May 3, 1932. T. COLLINS 1,856,539

METHOD OF MANUFACTURING RETURN BENDS

Original Filed Nov. 27, 1928

Fig. 1.

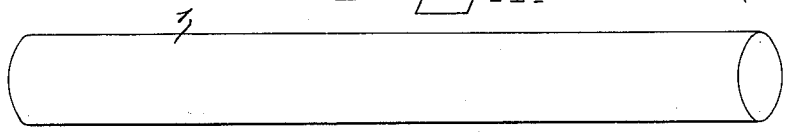


Fig. 2.

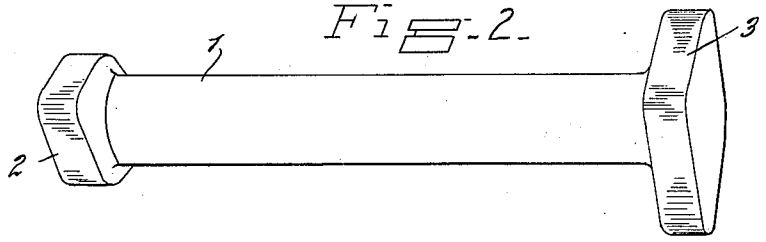


Fig. 3.

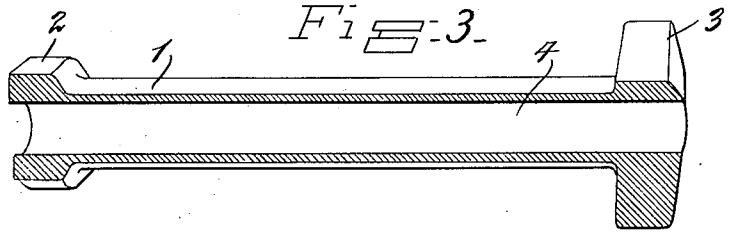


Fig. 4.

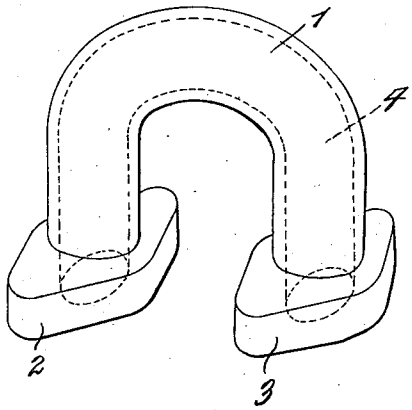
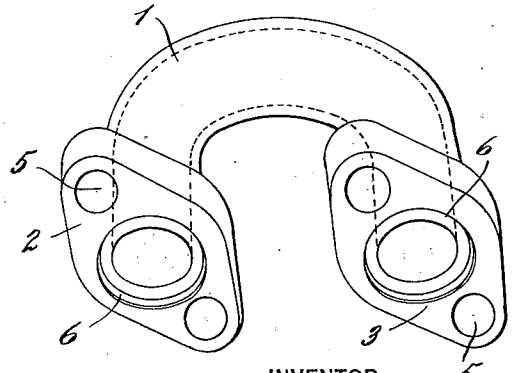


Fig. 5.



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UNITED STATES PATENT OFFICE

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METHOD OF MANUFACTURING RETURN BENDS

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This invention relates to a novel and improved method of manufacturing return bends. In the annexed drawings, in which I have shown a selected embodiment of the invention and have illustrated the steps of making the same;

Fig. 1 is a view of the stock from which the bend is to be made.

Fig. 2 is a view of the same element shown in Fig. 1, and illustrating a second step in making the bend.

Fig. 3 is a longitudinal sectional view through the element shown in Fig. 2, after a third step has been performed, and Figs. 4 and 5 show the same element after two more successive steps have been taken.

In practicing the invention, I start with a piece of stock in the form of a solid bar 1, as shown in Fig. 1. This bar is preferably round in cross section, although it is to be understood that other suitable cross sectional forms may be adopted. By the term "bar", I do not intend to limit myself to any one cross section.

The next step is preferably the heating of the ends of the bar to a forging temperature, and then the ends are upset in a suitable forging machine to produce flanges 2 and 3 of any desired form. The element is then formed with a longitudinally extending hole 4 therein. This hole may be formed by boring, drilling, or the like, but for the sake of simplicity, I will hereinafter refer to this hole as being bored, and it will be understood that this expression is to cover any suitable method of forming a hole in a solid piece of metal. This boring may take place from one end of the element completely through to the other end, or may be conducted from both ends towards the middle.

The element is then preferably bent to some such form as shown in Fig. 4, to bring the flanged ends to the desired positions. The next step is to provide the flanges with bolt holes 5, and preferably with counterbores 6 on their joint faces, to receive the ends of the tubes which are connected together by the bend. In the finished bend as shown in Fig. 5, the flanges are in the form of elongated diamonds, the longitudinal axes of which are disposed substantially parallel to each other, and, in the illustrated embodiment, the flanges are in the same plane, although this is not necessary. It will also be seen that the adjacent sides of the diamond-shaped flanges are parallel to each other. In Fig. 2 it will be seen that the longitudinal axes of the flanges are disposed at an angle to each other which is appropriate for the relative positions which the flanges occupy after the bending operation, in the illustrated embodiment these final positions of the flanges being such that the longitudinal axes are parallel to each other. The bolt holes 5 may conveniently be placed on these longitudinal flange axes.

The above method results in a return bend or tube connection formed from a solid bar with a hole bored longitudinally thereof. The method also is one by means of which the bend may be formed on a relatively small radius as compared with prior art practice. It further results in a connection with integral flanges formed of one piece of metal with the tubular part of the connection, and therefore the entire connection is particularly adapted for use with high pressure work. The bar is of any suitable metal such as steel, which will resist stresses caused by high pressure and may be formed in any usual way such as rolling or other forging method.

I claim:—

1. The method of forming a curved tube connection which comprises forging the end of a substantially straight solid bar to form a flange thereon, forming a hole extending longitudinally from end to end of the bar, and bending the bar to bring the forged flange to the desired position.

2. The method of forming a forged curved tube connection which comprises compressing the ends of a straight bar of forged metal to form integral forged flanges, cutting a straight hole from end to end through the bar, and bending the bar to bring the flanges into desired relative positions.

3. The method of making a curved tube connection with ends having elongated flanges disposed substantially parallel to each other, which comprises forging the ends of a substantially straight solid bar to form

said elongated flanges, with the longitudinal axes of said flanges making an angle with respect to each other which is appropriate for the relative positions the flanges are to occupy in the finished bend, forming a hole extending longitudinally from end to end through the bar and flanges, and bending the bar in a plane which will bring said longitudinal axes of the flanges substantially parallel to each other.

4. The method of making a curved tube connection with ends having elongated diamond-shaped flanges disposed with adjacent sides thereof substantially parallel to each other, which comprises forging the ends of a substantially straight solid bar to form said diamond-shaped flanges, with the sides thereof in relative positions which are appropriate for said parallel relation in the finished bend, forming a hole extending longitudinally from end to end through the bar and flanges, and bending the bar in a plane which will bring said flange sides substantially parallel to each other.

THOMAS COLLINS.