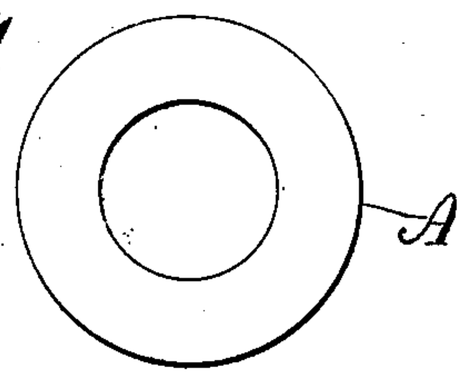


FIG. 2

FIG. 3

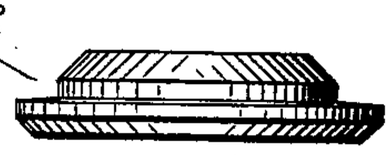
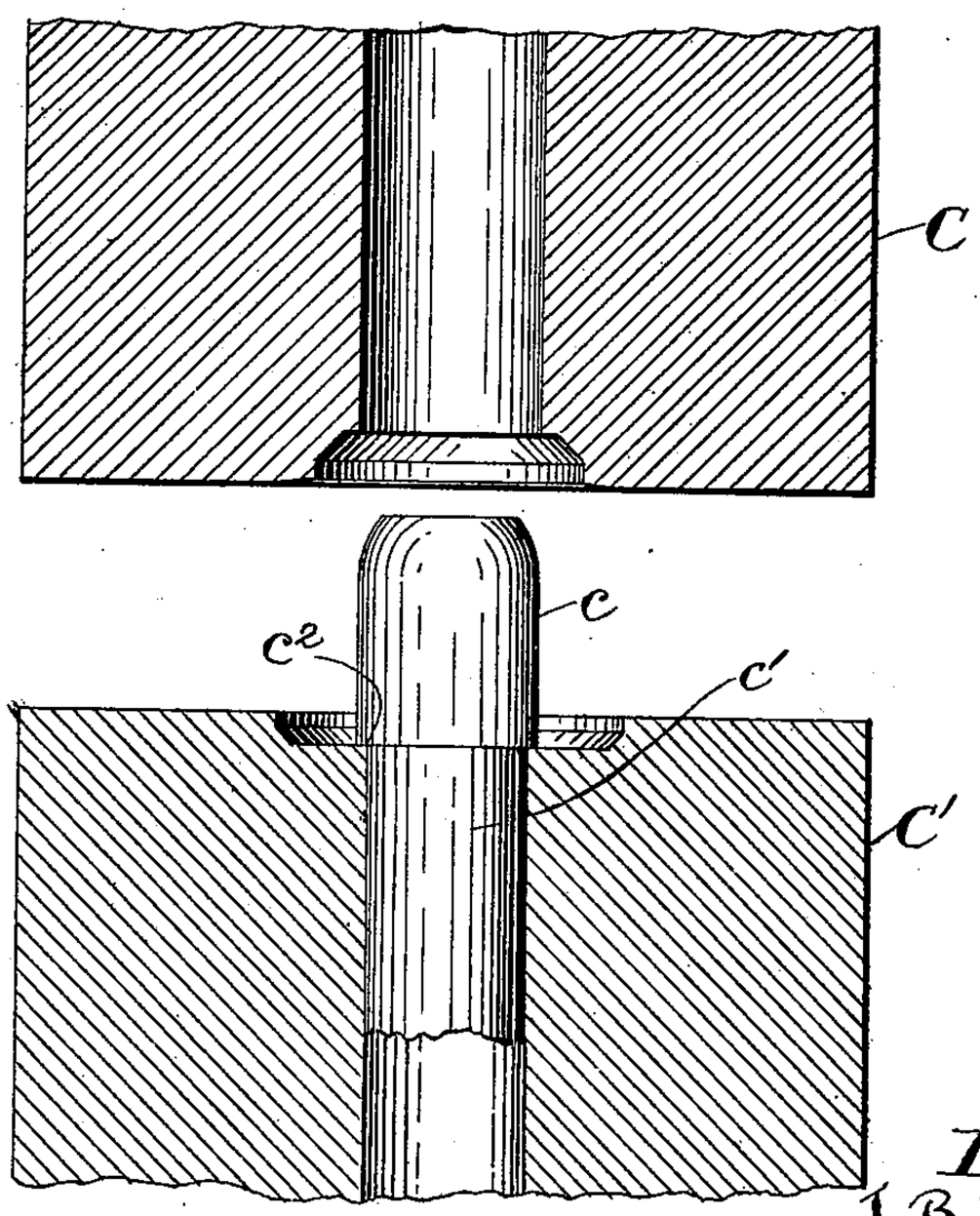


FIG. 4

FIG. 5



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UNITED STATES PATENT OFFICE.

JOHN B. HALIFAX, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GEO. L. THOMPSON MANUFACTURING COMPANY, OF ILLINOIS.

BEARING.

SPECIFICATION forming part of Letters Patent No. 652,844, dated July 3, 1900.

Application filed March 6, 1899. Serial No. 707,897. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. HALIFAX, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bearings, of which the following is a specification.

This invention relates to improvements in bearings; and the object of the invention is to produce a cone or analogous wearing member of a bearing of superior quality and at the same time at a minimum cost.

The invention consists in the matters hereinafter described, and more particularly pointed out in the appended claims, and will be readily understood, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a blank suitable for forming a bearing in accordance with the present invention. Fig. 2 is a sectional view of the same. Fig. 3 is a side elevation of a bicycle cone-bearing embodying the invention. Fig. 4 is an axial section of the same enlarged. Fig. 5 is an axial sectional view of a pair of dies for forming the bearing shown in the preceding figures.

Bearing-cones have heretofore usually been made by either one or the other of two general methods, the method adopted depending upon the material employed, whether tool-steel capable of being tempered or Bessemer or semi steel adapted for case-hardening. The present invention relates to improvements in bearings of the latter type—*i. e.*, bearings made of semisteel and case-hardened.

The usual method of making a cone from semisteel has been to turn it from a bar or rod of steel by means of a suitable lathe, next thread it, then case-harden it, and finally grind its bearing-surface. A large proportion of the cones made in this manner are seriously defective, the defects being due, among others, to the following reasons: first, to the warping, inequality of contraction, and distortion of the article during case-hardening. This is undoubtedly more or less due to inequalities in the homogeneity of the metal, such as the grain of the metal, and to existing internal strains due to the rolling or drawing of the stock in making. The intense heat necessary in case-hardening permits the rearrangement of the molecules and the result is more or less distortion of the article. The subsequent grinding of the bearing, if properly done, makes the cone-surface true, but can obviously not correct any distortion of the threaded or seat portion of the cone, so that while the cone may have a perfect cone-surface, yet it may nevertheless be and usually is more or less "out of center" when seated. A second source of defects is due to imperfections in the hardened "skin" formed by case-hardening in the form of flaws, which may show when the cone is first dressed or may only develop under wear. These defects must obviously be due largely, if not entirely, to lack of homogeneity of the metal.

The present invention consists in making bearings as follows: First, cutting out annular blanks of relatively-soft semisteel, such as is suitable for diework, having a cross-sectional form radically different from that of the proposed bearing and also of somewhat greater cross-sectional area. Desirably for all ordinary forms of bearings the blanks will be rectangular in cross-section. Next, cold-pressing such blanks between a suitable pair of dies by means of gradually-applied pressure (usually by the use of a hydraulic press) and under sufficient pressure to cause the metal to flow into all the lines of the mold or die and assume the required cross-sectional form, while at the same time it is greatly densified. This latter step of cold-flowing the metal into form is not to be confused with ordinary die pressing and drawing. In the latter method the metal is worked into form by a series of progressive steps, during which the metal substantially preserves the integrity of its character, such as its grain, density, &c. On the contrary, in the carrying out of the present invention the metal practically entirely changes its formation and becomes changed from a metal having a distinct grain to an amorphous homogeneous body of great density, showing on fracture radically-distinct characteristics. The bearings thus formed are next threaded (if intended to fit a threaded seat) and next case-hardened in the usual manner, and it is

this latter step which brings out the distinctive characteristics of the cold-flowed cone. It is found in practice that the distortion of such cones during case-hardening is very slight, that the shrinkage is almost exactly uniform in different cones of the same size, and that the case-hardening is much more perfect and free from flaws. All of these results are attributable to the uniformity and density of the texture of the bearing before hardening. Upon breaking a cone made in this manner the unhardened interior is found to be of a fine dense grainless texture, while the skin or hardened exterior extends inwardly to a practically-uniform depth all over the article, the juncture of the hardened and unhardened portions being shown in a sharply-defined line. The texture of the hardened portion also shows the increased density and uniformity. After hardening the wearing-surface is polished, or, if very perfect accuracy is desired, the surface is ground in the usual manner.

Referring to the drawings, A designates a blank, which may be struck out of sheet metal by means of a die or cut from tubular stock.

B designates an ordinary bicycle-crank cone formed from the blank A, as hereinbefore described.

C C′ designate two members of a pair of dies by means of which the cone B may be made. In practice the center or mandrel *c* of the die, which occupies the aperture of the blank during its formation into a bearing, is made movable within the main body of the die to facilitate disengagement of article after pressing, being in the present instance simply provided with a shank *c′*, seated in the lower member and held against inward endwise movement by a shoulder c^2.

It will of course be understood that the present invention is not limited to the production of the particular bearing shown.

I do not claim in the present application the improved method disclosed of producing these bearings and analogous articles, said method being made the subject of a separate application filed by me November 9, 1899, Serial No. 736,315.

I claim as my invention—

1. As a new article of manufacture, a bearing made of a blank cut from soft semisteel and made dense and substantially homogeneous throughout by cold-pressing between dies to which pressure is applied gradually and sufficient to cause the metal to flow and take the form of the cavity between the dies and thereafter case-hardened, substantially as described.

2. As a new article of manufacture an annular bearing for bicycles and the like, made from an annular blank of soft semisteel of rectangular form in cross-section, and having its interior made dense and substantially homogeneous by cold-pressing between dies to which a pressure is applied gradually and sufficient to cause the metal to flow and take the form of the cavity between the dies, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature hereto, in the presence of two subscribing witnesses, this 28th day of February, A. D. 1899.

JOHN B. HALIFAX.

Witnesses:
C. H. FOSTER,
ALBERT H. GRAVES.