April 5, 1949. R. SOMMA 2,466,057

COMBINED TUBE-CONNECTOR AND TUBE-FLARER

Filed Feb. 18, 1947 2 Sheets-Sheet 1

Fig. 2.

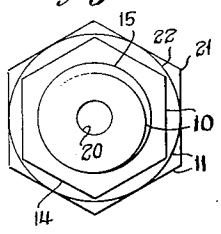


Fig. 1.

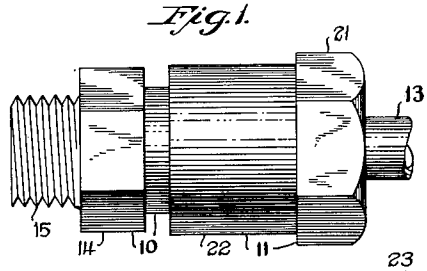


Fig. 3.

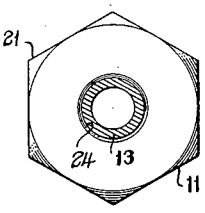


Fig. 4.

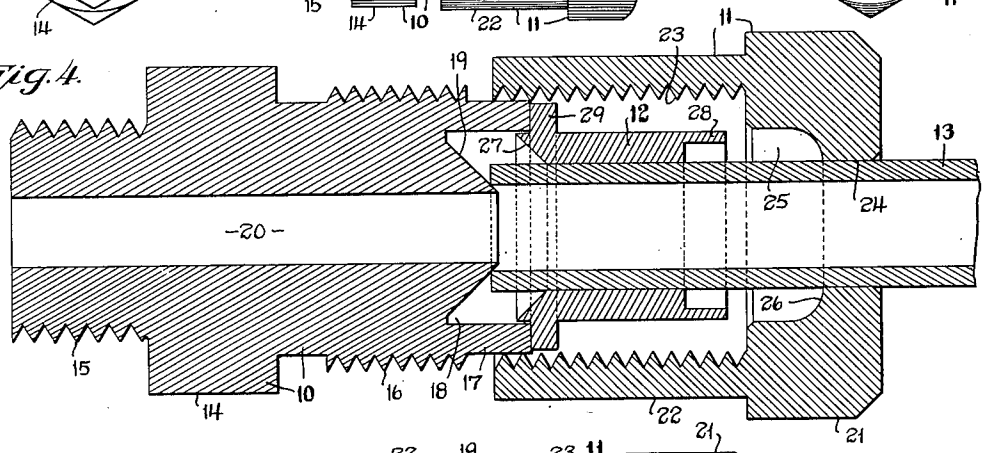


Fig. 5.

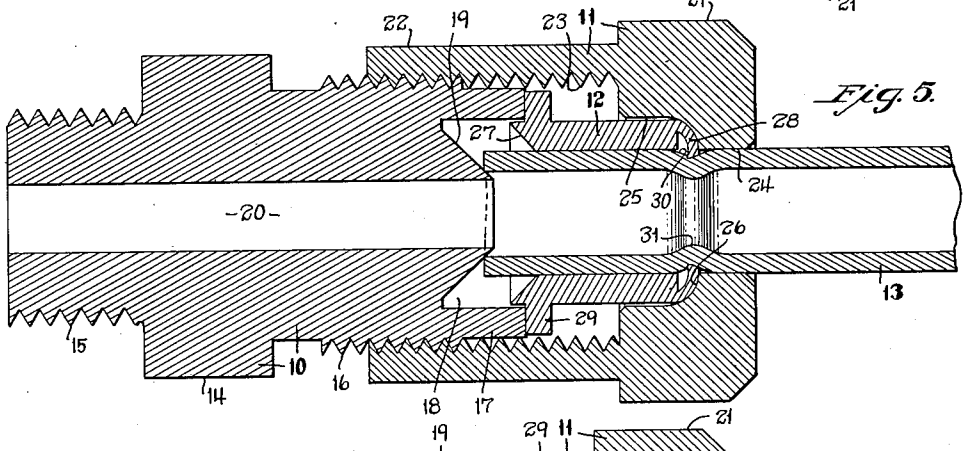
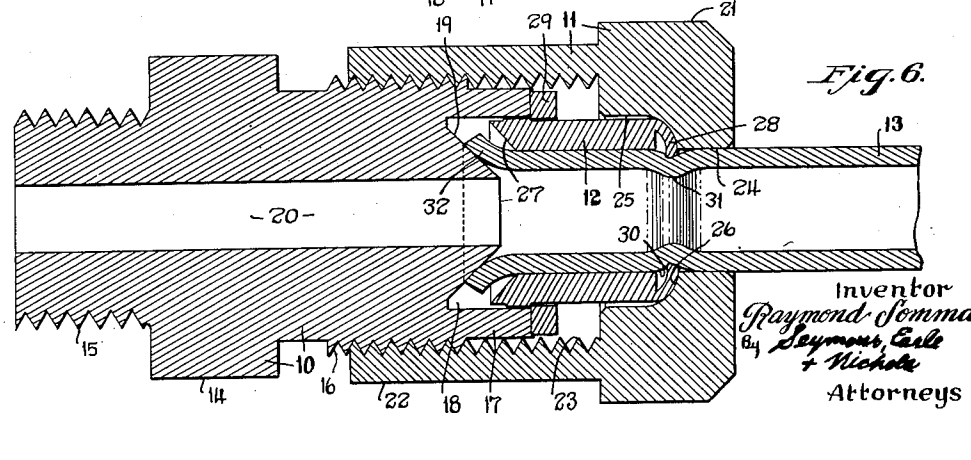


Fig. 6.



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COMBINED TUBE-CONNECTOR AND TUBE-FLARER

Filed Feb. 18, 1947 2 Sheets-Sheet 2

Fig. 7.

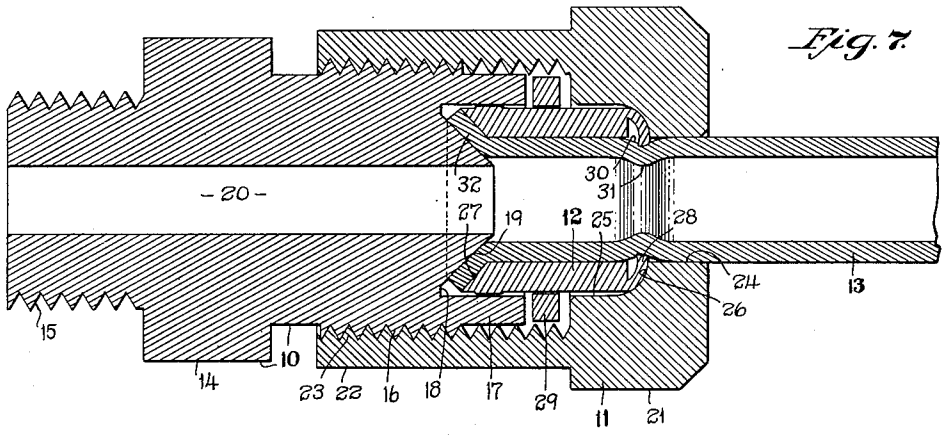


Fig. 8.

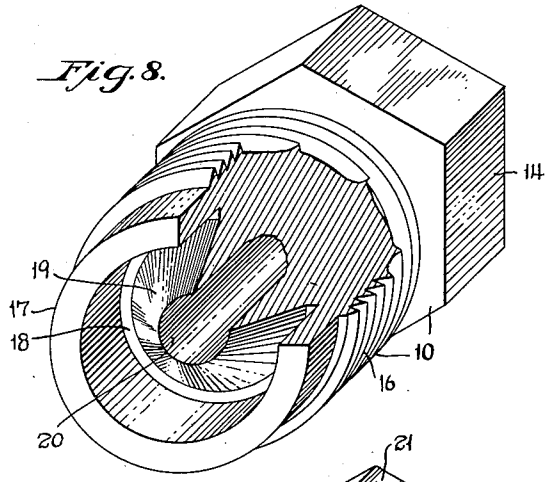


Fig. 11.

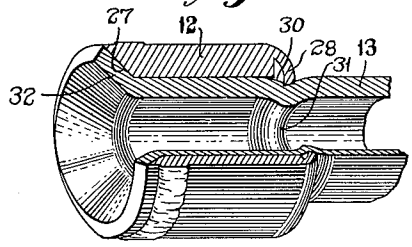


Fig. 9.

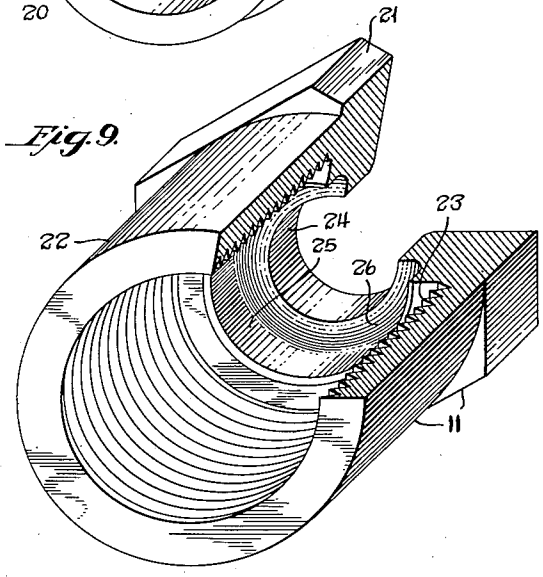
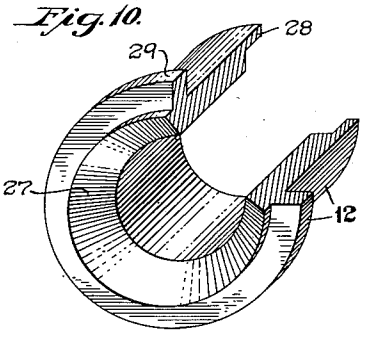


Fig. 10.



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COMBINED TUBE CONNECTOR AND TUBE FLARER

Raymond Somma, Waterbury, Conn.

Application February 18, 1947, Serial No. 729,232

5 Claims. (Cl. 285—122)

1

The present invention relates to improvements in combined connectors and flarers for tubes, i. e., fittings which not only serve to connect a tube to a desired object but which also serve to flare the end of such a tube to provide the desired fluid-tight and mechanically-strong connection.

One of the main objects of the present invention is to provide a superior fitting of the character referred to which may be readily and economically manufactured and conveniently used.

Another object of the present invention is to provide a superior combined tube-connector and tube-flarer which will not require an excessive and expensive degree of accuracy in its manufacture in order to insure the proper discharge of its functions.

A further object of the present invention is to provide a superior fitting of the character referred to which will permit the ready disconnection of a tube, once the latter has been flared and connected.

Still another object of the present invention is to provide a superior combined tube-connector and tube-flarer having its parts so constructed and arranged that the majority thereof may be re-used and not require discarding.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a view in side elevation of one form of a combined tube-connector and tube-flarer embodying the present invention and showing a fragment of a tube connected thereto;

Fig. 2 is an inner-end view thereof;

Fig. 3 is an outer-end view thereof;

Fig. 4 is a central-longitudinal sectional view on a larger scale than the preceding figures and showing a position which the parts may assume during the initial stages of assembly;

Fig. 5 is a view similar to Fig. 4 but showing the female-member threaded onto the male-member to a further degree sufficient to inwardly bend the gripping-flange of the tube-gripping band into gripping engagement with the tube but prior to the flaring of the said tube and prior to the severance of the stop-flange;

Fig. 6 is a view similar to Figs. 4 and 5 but showing the parts in the positions which they assume immediately after the stop-flange of the

2

tube-gripping band has been severed and after the end of the tube has been partly flared;

Fig. 7 is a view similar to Figs. 4, 5 and 6, save that the parts have moved into position to complete the flaring of the end of the tube and the full mechanical gripping thereof in a fluid-tight manner;

Fig. 8 is a perspective view of the male-member shown partly in section;

Fig. 9 is a similar view of the female-member;

Fig. 10 is a perspective view of the tube-gripping band partly in section and shown in its condition prior to application to a tube; and

Fig. 11 is a perspective view partly in longitudinal section of the end of the tube and the tube-gripping band after their removal from the fitting after the parts of the latter have reached the condition shown in Fig. 7.

The particular combined tube-connector and tube-flarer illustrated in the accompanying drawings for purposes of making clear a preferred form of the present invention, includes a body- or male-member generally designated by the reference character 10, a body- or female-member generally designated by the reference character 11, and a tube-gripping band generally designated by the reference character 12. The said parts may be formed of any suitable material such, for instance, as brass, stainless steel, etc., and are designed to be used in connection with a tube generally designated by the reference character 13, which latter may, for instance, be formed of copper, brass, plastic, or other suitable material capable of being flared or flanged substantially in the manner hereinafter described.

The male-member 10 above referred to is, in the instance shown, formed intermediate its respective opposite ends with an exterior polygonal wrench-receiving portion 14 and at its inner end is formed with an externally-threaded stem 15 which is adapted to be threaded into any desired article such, for instance, as a water-tank or into another tube- or pipe-fitting.

The end of the male-member 10 opposite its stem 15 is provided with external threads 16 and terminates in an integral collar 17 which is preferably unthreaded and the end of which constitutes a stop-abutment, for purposes as will hereinafter appear. Within its outer end and hence also within the collar 17, the male-member 10 is formed with a chamber 18 having an inclined bottom wall providing a conical or flare-gripping seat 19, for purposes as will hereinafter appear. Extending completely through the male-member 10 from the end of its stem 15 to its

chamber 18 is an axial passage 20 through which water, gas, or any other desired fluid may flow in either direction.

The female-member 11 above referred to includes a polygonal wrench-receiving portion 21 at its outer end and a skirt 22 at its inner end. The said skirt is integral with the portion 21 and is provided with internal threads 23 which are adapted to interfit with the threads 16 upon the exterior of the outer portion of the male-member 10.

The outer portion of the female-member 11 is formed centrally with a tube-receiving passage 24 through which the tube 13 may extend. Intermediate the passage 24 just referred to and the space within the interior of the skirt 22, is a chamber 25 larger than the said passage 24 and smaller than the interior diameters of the threads 23 and having its wall connected to the wall of the passage 24 by means of an inclined deflecting-surface 26. The said deflecting-surface is preferably and as shown, curved or arcuate.

The tube-gripping band 12 previously referred to has an interior diameter such as to have a sliding fit upon the exterior of a tube such as 13 in conjunction with which the said band may be designed to be used. At its inner end, the said band 12 is formed with an inclined or conical flare-gripping seat 27 extending in substantial parallelism with the flare-gripping seat 19 in the male-member 10, for purposes as will hereinafter appear.

The tube-gripping band 12 is so shaped and sized as to be capable of being extending into the chamber 18 in the male-member 10 and into the chamber 25 in the female-member 11. At its outer end, the said band 12 is formed with an integral gripping-flange 28 thinner than the main- or body-portion of the band 12 and preferably having its outer surface flush with the adjacent outer surface of the band prior to being deformed, as may be seen by reference to Figs. 4 and 10. Closely adjacent its inner end, the band 12 is formed upon its exterior with a radially-projecting stop-flange or stop-projection 29 which is adapted to engage with the end of the collar 17 of the male-member 10, for purposes as will hereinafter appear.

Operation

In using a combined tube-connector and tube-flarer of the particular design illustrated in the accompanying drawings, the tube 13 may be slipped through the tube-receiving passage 24 in the female-member 11 and extended into (and beyond, if desired) the interior of the skirt 22. The tube-gripping band or ring 12 may now be placed over the end of the tube 13 following which the female-member 11 may be threaded onto the male-member 10. For convenience of description, it may be assumed that the parts referred to have now assumed the positions in which they are shown in Fig. 4.

The male-member 10 and female-member 11 may be further interthreaded to inwardly bend the gripping-flange 28 of the tube-gripping band 12 into engagement with the adjacent portion of the periphery of the tube 13. The said bending is effected by the deflecting-surface 26 of the female body-member 11. The now inwardly-deflected end of the gripping-flange 28 will serve to compress the material of the said tube 13 to produce, in the outer periphery thereof, a groove 30 and to produce upon the interior of the said tube, a bead 31. Thus, the tube-gripping band 12 will interlock itself with the tube 13 in such manner that any movement of the said band in an axial direction will similarly move the tube 13.

The parts may now be assumed to have reached the positions in which they are shown in Fig. 5, and it may here be explained that the strength of the stop-flange 29 of the tube-gripping band 12 is such as to resist the axial movement of the band 12 into the chamber 18 of the male-member 10 until such time as the gripping-flange 28 has been forced into firm interlocking engagement with the tube 13.

The continued interthreading of the male-member 10 and female-member 11 after the parts have reached the positions in which they are shown in Fig. 5, will outwardly flare the end of the tube 13 by forcing the same down the incline of the conical seat 19, while at the same time shearing off the stop-flange 29 from the tube-gripping band or ring 12. The parts may now be assumed to have reached the positions in which they are shown in Fig. 6 in which it will be noted that the stop-flange 29 has been completely parted from the said tube-receiving band 12.

The further interthreading of the male-member 10 and female-member 11 will ultimately fully flare the end of the tube 13 to produce thereon the flare or flange 32, shown in Figs. 7 and 11, and will tightly pinch or compress the said flange or flare into a fluid-tight and mechanically-strong connection when the parts reach the positions in which they are shown in Fig. 7. Under these conditions, the now-sheared-off stop-flange 29 will be free to float about substantially the central portion of the tube-gripping band 12 adjacent the end of the collar 17 of the male-member 10, as is shown in Fig. 7.

Should it be desired for any reason to disconnect the tube 13 from the male-member 10, the female-member 11 may be unthreaded from the said male-member, whereupon the end of the tube 13 together with its now tightly attached tube-gripping band 12, may be withdrawn out of the chamber 18 in the male-member 10, since the said tube-gripping band may be readily withdrawn from the said chamber 18.

The connection of the tube 13 to the male-member 10 or its equivalent may be re-established by merely restoring the parts to the positions in which they are shown in Fig. 7.

In the event that it is desired to utilize the male-member 10 and the female-member 11 in connection with another tube such as 13, it only becomes necessary to sever the tube 13 which may be done closely adjacent the polygonal end of the female-member 11. Following this operation, the severed end of the tube together with the tube-gripping band 12 and its now-sheared-off stop-flange 29 may be withdrawn from within the female-member and discarded. Now by employing a new tube-gripping band 12 like that shown in Figs. 4, 5 and 10, the parts 10 and 11 may be re-used either in connection with a fresh tube or in connection with a new portion of the shortened tube 13.

Obviously, if desired, the stem 15 may be omitted and the male-member 10 may be provided at that end with a second set of features like 16 to 19 inclusive to provide a double-ended fitting to interconnect two tubes like 13.

Preferably and as shown, both the gripping-flange 28 and the stop-flange 29 of the tube-gripping band or ring 12 are circumferentially continuous though this feature is not necessary, since the said flanges may be circumferentially

interrupted. The said flanges 28 and 29 or their equivalents must, however, have characteristics such that the said stop-flange will not shear off or break loose from the exterior of the tube-gripping band 12 until it has sufficiently resisted the movement of the said band toward the male-member 10 to insure the deformation of the gripping-flange 28 into locking engagement with the tube 13. Conversely, the gripping-flange 28 or its equivalent must be sufficiently flexible to deform and firmly grip the tube 13 or its equivalent before the stop-flange 29 or its equivalent will be sheared off from the band 12.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A combined tube-connector and tube-flarer, including in combination: a first body-member provided with threads for engagement with the threads of the hereinafter-mentioned second body-member, said first body-member being formed with a longitudinal passage and with an inclined flare-gripping seat surrounding the said passage, the said first body-member also being provided with a stop-abutment facing toward and positioned for engagement by the stop-projection of the hereinafter-mentioned tube-gripping band; a second body-member provided with threads for engagement with the threads of the said first body-member, the said second body-member being formed with a tube-receiving passage and with an inclined deflecting-surface around the said passage and inclined in the same general direction as the flare-gripping seat of the said first body-member; and a tube-gripping band adapted to fit upon the end-portion of a tube and having an inclined flare-gripping seat complementing and adapted to cooperate with the flare-gripping seat in the first body-member, the said tube-gripping band also having inwardly-bendable gripping-means positioned to engage with the inclined deflecting-surface of the said second body-member to be forced inwardly thereby into gripping engagement with the periphery of a tube, the said tube-gripping band also having upon its exterior a stop-projection which is normally rigid therewith but displaceable with respect thereto, the said stop-projection being located for engagement with the stop-abutment of the said first body-member prior to the cooperation of the flare-gripping seat of the said band with the flare-gripping seat of the said first body-member; the relative resistances to displacement of the gripping-means and the stop-projection of the said tube-gripping band being such that the said gripping-means will be deflected into gripping engagement with a tube before the said stop-projection is displaced.

2. A combined tube-connector and tube-flarer, including in combination: a first body-member provided with threads for engagement with the threads of the hereinafter-mentioned second body-member, said first body-member being formed with a longitudinal passage and with an inclined flare-gripping seat surrounding the said passage, the said first body-member also being provided with a stop-abutment facing toward and positioned for engagement

by the stop-projection of the hereinafter-mentioned tube-gripping band; a second body-member provided with threads for engagement with the threads of the said first body-member, the said second body-member being formed with a tube-receiving passage and with an inclined deflecting-surface around the said passage and inclined in the same general direction as the flare-gripping seat of the said first-body member; and a tube-gripping band adapted to fit upon the end-portion of a tube and having an inclined flare-gripping seat complementing and adapted to cooperate with the flare-gripping seat in the first body-member, the said tube-gripping band also having at its end opposite its said seat inwardly-bendable gripping-means positioned to engage with the inclined deflecting-surface of the said second body-member to be forced inwardly thereby into gripping engagement with the periphery of a tube, the said tube-gripping band also having upon its exterior a stop-projection which is normally rigid therewith but displaceable with respect thereto, the said stop-projection being located for engagement with the stop-abutment of the said first body-member prior to the cooperation of the flare-gripping seat of the said band with the flare-gripping seat of the said first body-member; the relative resistances to displacement of the gripping-means at the end of the said tube-gripping band and the stop-projection on the said band being such that the said gripping-means will be deflected into gripping engagement with a tube before the said stop-projection is displaced.

3. A combined tube-connector and tube-flarer, including in combination: a male body-member provided with external threads for engagement with the internal threads of the hereinafter-mentioned female body-member, said male body-member being formed with a longitudinal passage and with an inclined flare-gripping seat surrounding the said passage, the said male body-member also being provided with a stop abutment facing toward and positioned for engagement by the stop-projection of the hereinafter-mentioned tube-gripping band; a female body-member provided with internal threads for engagement with the external threads of the said male body-member, the said female body-member being formed with a tube-receiving passage and with an inclined deflecting-surface around the said passage and inclined in the same general direction as the flare-gripping seat of the said male body-member; and a tube-gripping band adapted to fit upon the end-portion of a tube and having an inclined flare-gripping seat complementing and adapted to cooperate with the flare-gripping seat in the male body-member, the said tube-gripping band also having inwardly-bendable gripping-means positioned to engage with the inclined deflecting-surface of the said female body-member to be forced inwardly thereby into gripping engagement with the periphery of a tube, the said tube-gripping band also having upon its exterior a stop-projection which is normally rigid therewith but displaceable with respect thereto, the said stop-projection being located for engagement with the stop-abutment of the said male body-member prior to the cooperation of the flare-gripping seat of the said band with the flare-gripping seat of the said male body-member; the relative resistances to displacement of the gripping-means and the stop-projection of the said tube-gripping band being such that the said gripping-means will be deflected into gripping en-

gagement with a tube before the said stop-projection is displaced.

4. A combined tube-connector and tube-flarer, including in combination: a male body-member provided with external threads for engagement with the internal threads of the hereinafter-mentioned female body-member, said male body-member being formed with a longitudinal passage and with an inclined flare-gripping seat surrounding the said passage, the said male body-member also being provided with a stop-abutment facing toward and positioned for engagement by the stop-projection of the hereinafter-mentioned tube-gripping band; a female body-member provided with internal threads for engagement with the external threads of the said male body-member, the said female body-member being formed with a tube-receiving passage and with an inclined deflecting-surface around the said passage and inclined in the same general direction as the flare-gripping seat of the said male body-member; and a tube-gripping band adapted to fit upon the end-portion of a tube and having an inclined flare-gripping seat complementing and adapted to cooperate with the flare-gripping seat in the male body-member, the said tube-gripping band also having at its end opposite its said seat inwardly-bendable gripping-means positioned to engage with the inclined deflecting-surface of the said female body-member to be forced inwardly thereby into gripping engagement with the periphery of a tube, the said tube-gripping band also having upon its exterior a stop-projection which is normally rigid therewith but displaceable with respect thereto, the said stop-projection being located for engagement with the stop-abutment of the said male body-member prior to the cooperation of the flare-gripping seat of the said band with the flare-gripping seat of the said male body-member; the relative resistances to displacement of the gripping-means at the end of the said tube-gripping band and the stop-projection on the said band being such that the said gripping-means will be deflected into gripping engagement with a tube before the said stop-projection is displaced.

5. A combined tube-connector and tube-flarer, including in combination: a male body-member provided with external threads for engagement with the internal threads of the hereinafter-mentioned female body-member, said male body-member being formed with a longitudinal passage

and with an inclined flare-gripping seat surrounding the said passage, the said male body-member also being provided with a stop-abutment facing toward and positioned for engagement by the stop-projection of the hereinafter-mentioned tube-gripping band; a female body-member provided with internal threads for engagement with the external threads of the said male body-member, the said female body-member being formed with a tube-receiving passage and with an inclined deflecting-surface around the said passage and inclined in the same general direction as the flare-gripping seat of the said male body-member; and a tube-gripping band adapted to fit upon the end-portion of a tube and having an inclined flare-gripping seat complementing and adapted to cooperate with the flare-gripping seat in the male body-member, the said tube-gripping band also having at its end opposite its said seat an inwardly-bendable gripping-flange positioned to engage with the inclined deflecting-surface of the said female body-member to be bent inwardly thereby into gripping engagement with the periphery of a tube, the said tube-gripping band also having upon its exterior a stop-projection which is normally rigid therewith but displaceable with respect thereto, the said stop-projection being located for engagement with the stop-abutment of the said male body-member prior to the cooperation of the flare-gripping seat of the said band with the flare-gripping seat of the said male body-member; the relative resistances to displacement of the gripping-flange and the stop-projection of the said tube-gripping band being such that the said gripping-flange will be bent into gripping engagement with a tube before the said stop-projection is displaced.

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