Sept. 9, 1930. J. E. TRAINER ET AL 1,775,331

METHOD OF FORMING RETURN BENDS

Filed Dec. 27, 1928

Fig - 1 -

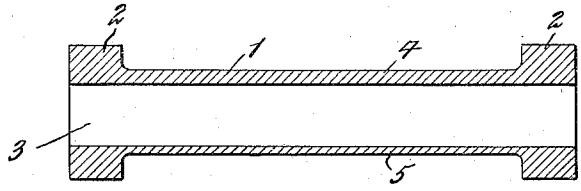


Fig - 2 -

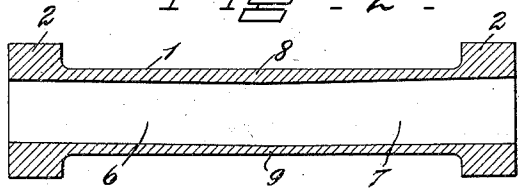


Fig - 3 -

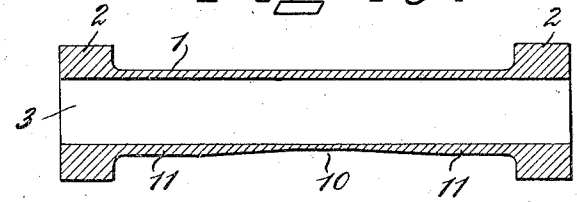


Fig - 4 -

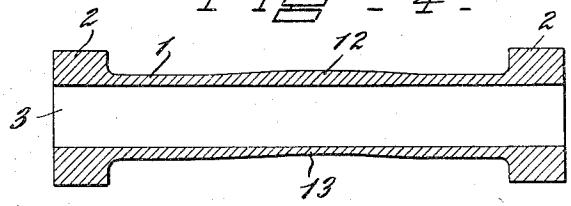
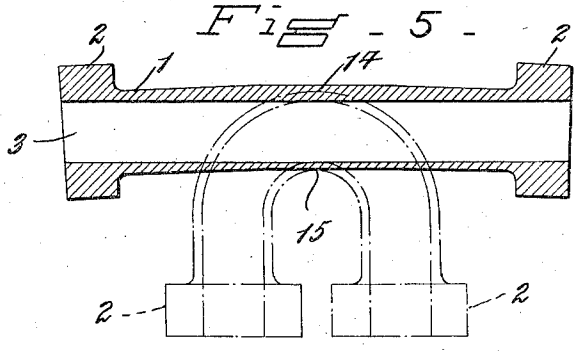


Fig - 5 -



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UNITED STATES PATENT OFFICE

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METHOD OF FORMING RETURN BENDS

Application filed December 27, 1928. Serial No. 328,822.

This invention relates to a novel and improved method of making return bends. It will be best understood from the following description and the accompanying drawing. In the drawing, in which we have shown certain selected methods by which the invention may be practised:

Fig. 1 is a longitudinal sectional view through the blank from which the bend is to be made, and illustrating one step in the method of forming the same.

Figs. 2, 3, 4 and 5 are views corresponding to Fig. 1, and showing other methods by which the bend may be formed, the preferred method being shown in Fig. 5.

In practicing the invention, a solid bar is formed, preferably with integral flanges at the ends thereof, as described and claimed in the copending application of Thomas Collins, Serial No. 322,123, filed November 27, 1928. By the term "bar" we do not intend to limit ourselves to any one cross-sectional form of stock, although preferably the stock is in the form of a cylindrical bar from which a hollow cylindrical tube may be formed.

Referring now to Fig. 1, we have shown therein a bar 1 having integral flanges 2 formed thereon. This bar is then preferably bored longitudinally thereof to form a bore 3. By the term "boring" we do not intend to limit ourselves to any particular method of forming the hole as this hole may be made by boring, drilling or the like. The bore 3 is preferably formed eccentrically of the bar, as plainly shown in Fig. 1, the wall 4 being thicker than the wall 5, and the bore being substantially parallel to the longitudinal axis of the bar. The bored stock is then bent to form the return bend, the wall 5 being disposed on the concave side of the bend and the wall 4 on the convex side thereof. Suitable holes may then be drilled through the flanges, if desired, in order to secure the bend to adjoining tubes or the like.

In Fig. 2 we have shown another method of practicing the invention, in which the bore through the bar is formed of two portions 6 and 7 which are disposed at an angle to each other and at an angle to the longitudinal axis of the bar, by means of which an additional portion 8 of metal is provided in one wall and a thinner wall 9 is provided opposite the portion 8. The stock may then be bent in such a way that the excess metal at 8 will occur on the convex or outer side of the bend.

In Fig. 3 is shown still another manner in which the invention may be practiced. In this form the bore 3 is substantially coaxial with the axis of the bar, and the thin wall is provided by removing metal at 10 on what is to be the concave side of the bend. This leaves more metal at the portions 11 which are not bent to the same degree as the middle portion of the stock.

In Fig. 4 is shown another way of achieving substantially the same results as shown in Fig. 3. In this form the bar is first bent adjacent its middle only, so as to form a part 12 with more metal than is found at 13 diametrically opposite thereto. The end portions of the bar are not bent. The bore 3 is then formed and the result will be an excess of metal at 12 over what is found diametrically opposite at 13. Then, when the bend is formed, the part 12 will be the convex portion and the part 13 will be the concave portion.

In Fig. 5 is shown the preferred form, in which the entire length of the bar is bent slightly and substantially uniformly, and then the bore 3 is formed as a straight hole extending longitudinally of the bar. This results in an excess of metal at 14 and a smaller amount diametrically opposite thereto at 15. The thickness of the wall formed by the bore 3 gradually approaches a uniform thickness at the flanges 2, as will be evident from an inspection of Fig. 5. The bar is then bent to the form shown in dot and dash lines in this figure, to form the return bend, and when in this form the thickness of the wall will be substantially uniform throughout the length of the bend, the excess metal at 14 being distributed throughout the length of the bend and the relatively thin portion 15 becoming thicker because of the short side of the bar.

We claim:—

1. The method of forming a return bend which comprises boring a hole longitudinally through a bar, with more metal on one side of the hole than on the other, and so bend-

ing the bored bar that the side with less metal will form the concave side of the bend.

2. The method of forming a return bend which comprises forging a bar with a flange on the end thereof, boring a hole longitudinally therethrough with more metal on one side of the hole than on the other, and then bending the bored bar so that the side with less metal will form the concave side of the bend.

3. The method of forming a return bend which comprises bending a solid bar and then boring a straight hole longitudinally of the bar whereby more metal will be disposed on one side of the hole than on the other, and so bending the bored bar that the side with less metal will form the concave side of the bend.

4. The method of forming a return bend which comprises bending a solid bar uniformly for substantially its entire length, boring a straight hole therethrough longitudinally thereof, whereby more metal will be disposed on one side of said hole than on the other, and then bending the bored bar so that the side with less metal will form the concave side of the bend.

5. The method of forming a return bend which comprises boring a hole longitudinally of a solid bar with the axis of the bore eccentric to at least a portion of the axis of the bar, whereby more metal is disposed on one side of the hole than on the other, and then so bending the bored bar that the side with less metal will form the concave side of the bend.

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