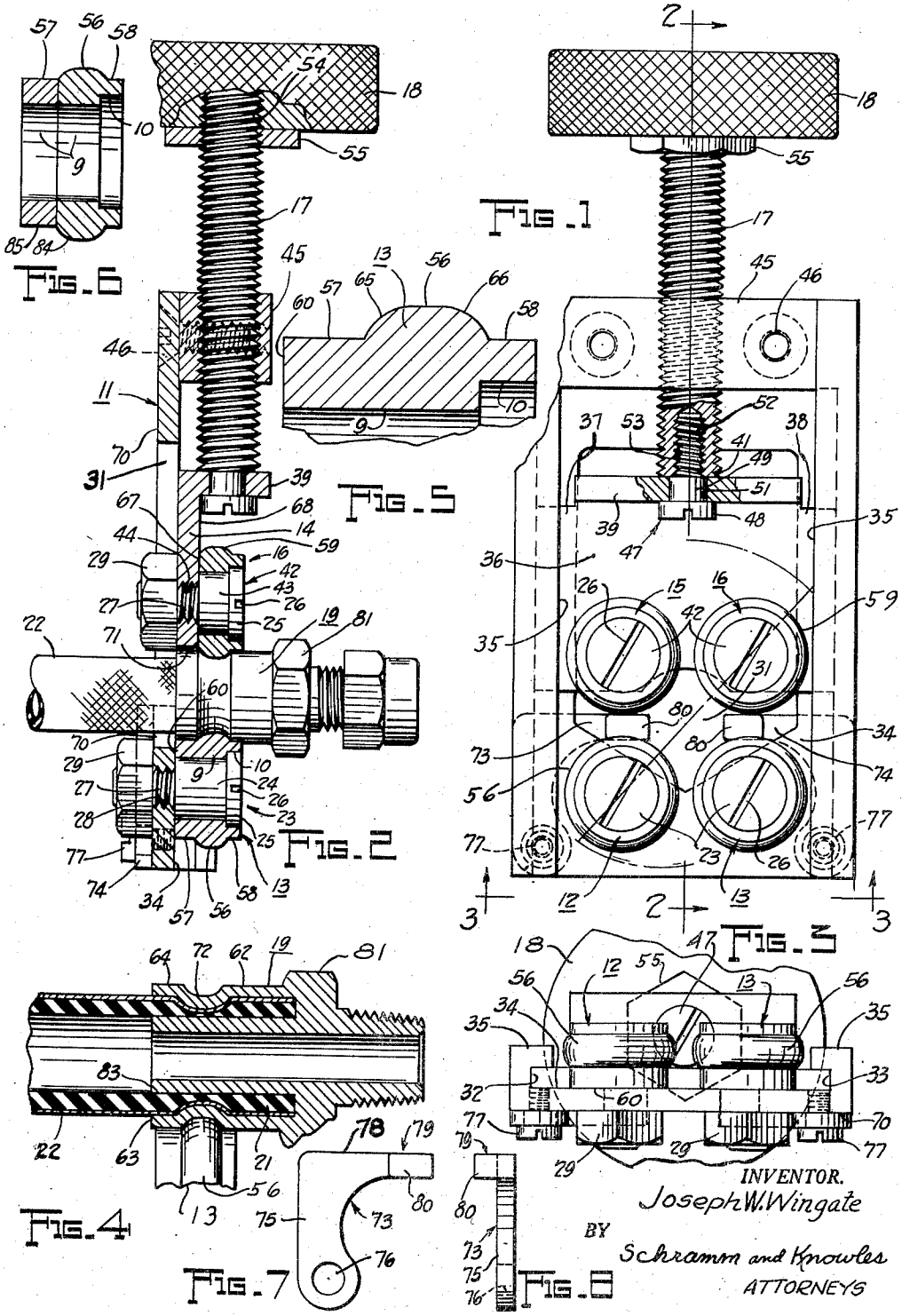
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CRIMPING TOOL FOR TUBE FITTINGS

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CRIMPING TOOL FOR TUBE FITTINGS

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The present invention relates to tools for crimping metal tube fittings to secure the fittings to flexible tubing such as rubber and composition air hose and the like and to make a fluid-tight joint between the tubing and the fitting.

An object of the invention is to provide a sturdy, durable, adjustable crimping tool which may be operated easily and manufactured inexpensively.

A further object of the invention is to avoid kinking of the flexible hosing or other tubing to which the fitting is attached without permitting the skirt of the fitting to flare.

Still another object of the invention is to locate the crimp formed in the fitting accurately with respect to the longitudinal dimensions of the fittings so that an adequate length of skirt will be formed while insuring that the tubing attached to the fitting is securely clamped and at a sufficient distance from the end thereof.

Other and further objects, features and advantages of the invention will become apparent as the description proceeds.

In carrying out the invention in accordance with a preferred form thereof, a rectangular base-plate is employed of oblong shape, approximately twice as long as wide, with a central cutaway portion. Inwardly directed channels are formed along two sides of the front surface of the base-plate and a crosshead is provided with edges slidably fitting in the channels.

Crimping rollers are mounted at one end of the base-plate. A crimping roller unit consisting of one or two crimping rollers is also mounted on the crosshead so that the tool may be rotated around the tube fitting and the crimping rollers may be forced into engagement with the lateral surface of the tube fitting by rotation of an adjusting screw provided for adjusting the crosshead.

A better understanding of the invention will be afforded by the following detailed description considered in conjunction with the accompanying drawing, in which:

Fig. 1 is a plan view of a crimping tool forming an embodiment of the invention.

Fig. 2 is a view of a longitudinal section represented as cut by a broken plane 2—2 indicated in Fig. 1.

Fig. 3 is an end view of the apparatus of Figs. 1 and 2 as seen from the end away from the adjusting handle.

Fig. 4 is a fragmentary enlarged view in longitudinal section of the apparatus showing a fitting which has been attached to the end of a length of tubing and showing a portion of one of the crimping rollers.

Fig. 5 is a fragmentary longitudinal sectional view of one of the crimping rollers.

Fig. 6 is a view of the longitudinal section of a modified crimping roller arrangement.

Fig. 7 is a detail plan view of a swinging locating member, and

Fig. 8 is an elevation of the locating member.

Like reference characters are utilized throughout the drawings to designate like parts.

In the form of crimping tool illustrated there is a rectangular or oblong base-plate 11 approximately twice as long as wide with a pair of crown, crimping rollers 12 and 13 rotatably secured to one end of the base-plate, and a slidable crosshead 14 which in turn carries a crimping roller unit consisting in the arrangement illustrated of a pair of crown, crimping rollers 15 and 16 rotatably mounted on the crosshead 14. It will be understood, however, that the invention is not limited thereto and if desired the crimping roller means carried by the crosshead 14 slidable on the base-plate 11 may consist of a single roller instead of two.

There is an adjusting screw 17 with a knurled knob or handle 18 for either backing off the crosshead 14 or moving it toward the end of the base-plate 11 carrying the crimping rollers 12 and 13 for forcing the rollers against the lateral surface of a threaded tube fitting 19 in order to crimp the fitting 19 around the end 21 of a length of tubing 22 for securing the fitting 19 to the tubing 22 and making a fluid-tight joint for enabling threaded connections to be made to flexible tubing or hose, carrying gases or liquids.

For rotatably securing the fixed crimping rollers 12 and 13 at the end of the base-plate 11, flat-head shoulder screws 23 are provided each having a head consisting of a cylindrical portion 24 and a flange or shoulder 25 with an eye or slot 26 for receiving a screw driver and a threaded shank 27 extending through one of two openings 28 in the plate 11 and secured to the plate 11 by nuts 29. The rollers 12 and 13 each has a bore 9 and a counter bore 10 of such size as to form a free running fit with the head portions 24 and 25 of one of the screws 23 so that the heads of the screws 23 serve as journals for the rollers 12 and 13. It will be observed that the central portion of the base-plate 11 is cut away to leave an elongated, substantially six-sided opening 31 for permitting tube fittings 19 and lengths of tubing or flexible hosing 22 to be passed through the opening 31.

In order that the crosshead 14 may be accurately mounted on the plate 11 for longitudinal sliding movement thereon and without warping or twisting in angular relationship thereto, the base-plate 11 is formed with confronting channels 32 and 33 at the sides thereof extending along the front surface 34 of the base-plate 11. The channels 32 and 33 are formed by overhanging ledges 35.

For slidable mounting in the channels 32 and 33, the crosshead 14 is formed as a plate 36 with edges 37 and 38 of such width and thickness as to form a sliding fit in the channels 32 and 33. Preferably a transversely extending bracket 39 is also formed on the plate 36 of the crosshead 14 for cooperation with end 41 of the adjusting screw 17.

For securing the crimping rollers 15 and 16 to the crosshead 14, shoulder screws 42 are provided somewhat similar to the screws 23 but having shallower cylindrical head portions 43. One or two openings 44 are provided in the crosshead plate 36, according to whether one or two crimping rollers are used on the crosshead, to receive the threaded shank 27 and to permit the screw 42 to be secured by the nut 29.

The adjusting screw 17 is mounted at the end of the base-plate 11 away from the rollers 12 and 13. For this purpose a suitable crossblock 45 may be formed in the base-plate 11, or as illustrated, preferably a separate crossblock is provided secured to the base-plate 11 by flathead screws 46.

For enabling the adjusting screw 17 to back off the crosshead 14 a shoulder screw 47 is provided having a flange or shoulder portion 48 and a neck or journal portion 49 adapted to fit loosely in an opening 51 in the bracket 39 of the crosshead 14. The screw 47 has a threaded shank

52 threaded into a threaded axial socket 53 in the end 41 of the screw 17. Left-handed threads may be employed to avoid loosening the screw 47. The head or handle 18 is secured to the screw 17 in any desired manner as by means of a threaded socket 54 and a lock nut 55.

It will be observed that each of the crimping rollers 12 and 13, which are mounted on the base-plate 11, and therefore may be referred to as stationary crimping rollers, is a crown roller having a crown or bulging portion 56 between two cylindrical portions 57 and 58, the latter of slightly greater diameter, say about .005" to about .015" greater diameter, preferably of the order of about .010" greater diameter than the former. The cylindrical portion 57 toward and seated with its end face 60 against the front surface 34 of the plate 11 serves as a neck or collar for confining the skirt of the fitting during crimping. In the arrangement illustrated, the neck 57 has somewhat greater axial length than the cylindrical portion 58.

The crowned crimping roller means 15, 16 on the crosshead 14, which move laterally with the crosshead 14 and may therefore be referred to as movable crimping roller means, also comprise crown rollers, each with a crown or bulging portion 59 corresponding in shape and size to the crowns 56 of the rollers 12 and 13, and a cylindrical portion 61 corresponding in length and diameter to the cylindrical portion 58 of the stationary crimping rollers 12 and 13. However, no portion corresponding to the cylindrical portion 57 of the crimping rollers 12 and 13 is needed and end faces 67 of the crosshead rollers 15 and 16 seat against front surface 68 of the crosshead. The plate portion 36 of the crosshead 14 serves as a spacer and provides the requisite axial displacement of the crowns 59 of the movable rollers 12 and 13 so that the crimping roller crowns 56 and 59 are the same distance from the front surface 34 of the base-plate 11 and are symmetric with respect to a common plane of rotation which is also the rotational plane of the fixed rollers 12, 13.

The relationship between the diameters of the roller portions 56 and 58 and likewise the roller portions 59 and 61 is such that the fitting 19 will be crimped to the desired extent with the cylindrical portions 58 and 61 of the crimping rollers bearing against the external lateral surface 62 of the tubular fitting 19. However, those dimensions of the rollers which are toward the surface 34 of the base-plate 11 from the plane of the crests of the roller crowns are preferably relieved in order to avoid kinking, cutting, notching or otherwise weakening the portion of the surface of the flexible hose or other tubing 22 where the end 63 of the skirt 64 of the fitting 19 bears against the tubing 22. Nevertheless the cylindrical collar or neck 57 is provided on each of the fixed rollers 12 and 13 and the relationship between the dimensions of the various portions of the crimping rollers are such as to avoid flaring of the skirt 64 of the fitting 19.

Preferably the diameter of the flare preventing neck 57 of the rollers 12 and 13 is less than the diameter of the cylindrical portions 58 and 61 of the rollers 12, 13, 15 and 16. Moreover, the radius of the part 65 of the crown 56 (or 59) of the crimping rollers 12, 13 (15 and 16) as identified for sake of illustration in Fig. 5, which crown part is toward the baseplate 11 and, therefore, toward the open end of the skirt 64 of the fitting, is relieved with respect to the radius of other part 66 of the crown 56 (or 59). The radii of the longitudinal section as illustrated in Figs. 2 and 5 may be made different in the curves defining the crown parts 65 and 66. For example, the radius of the crown part 65 is preferably greater than the radius of the crown part 66. The surface curvatures of the crowns 56 and 59 of the crimping rollers 12, 13, 15 and 16, independently of the different diameters of the cylindrical portions 57, 58 and 61 of these rollers, provide certain reliefs which tend to avoid kinking of tubing by the end 63 of the skirt 64 of the fitting 19 and promote avoidance of flare of the skirt 64.

The distance between lower edge 71 of the crosshead

14 and the axis of the threaded screw shank 27 is preferably less than the radius of the cylindrical necks 57 of the stationary crimping rollers 12 and 13 in order that the principal radial pressure contact between the skirt 64 and the parts of the crimping tool will be with the neck portions 57 of the crimping rollers 12 and 13, thus avoiding frictional engagement between the skirt 64 and the edge 71 of the crosshead 14. However, the edge 71 of the crosshead 14 may be employed if desired for confining the skirt 64 of the fitting 19.

In utilizing the crimping tool, the tubing 22 is first inserted into the fitting 19, preferably bringing the parts into the opening 31 in the base-plate 11 and the end 63 of the skirt 64 is brought flush with the front face 34 of the plate 11 in order that a crimp 72 will be formed in the fitting 19 at a desired uniform distance from the end 63 of the skirt 64. For accomplishing such uniform location, locating stop members 73 and 74 are provided which are pivotally mounted at the same end of the base-plate 11 as the stationary crimping rollers 12 and 13 at the corners of the base-plate 11 as illustrated in Fig. 1.

The locating stop members 73 and 74 are in the form of angle members each having an arm 75 (Fig. 7) with a hole 76 therein to receive a pivot in the form of a shoulder head mounting screw 77 threaded in the base-plate 11. There is a second arm 78 formed with a transversely extending block portion 79 adapted to extend transversely into the cutaway portion or opening 31 in the base-block 11. It will be observed that the angle members or arms 73 and 74 slide along back surface 70 of the base-plate 11 as they pivot around the pivot screws 77 while the block portions 79 extend toward the front surface 34 of the base-plate 11 and are of such dimensions that their faces 80 lie in the same plane as the front surface 34 of the base-plate 11.

Preparatory to crimping a fitting and uniting it with a length of tube 22, the fitting 19 is secured at a suitable location as on a bench by means of a vise or preferably by using a jig mounted in an opening in the top of the bench adapted to receive a hexagonal nut portion 81 of the fitting 19 loosely to prevent its rotation. With the crosshead 14 of the tool backed off by reverse rotation of the handle 18, the tool is then placed around the fitting 19 with the front face 34 of the base-plate 11 toward the nut portion 81 of the fitting and with the locating stop members 73 and 74 in the position shown in Fig. 1. The tool then rests on the edge 63 of the fitting 19 with the surfaces 80 of the stop members 73 and 74 serving as stops resting on the fitting end 63 and fixing the location of the crowns 56 and 59 of the crimping rollers with respect to the skirt of the fitting 19.

The movable crimping rollers 15 and 16 are then brought into position by advancing the crosshead 14 by means of the adjusting screw handle 18. The end of the length of hose or other tubing 22 is then inserted in the fitting 19 around its central core 83. The tool is thereafter rotated around the axis of the fitting 19 while progressively drawing in the movable crimping rollers 15 and 16 by further rotation of the handle 18 of the adjusting screw 17 around the axis of the adjusting screw 17, while also revolving the tool bodily by means of its handle 18 around the axis of the fitting 19. When the fitting 19 has been fully crimped by producing the conformation illustrated in Fig. 4, the crosshead 14 is backed off by reversing the rotation of the handle 18 and the locating arms 73 and 74 are swung outward so as to clear the tubing 22 and the fitting 19 whereupon the tubing 22 and the fitting 19, which has been attached to it may be lifted out from the bench and the jig holding the nut portion 81 of the fitting 19, after which the same procedure may be repeated with another fitting and length of tubing.

The crimping rollers 12, 13, 15 and 16 are so mounted that the bulging portions or crowns 56 and 59 are all the same distance from the surface 34 of the base-plate 11

and means are provided for retaining the skirt **64** of the fitting **19** without flaring. However, the invention is not limited to the specific structure described nor to the neck or collar **57** being integral with the crown **56**. For example, as illustrated in Fig. 6, a separate crown roller **84** and collar **85** may be provided, both rotatable upon the head of the shoulder screw **23**. In this manner the stationary crown rollers **84** and the movable crown rollers **42** are identical and the stocking of parts for replacement is simplified.

The ledges **35** overhanging the channels **32** and **33** extend further in the direction perpendicular to the surface **34** of the base-plate **11** than the middle of any of the crowns **56** or **59** of the crown crimping rollers so that rigid support of the crimping rollers is provided, assuring constancy of the spacing of the crimp **72** from the end of each fitting and assuring that the axes of the crimping rollers will remain parallel to each other and perpendicular to the base-plate **11**.

In accordance with the patent statutes the principles of the present invention may be utilized in various ways, numerous modifications and alterations being contemplated, substitution of parts and changes in construction being resorted to as desired, it being understood that the embodiments shown in the drawings and described above are given merely for purposes of explanation and illustration without intending to limit the scope of the claims to the specific details disclosed.

What I claim and desire to secure by Letters Patent of the United States is:

1. A crimping tool for tube fittings comprising in combination a substantially rectangular base plate having a central cut away portion providing a through opening for receiving a tube fitting, the base plate having first and second ends each spaced from the cut away portion, front and back surfaces, and inwardly directed channels along two sides of the base plate on the front surface, a crosshead having edges slidably fitting in said channels, crimping roller means mounted on the crosshead symmetrical with respect to the crosshead and the base plate, crimping roller means mounted on the base plate at the first end symmetrical with respect to the base plate, whereby the roller means mounted on the base plate and the roller means mounted on the crosshead are symmetrical with respect to each other, one of said base plate and crosshead crimping roller means comprising circular toroidally curved crown means and a coaxial cylindrical means for confining the skirt of a received tube fitting during a crimping operation, the circular crown having an axial length greater than its radial extent outwardly of the cylindrical surface generated by the cylindrical skirt confining means, a block at the second end of the base plate, said block having a threaded opening therein the axis of which is longitudinal with respect to the base plate, an adjusting screw threaded through the block opening and at one end rotatably secured to the crosshead, whereby the crimping roller means carried by the crosshead may be forced relatively toward the crimping roller means carried by the base plate to clamp therebetween a tube fitting received in the through opening of the base plate and whereby the crosshead crimping roller means may be backed off after crimping such tube fitting, the symmetrically mounted roller means on the base plate coacting with the symmetrically mounted roller means on the crosshead to locate the received tube fitting in predetermined position centrally in the base plate opening and clear of the walls of such opening and to retain such fitting in such central position as the tool is relatively rotated about the fitting in a crimping operation, and the cylindrical skirt confining means being held against the skirt of a crimped tube fitting during such relative rotation of the crimping roller means of the crosshead and of the base plate about the tube fitting whereby to prevent flaring of such skirt.

2. A crimping tool as in claim 1 wherein the crimping roller means carried by the crosshead comprises a first pair of crimping rollers and the crimping roller means on the base plate comprises a second pair of crimping rollers.

3. A crimping tool as in claim 1 wherein the crimping roller means on the base-plate has a substantially cylindrical neck portion and a bulging crown portion of greater radius with respect to the axis of the crimping roller means than the cylindrical neck portion and conforming substantially to a portion of a toroidal surface, the radius of the longitudinal section of the crimping roller means in the bulging portion being relieved toward said cylindrical portion of the roller means to avoid flaring of the end of the fitting.

4. A crimping tool for tube fittings, as in claim 1, wherein the crimping roller means on the base-plate has first and second cylindrical portions and a bulging crown portion of greater radius in between the cylindrical portions, serving to crimp the fitting, the first cylindrical portion toward the base-plate serving to confine the skirt at the end of the fitting and the second cylindrical portion serving to fit against the uncrimped portion of the fitting adjacent to the crimped portion on the opposite side from the skirt, and the crimping roller means on the crosshead has a bulging crown portion corresponding to the crown portion of the crimping roller means on the base-plate, and a cylindrical portion corresponding to the second cylindrical portion of the roller means on the base-plate.

5. A crimping tool as in claim 4 wherein the radius of the second cylindrical portion of the crimping roller means on the base-plate exceeds the radius of the first cylindrical portion for confining the fitting skirt, whereby the skirt of the fitting is effectively confined without flaring thereof or kinking of tubing in the fitting, the crimping roller means on the crosshead having a bulging crown portion conforming in shape and dimension to the bulging crown portion of the crimping roller means on the base-plate.

6. Apparatus as in claim 5 wherein the radius of the bulging crown portions of the crimping roller means are relieved toward the base-plate and the crosshead for promoting avoidance of flare of the skirt of the fitting being crimped.

7. A crimping tool for tube fittings comprising in combination a base-plate, first crimping roller means symmetrically mounted on the base-plate with axes perpendicular to the plane of the base-plate, a crosshead slidable on the base-plate and carrying second crimping roller means adapted to cooperate with the first crimping roller means, means for adjusting the position of the crosshead, swinging stop members adapted to be brought into position between the first crimping roller means and the crosshead crimping roller means for locating a tube fitting and adapted to be swung away from said position for releasing a tube fitting, said crimping roller means having bulging crown portions with peripheries adapted to contact the periphery of a tube fitting to be crimped for producing a crimp therein with the radius of the bulging crown portion being greater at one end than at the other end, one of said crimping roller means being provided with means adjacent the small radius portion of the crown thereof for confining the skirt of the tube fitting to be crimped and avoiding flare thereof.

8. A crimping tool for tube fittings comprising in combination a base-plate, first crimping roller means symmetrically mounted on the base-plate with axes perpendicular to the plane of the base-plate, a crosshead slidable on the base-plate and carrying second crimping roller means adapted to cooperate with the first crimping roller means, said crimping roller means having bulging crown portions with peripheries adapted to contact the periphery of a tube fitting to be crimped for producing a crimp therein with the radius of the bulging crown portion of the crimping roller means being greater at one end than at the other end, one of said crimping roller means com-

prising a pair of crimping rollers and one of the crimping roller means being provided with means adjacent the crown portion for confining the skirt of the tube fitting to be crimped and avoiding flare thereof.

9. A crimping tool for tube fittings comprising in combination a base-plate having a central cutaway portion, first and second ends beyond the cutaway portion, front and back surfaces, and inwardly directed channels along two sides of the base-plate on the front surface, a crosshead having edges slidably fitting in said channels, a pair of crimping rollers rotatably mounted on said base-plate at the first end thereof, crimping roller means rotatably mounted on said crosshead, said crimping rollers and crimping roller means including crowns, a crossblock at the second end of said base-plate, said crossblock having a threaded opening therein with an axis longitudinal with respect to said base-plate, an adjusting screw threaded into said threaded opening, rotatably secured to said crosshead whereby, when the tool is rotated around a tube fitting, the crimping roller means carried by the crosshead may be forced toward the said pair of crimping rollers on the base-plate and against the tube fitting to be crimped, and may be backed off when the crimping has been accomplished, said inwardly directed channels being formed by overhanging ledge portions extending from the front surface of the base-plate in a direction perpendicular thereto further than the distance from the front surface of the base-plate to the middle of the said crowns of the crimping rollers.

10. A crimping tool for tube fittings comprising in combination a base plate having a central through opening to receive a tube fitting to be crimped, said base plate having means defining a pair of spaced parallel channels disposed on opposite sides of the through opening in confronting relation to one another, crimping roller means rotatably mounted on the base plate intermediate the channels in overhanging relation to the through opening, a crosshead carried by the base plate and guided in the channels for rectilinear sliding movement across the through opening toward and away from the crimping roller means, crimping roller means rotatably mounted on the crosshead and overhanging the crosshead and the through opening for engaging a tube fitting disposed in such opening, the roller means on the base plate comprising a circular radially projecting crown, the roller means on the crosshead also comprising a circular radially projecting crown, the radial crowns of the base plate and crosshead roller means being disposed in a common plane, one of said roller means also comprising a substantially cylindrical element coaxial to and of less diameter than the circular crown of the corresponding roller means, said cylindrical element being engageable with the skirt of a tube fitting being crimped between the roller means of the base plate and of the crosshead in a normal crimping operation to confine such skirt and prevent flaring thereof during the crimping operation, operating means connecting the crosshead to the base plate, said operating means being actuatable in one direction for advancing the crosshead toward the crimping roller means on the base plate for clamping between the base plate crimping roller means and the crosshead crimping roller means a tube fitting disposed in the through opening, and said operating means being actuatable in a reverse direction to withdraw the crosshead in releasing a crimped tube fitting.

11. A crimping tool for tube fittings comprising in combination a base plate having a central through opening to receive a tube fitting to be crimped, said base plate having means defining a pair of spaced parallel channels disposed on opposite sides of the through opening in confronting relation to one another, the through opening being located wholly within the limits established by the ends of the channels, crimping roller means rotatably mounted on the base plate intermediate the channels in overhanging relation to the through opening, a crosshead carried by the base plate and guided in the channels for rectilinear sliding movement across the through opening toward and away from the crimping roller means, crimping roller means rotatably mounted on the crosshead and overhanging the crosshead and the through opening for engaging a tube fitting disposed in such opening, the roller means on the base plate comprising a circular radially projecting crown, the roller means on the crosshead also comprising a circular radially projecting crown, the radial crowns of the base plate and crosshead roller means being disposed in a common plane, one of said roller means also comprising a substantially cylindrical element coaxial to and of less diameter than the circular crown of the corresponding roller means, said cylindrical element being engageable with the skirt of a tube fitting being crimped between the roller means of the base plate and of the crosshead in a normal crimping operation to confine such skirt and prevent flaring thereof during the crimping operation, operating means connecting the crosshead to the base plate, said operating means being actuatable in one direction for advancing the crosshead toward the crimping roller means on the base plate for clamping between the base plate crimping roller means and the crosshead crimping roller means a tube fitting disposed in the through opening, and said operating means being actuatable in a reverse direction to withdraw the crosshead in releasing a crimped tube fitting.

12. In a tool for crimping a tube fitting having a thin walled substantially cylindrical skirt, the tool being of the type in which the tube fitting is clamped between crowned roller means and relatively rotated so that the fitting skirt is progressively deformed radially inwardly in the formation of an annular groove about the skirt to grip an internal tube, the improvement which comprises a crimping roller having a circular toroidally curved crown and a pair of substantially cylindrical control sections disposed one on each side of and contiguous to the crown, said control sections being coaxial to one another and to the crown and being of less diameter than the crown, the crown being relatively shallow radially and having an axial length between the cylindrical sections about twice its radial height as measured outwardly of the cylindrical surface generated by either control section, whereby in a normal crimping operation the crown of the roller is received to its full effective radial depth in said groove in the skirt of the tube fitting and the portions of the skirt on each side of such groove are confined by the cylindrical control sections of the roller, and one of said cylindrical control sections being of slightly greater curvature radius than the other whereby to effect a relatively tighter grip on the cylindrical skirt of a tube fitting being crimped.

13. In a tool for crimping a tube fitting having a thin walled substantially cylindrical skirt, the tool being of the type in which the tube fitting is clamped between crowned roller means and relatively rotated so that the fitting skirt is progressively deformed radially inwardly in the formation of an annular groove about the skirt to grip an internal tube, the improvement which comprises a crimping roller having a circular toroidally curved crown and a pair of substantially cylindrical control sections disposed one on each side of and contiguous to the crown, said control sections being coaxial to one another and to the crown and being of less diameter than the crown, the crown being relatively shallow radially and having an axial length between the cylindrical sections about twice its radial height as measured outwardly of the cylindrical surface generated by either control section, whereby in a normal crimping operation the crown of the roller is received to its full effective radial depth in said groove in the skirt of the tube fitting and the portions of the skirt on each side of such groove are confined by the cylindrical control sections of the roller, one of said cylindrical control sections being of greater axial length than the other, and one of said cylindrical control sec-

tions being of slightly greater curvature radius than the other whereby to effect a relatively tighter grip on the cylindrical skirt of a tube fitting being crimped.

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