Dec. 4, 1928. 1,693,748

W. J. FIEGEL ET AL

METHOD OF MAKING BALL AND SOCKET JOINTS

Filed Jan. 24, 1927

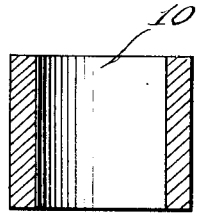

Fig. 1

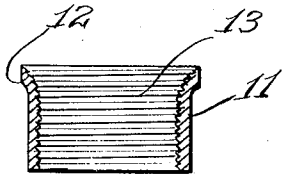

Fig. 2

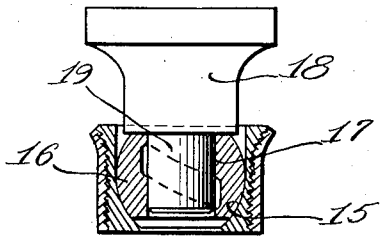

Fig. 5.

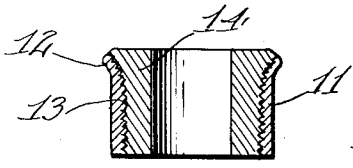

Fig. 3.

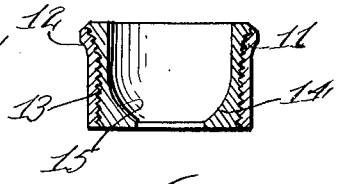

Fig. 4

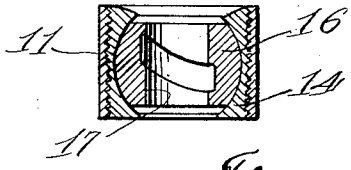

Fig. 7.

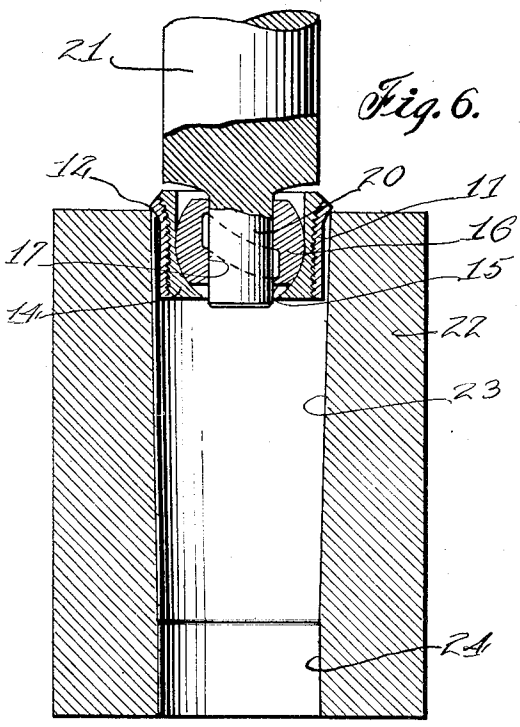

Fig. 6.

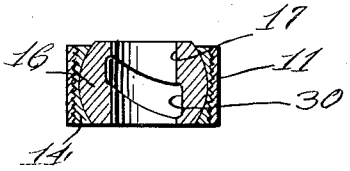

Fig. 8.

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Patented Dec. 4, 1928. 1,693,748

UNITED STATES PATENT OFFICE.

WILLIAM J. FIEGEL AND WINFIELD S. ENDERICK, OF DETROIT, MICHIGAN, ASSIGNORS TO BOHN ALUMINUM AND BRASS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

METHOD OF MAKING BALL AND SOCKET JOINTS.

Application filed January 24, 1927. Serial No. 163,271.

This invention relates to the method of making ball and socket joints and has as one of its primary objects to simplify and reduce the cost of manufacturing devices of this character and to improve the character of the articles produced.

The novel steps of the method as well as the sequence of the several steps and the advantages resulting from the present invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings wherein:

Figure 1 is a sectional view of a length of tubing employed in producing the shell.

Figure 2 is a sectional view showing the shell.

Figure 3 is a sectional view showing the shell after being babbitted.

Figure 4 is a view showing the babbitted shell after the babbitt has been initiallly shaped.

Figure 5 is a sectional view showing the manner of introducing the ball into the shell.

Figure 6 is a sectional view showing the manner in which the end of the shell is closed-in.

Figure 7 is a sectional view of the article after the end of the shell is closed-in, and

Figure 8 is a sectional view of the completed article.

In practicing our improved method a piece of tubing 10 formed of steel or other suitable metal is first bored and turned down on the outside to form a shell 11 such as illustrated in Figure 2 provided with a flared end 12 and an inner roughened surface 13. The shell is faced to length and then tinned and babbitted to provide a layer of babbitt 14 as illustrated in Figure 3.

The babbitt 14 is then formed or shaped by suitable forming tools to provide a substantially concave or hemispherical socket 15 adjacent the end of the shell remote from the flared end 12. A ball 16 in the form of a frustum of a sphere and herein shown as provided with an axial bore 17 is introduced into the shell by means of a special tool 18 provided with a cylindrical extension 19 which enters the bore 17 of the ball. By means of this tool the ball 16 is forced firmly into the socket 15 previously formed in the babbitt. The ball and shell is next engaged by an extension 20 of a special tool 21 and forced through a die 22 provided with a bore or opening 23 tapering inwardly from the upper to the lower end thereof and it is preferable that the tapered portion of the die terminates in a portion 24 the walls of which are parallel with the longitudinal axis of the die. In passing through the die 22 the flared end 12 of the shell and the babbitt adjacent thereto is pressed inwardly so as to close-in the open end of the shell so that the outer wall of the shell is substantially parallel to the longitudinal axis of the bore 17. The condition of the article after the closing-in operation is illustrated in Figure 7 from which it will be noted that the open end of the shell has been closed-in so as to confine the ball 16 within the shell.

After this, the outer surface and both ends of the article are finished so that the final article is substantially, as illustrated in Figure 8 of the drawings. The bore 17 of the ball is usually provided with an oil groove 30.

From the foregoing it will be apparent that by means of the herein described method it is possible to economically construct ball and socket joints with expediency and dispatch. Furthermore the several steps of the method are few in number and the invention may be practiced in the manufacture of bearings in large quantities.

While for the purpose of fully disclosing the invention the several steps of the method have been described in detail and in a certain sequence, nevertheless it will be apparent to those skilled in this art that both the character and sequence of the steps of the herein described method may be varied without departing from the spirit and scope of this invention and to this end reservation is made to make such changes as may come within the purview of the accompanying claims.

What we claim as our invention is:—

1. In the method of manufacturing ball and socket joints, the steps which consist in shaping the babbitt of a babbitted shell to form a hemispherical recess, introducing a ball into said recess and closing-in the end of the recess to confine the ball therein.

2. In the method of manufacturing ball and socket joints the steps which consist in babbitting a shell having a flared end, shaping the babbitt at the end opposite to the flared end to form a substantially hemispherical recess, introducing a ball into said recess

and pressing in the flared end to confine said ball.

3. In the method of manufacturing ball and socket joints the steps which consist in babbitting a tubular shell, shaping the babbitt to form a socket, introducing a ball into said socket and closing the open end of said socket to confine the ball.

4. In the method of manufacturing ball and socket joints the steps which consist in babbitting a tubular shell having a flared end, shaping the babbitt to form a socket, introducing a ball in said socket at the end opposite said flare and closing-in the flared end to confine the ball in the socket.

5. In the method of manufacturing ball and socket joints the steps which consist in babbitting a shell flared at one end, shaping the babbitt to form a socket at the end opposite to said flare, pressing a ball into said socket and closing the open end of said socket to confine said ball.

6. In the method of manufacturing ball and socket joints the steps which consist in shaping a tubular member to form a tubular shell having a flared end, babbitting said shell, shaping the babbitt to form a socket at the end opposite to said flared end, inserting a ball in said socket and closing-in the flared end to confine the ball in the socket.

7. In the method of manufacturing ball and socket joints those steps which consist in babbitting a flared sleeve-like member, shaping the babbitt to form a socket, pressing a frustum of a ball having an axial recess into said socket with the axis of said recess coincident with the axis of said member and closing-in the flared end of said member to confine said ball in said socket.

8. In the method of manufacturing ball and socket joints the steps which consist in shaping a tubular member to form a tubular shell having a flared end, babbitting said shell, shaping said babbitt to form a substantially hemispherical socket at the end remote from said flare, introducing a ball into said socket and closing-in the flared end of said shell to confine said ball in said socket.

9. In the method of manufacturing ball and socket joints the steps which consist in shaping a tubular member to form a tubular shell having a flared end, babbitting said shell, shaping said babbitt to form a substantially hemispherical socket at the end remote from said flare, introducing a ball into said socket, closing-in the flared end of said shell to confine said ball in said socket and finishing the outer surface and two ends of said shell.

10. In the method of manufacturing ball and socket joints the steps which consist in shaping a steel tube to form a tubular shell, having a flared end, tinning and babbitting said shell, boring said babbitt to form a substantially concave socket at the end remote from said flare, introducting a ball into said socket, closing-in the flared end of said shell to confine said ball in said socket and finishing the outer surface and two ends of said shell.

11. In the method of manufacturing ball and socket joints the steps which consist in shaping a steel tube to form a tubular shell having a flared end, facing said shell to length, tinning and babbitting said shell, boring said babbitt to form a substantially concave socket at the end remote from said flare, introducing a ball into said socket, closing-in the flared end of said shell to confine said ball in said socket, rough facing the ends of said shell and finishing the outer surface and two ends of said shell.

12. In the method of manufacturing ball and socket joints, those steps which consist in shaping a tubular member to form a tubular sleeve like shell having a flared end, shaping said shell at the end remote from said flare to form a socket, introducing a ball into said socket and closing in the end of said shell to confine said ball in said socket.

13. In the method of manufacturing ball and socket joints, those steps which consist in shaping a tubular member to form a tubular shell having a flared end, shaping the tubular member at the end remote from said flare to form a socket, pressing a frustum of a ball having an axial recess into said socket with the axes of said recess coincident with the axes of said member and closing in the flare of said member to confine said ball in said socket.

In testimony whereof we affix our signatures.

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WINFIELD S. ENDERICK.