

E. GRUBER.
 PROCESS OF UNITING ARTICLES TO SHEET METAL SUPPORTS.
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1,249,948.

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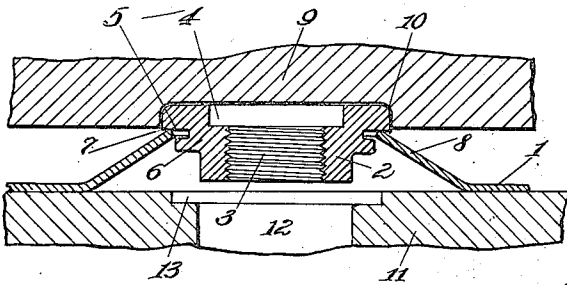


Fig. 1.

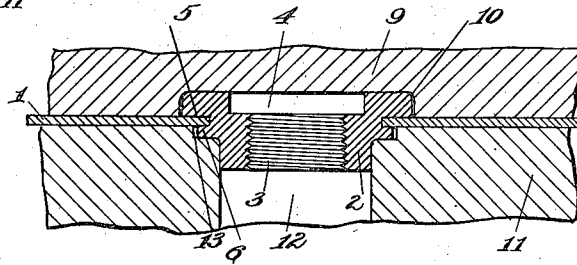


Fig. 2.

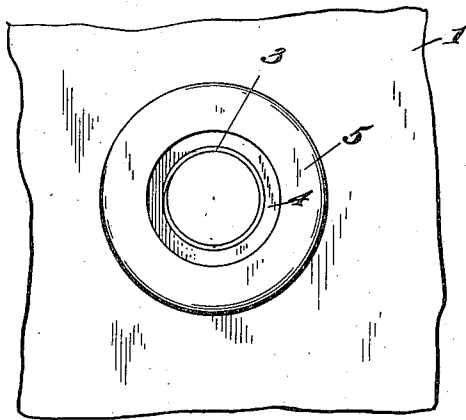


Fig. 3.

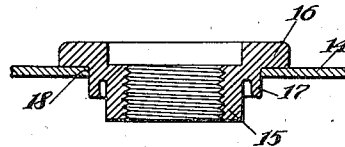


Fig. 4.

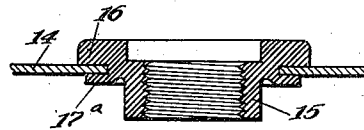


Fig. 5.

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PROCESS OF UNITING ARTICLES TO SHEET-METAL SUPPORTS.

1,249,948.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD GRUBER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Processes of Uniting Articles to Sheet-Metal Supports, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to processes of uniting articles such as bushings to sheet metal supports and more particularly to processes of uniting bung bushings to the heads or bodies of metallic barrels. It is the object of the invention to provide a process whereby such articles may be secured in place in such manner as to prevent the displacement thereof and also to produce a leak-tight joint between the articles and the surrounding metal plates.

As previously stated, the invention may be used, and a large field for its practice resides, in connection with the art of making metallic barrels. After having produced a satisfactory method of making and uniting the bodies and heads of these barrels, it is necessary that some satisfactory manner be provided for applying the bungs thereto.

It is necessary, in order to produce a commercial article, that the bushings for the bungs be retained firmly in place, in such manner as will withstand all ordinary incidents of use; also that the connection between the bushings and the metal of the barrel body or head be such as will prevent the leakage of liquid therebetween. I accomplish these results in and through the construction and process described herein and illustrated in the drawings forming part hereof, wherein Figure 1 represents a sectional view taken through a bushing and the cooperating portion of the metallic article to which it is to be applied, but prior to connecting these parts, the die members being indicated as open; Fig. 2 represents a similar view, showing the die members closed and the positions assumed by the parts after the closing of the die members; Fig. 3 represents a plan view of the bushing and the surrounding metal, after the parts have been united; Fig. 4 represents a view, similar to Fig. 1, of a modified form of bushing, the die members being omitted; and Fig. 5 a view similar to Fig. 4, showing the posi-

tions assumed by the parts after the connection has been made between the metallic body and the bushing.

Describing by reference characters the various parts illustrated herein, 1 denotes the sheet metal body (for instance, the head of a metal barrel) to which an article such as a bung bushing is to be applied, and 2 denotes the article, in this case a bushing, said bushing being provided with an internal thread 3 and a recess 4 above the internal thread, the parts 3 and 4 being intended, respectively, for the externally threaded body and the head of a metallic bung. 5 denotes a peripheral flange projecting from the upper or outer portion of the bushing and 6 a flange extending substantially parallel with the flange 5 and spaced therefrom to provide therewith a recess 7. It will be noted that the flange 6 is of considerably less diameter than the flange 5, whereby the latter flange projects beyond and overhangs the former. For convenience of manufacture, the bushing is circular in cross-section and the flanges 5 and 6 are also circular.

In applying the bushing to the cooperating metal plate 1, a hole is cut through the metal of substantially the same diameter as the diameter of the bushing in the plane of the recess 7. The metal surrounding this opening is flared outwardly into frusto-conical shape, as indicated at 8, Fig. 1. This results in stretching the metal of the part 8, whereby the opening therethrough is enlarged. The part 8 will be of such dimensions and will be given such an inclination as will enable the bushing to be dropped into the opening thereof, the flange 6 clearing said opening and the bushing resting on top of the portion 8, through the engagement of the outwardly projecting flange 5 therewith.

It will be evident that, by making the opening of proper size and by giving proper inclination to the part 8, the metal bounding the opening will just clear the flange 6, whereby the bushing may be properly centered by the plate when inserted in the manner shown in Fig. 1.

9 denotes an upper die member having a cylindrical recess 10 therein of the same diameter and substantially the same depth as the thickness of the flange 5. 11 denotes a second die member having an opening 12 of a diameter to receive the body of the bush-

ing 2 therewithin and having in its upper surface an annular recess 13 substantially coextensive in diameter with the flange 6 and preferably of slightly less depth than the thickness of said flange.

With the parts assembled as shown in Fig. 1, by moving the die member 9 downwardly, or toward the member 11, the metal 8 will be forced downwardly into substantially the same plane with the body of the metal plate indicated at 1, and the metal in the portion 8 will flow into the recess between the flanges 5 and 6. Owing to the fact that the recess 13 is of slightly less depth than the flange 6 and the flange 6 is relatively thin, this flange will be forced upwardly toward the flange 5, whereby the inner edge of the metal surrounding the bushing will be gripped firmly between said flanges, as shown in Fig. 2.

By this operation, the bung bushing will be clamped firmly to the metal of the barrel or other article, the metal being gripped tightly between the flanges 5 and 6. In order to render the joint between the metal and the bushing leak-proof, the metal body and the bushing flanges may be united by autogenous welding, or the metal may be united to the flanges by means of solder.

In Figs. 4 and 5 there is shown a modification of the manner of uniting the bung bushing (or other similar article) to the surrounding metal plate. In these views, 14 denotes the metal plate, 15 the body of the bushing, 16 the upper flange, and 17 the lower flange. In inserting the bushing in accordance with the modification disclosed in these figures, an opening is provided in the metal, which opening is of a diameter to receive closely therewithin the cylindrical wall 18 projecting downwardly from the flange 16. The bottom of this wall forms the flange 17, which flange, in the preliminary stage of the operation extends in a vertical direction. After the bushing has been fitted in the manner shown in Fig. 4, the upper flange 16 and the lower flange 17 are subjected to dies which roll the lower flange outwardly into a horizontal position, as shown at 17^a, Fig. 5, thereby gripping the metal 14 between the flanges, the appearance of the bushing and the surrounding metal at the end of the operation being substantially identical with the appearance of these parts in Figs. 1 and 2. After the parts have thus been united, the joint between the metal and the bushing may be rendered leaktight, as by autogenous welding or by solder.

While I have described my invention as applicable to the manufacture of metallic barrels, it will be evident that it may be used in other relations; hence I do not propose to be limited to the use of the invention only in connection with the art particularly identified in the descriptive matter herein,

but reserve my right to all uses to which it may be applicable.

Having thus described my invention, what I claim is:—

1. The process of uniting a metal sheet and a bushing or similar body which comprises providing the body with a pair of substantially parallel flanges having a recess therebetween, one of said flanges being of greater diameter than the other, forming an opening in the metal sheet, forcing the metal surrounding the opening out of the plane of the sheet whereby the opening is expanded sufficiently to admit the passage of the smaller flange therethrough, applying the body to the opening with the larger flange resting on the metal surrounding the opening, forcing the displaced metal back into substantially the plane of the body portion of the sheet, forcing the flanges into substantial engagement with opposite sides of the adjacent sheet, and finally closing the joint between the sheet and the bushing.

2. The process of uniting a metal sheet and a bushing or similar body which comprises providing the body with a pair of substantially parallel flanges having a recess therebetween, one of said flanges being of greater diameter than the other, forming an opening in the metal sheet of smaller diameter than the smaller flange, forcing the metal surrounding the opening out of the plane of the sheet whereby the opening is expanded sufficiently to admit the passage of the smaller flange therethrough, applying the body to the opening, with the metal surrounding the opening in position to enter the recess between the flanges, forcing the displaced metal back into substantially the plane of the body portion of the metal sheet and into said recess, and closing the joint between the metal sheet and the flanges.

3. The process of uniting a bushing or similar body and a metal sheet which comprises providing the body with a pair of longitudinally spaced substantially parallel flanges, one of said flanges being of greater diameter than the other and there being an annular recess between said flanges, providing the sheet with an opening of substantially the diameter of said recess, forcing the portion of the metal surrounding the opening out of the plane of the sheet, thereby enlarging the opening a sufficient extent to receive therewithin the flange of smaller diameter, inserting the body in said opening with the metal immediately surrounding the opening in position to enter said recess, forcing the displaced metal of the sheet and the recess into substantially the plane of the sheet, closing the recess between said flanges to grip the metal sheet between said flanges, and finally closing the joint between said flanges and the surrounding body of the sheet.

4. The process of uniting a bushing or similar body and a metal sheet which comprises providing the body with a pair of longitudinally spaced substantially parallel flanges, one of said flanges being of greater diameter than the other and there being an annular recess between said flanges, providing the sheet with an opening of substantially the diameter of said recess, forcing the portion of the metal surrounding the opening out of the plane of the sheet, thereby enlarging the opening a sufficient extent to receive therewithin the flange of smaller diameter, inserting the body within said opening with the metal immediately surrounding the opening in position to enter said recess, forcing the displaced metal of the sheet and the recess back into substantially the plane of the sheet, and closing the joint between said flanges and the surrounding body of the sheet.

5. The process of uniting a metal sheet and a bushing or similar body which comprises providing the outer end of the body with a pair of longitudinally spaced substantially parallel flanges, the outer flange being of greater diameter than the inner flange and said flanges being spaced by a recess, forming the metal sheet with an opening of substantially the diameter of the recess, pressing the metal surrounding the opening into frusto-conical shape, thereby expanding the opening to a diameter slightly greater than that of the smaller flange, inserting the body into the opening with the outer flange resting on top of the frusto-conical end of the displaced metal, forcing the body and the displaced metal backwardly into substantially the plane of the sheet, thereby contracting the opening and forcing the metal surrounding the same into the space between the flanges, and closing the space between the flanges to close the joint between the metal sheet and the flanges.

6. The process of uniting a metal sheet and a bushing or similar body which comprises providing the outer end of the body with a pair of substantially parallel flanges, forming the metal sheet with an opening of substantially the diameter of the body between the flanges, inserting the body into the opening with the metal immediately surrounding the opening between said flanges, and forcing said flanges toward each other thereby to clamp the metal surrounding the opening between said flanges.

7. The process of uniting a body and a

metal sheet which comprises providing the body with a pair of longitudinally spaced flanges, one of said flanges being of greater diameter than the other and there being a recess between said flanges, providing the sheet with an opening of substantially the diameter and contour of said recess, forcing the metal surrounding the opening out of the plane of the sheet, thereby enlarging the opening a sufficient extent to permit the passage therethrough of the flange of smaller diameter, inserting the body in said opening with the metal immediately surrounding the opening in position to enter said recess and with the larger flange bearing against said metal, forcing the body toward the plane of the sheet whereby the flange of larger diameter will force the displaced metal of the sheet into substantially the plane of the sheet, thereby contracting the opening to its original size so as to conform to and fit the said recess between the flanges, forcing one of said flanges toward the other thereby to grip the metal sheet between said flanges, and finally closing the joint between said flanges and the surrounding sheet.

8. The process of uniting a body and a metal sheet which comprises providing the body with a pair of longitudinally spaced flanges, one of said flanges being of greater diameter than the other and there being a recess between said flanges, providing the sheet with an opening of substantially the diameter and contour of said recess, forcing the metal surrounding the opening out of the plane of the sheet, thereby enlarging the opening a sufficient extent to permit the passage therethrough of the flange of smaller diameter, inserting the body in said opening with the metal immediately surrounding the opening in position to enter said recess and with the larger flange bearing against said metal, forcing the body toward the plane of the sheet whereby the flange of larger diameter will force the displaced metal of the sheet into substantially the plane of the sheet, thereby contracting the opening to its original size so as to conform to and fit the said recess between the flanges, and forcing one of said flanges toward the other thereby to grip the metal sheet between said flanges.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

EDWARD GRUBER.

Witnesses:

H. O. DAVIDSON,
O. P. STEHN.