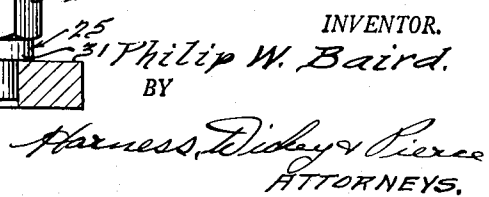


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TUBE FLARING TOOL

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2 Claims. (Cl. 153—79)

This invention relates to a tube flaring tool and more particularly to a tool for simultaneously flaring tubing on two opposed nuts to form a flare nut union, which tool is adapted to operate with a plurality of sizes of nuts and tubing to form flare nut unions of various sizes.

It is an object of this invention to provide a flaring tool of the aforementioned type which is adapted for use in flaring various sized pieces of tubing onto various sized nuts, so as to provide a complete tool by means of which a mechanic can form flare nut unions of various conventional sizes used, for example, in refrigeration installation and repair work.

It is a still further object of this invention to provide a tool of the aforementioned type, which is relatively compact and simple to use and relatively inexpensive to manufacture.

It is a still further object of this invention to provide a tool of the aforementioned type which will readily produce a flare nut union wherein the two nuts are disposed in a closely spaced, back-to-back relationship, so that a conventional clamp type flaring tool can not be used.

It is a still further object of this invention to provide a tool of the aforementioned type which will flare both ends of a piece of tubing into engagement with the opposed nuts, simultaneously.

These and other objects of this invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a side elevational view of the tool of this invention, with parts broken away in section for purposes of clarity;

Fig. 2 is a sectional view of the structure illustrated in Figure 1, taken along the line 2—2 thereof and illustrating the position of the parts after the flare union has been completed;

Fig. 3 is a view similar to Fig. 2, illustrating the position of the parts just prior to the flaring operation; and

Fig. 4 is a view similar to Figure 1, showing a further embodiment of the invention.

Referring now to the drawing, it will be seen that the tool of this invention includes a base plate 5 having a pair of upwardly extending dowel pins 7 and 9, rigidly connected therewith in any suitable manner. The upper ends of the dowel pins are reduced in diameter at 11 to provide shoulders 13 which are adapted to support an upper plate member 15 having apertures 17 therein in which the reduced dowel pin upper ends 11 are slidably and removably receivable. The dowel pins 7 and 9 act, therefore, as means for releasably retaining and maintaining the upper plate 15 in a predetermined alignment and arrangement relative to the base plate 5.

A plurality of flare pins or post elements 19, 21, 23 and 25 are rigidly connected with the base plate 5 in any suitable manner and project upwardly therefrom. Each of the flare pins 19 includes an enlarged portion 27, over which a nut 29 is insertable. The flare pins 19, 21, 23, and 25 are of different diameters to accommodate nuts and tubing of correspondingly different sizes and are illus-

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trated as being of sizes to flare $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{8}$ " tubing. The lower end of a nut inserted over a flare pin rests either on the top surface of the base plate 5, if flare pin 19 is used, or on the top surface of a flange or shoulder 31 formed on the flare pin elements 21, 23 and 25, adjacent the top surface of the base plate 5, when the latter flare pins are used. The flange or shoulder portions 31 are provided on pins 21, 23 and 25, as distinguished from merely using the top surface of the base plate as an abutment or support for the nuts, for reasons which will hereinafter appear. Each of the flare pins has its upper end reduced to provide a projection 33 thereon, over which projection one end of a piece of tubing 35 is adapted to be inserted. The lower end of each projection 33 is joined with the upper end of its enlarged portion 27, by an annular arcuate shoulder 36, which is adapted to engage the tubing and flare the same into engagement with a flare seat or shoulder 37 in the nut 29 when the tubing is forced against the shoulder, as will be hereinafter brought out.

A plurality of flare pins 19', 21', 23' and 25' are connected with the upper plate member 15 in vertical alignment with the lower flare pins 19, 21, 23 and 25 respectively. Each of the upper flare pins is constructed in substantially the same manner as the lower flare pins, so that they are provided with enlarged portions 27', adapted to be slidably received in the upper end of a correspondingly sized second nut 41, which is inserted over the upper end of the tubing 35 and abuts the upper end of the lower nut 29. The nuts 41 and 29 are disposed in an opposed back-to-back relationship and the upper end of the tubing 35 is adapted to be flared into engagement with a flare seat or shoulder 43 in the nut 41. The upper flare pins are provided with a projection 33' on the lower end thereof, which corresponds to the projection 33 on the lower flare pin and with a flare surface or shoulder 36' which corresponds to the shoulder 36 previously described. In the embodiment illustrated in Fig. 1, the upper flare pins extend slidably through apertures 45 in the upper plate member 15, so as to be movable relative thereto. Annular shoulders or snap rings 47 are provided on the upper flare pins adjacent the upper end thereof, to prevent the pins from dropping downwardly through the apertures 45 when the upper plate member is disassembled and removed from the dowel pins 7 and 9 and the base plate 5. The upper flare pins 21' and 23' because their enlarged portions 27' are not larger than the apertures 45, are provided with shoulders 47, which prevent them from being pulled upwardly through the plate apertures 45 and out of engagement therewith.

When it is desired to form a flare nut union, wherein the nuts 29 and 41 are disposed in a back-to-back relationship with only a small distance between the opposed nut faces so that an ordinary clamp type flare tool can not be used, the tool of this invention is especially adapted for use. In order to form a flare nut union the upper plate 15 is removed from its dowel pins 7 and 9 and out of interfering relationship with the lower base plate 5 and its flare pins. A nut 29 is then inserted over a lower flare pin of corresponding size. A piece of tubing 35 is then dropped over the projection 33 of the particular flare pin used, so that the lower end of the piece of tubing engages the shoulder or flare surface 36 adjacent the bottom of the projection and the tubing is disposed within the upper end of the nut 29. The upper nut 41 is then inserted over the upper end of the tubing and will abut the upper end of the lower nut 29. The upper plate 15 is then positioned over the upper ends of the dowel pins 7 and 9, so as to bring the upper flare pins into alignment with the lower flare pins. The top of the upper flare pin being used is then struck with an impact imparting device such as a hammer, or the upper flare pin is forced toward the lower flare pin, such as by

a vise or the like, whereupon the downward movement of the upper flare pin will flare the upper end of the tubing into engagement with the upper nut 41 and will force the tubing downwardly against the lower flare pin shoulder 36 to cause the lower end of the piece of tubing to flare into engagement with the lower nut 29. The flare pins are so spaced relative to each other that the upper flare pin is forced downwardly until it engages the upper end of its corresponding lower flare pin, at which time the flare will be completed on the opposite ends of the tubing, but the nuts will not be jammed or forced into engagement with each other so that they cannot turn easily on the tubing. In other words, as the nuts of any particular diameter or size are of a predetermined length, and as the relationship between the upper and lower flare pins is predetermined, the nuts will not become jammed on the tubing so as to be nonrotative after the flaring operation. The nut supporting flanges 31, on lower flare pins 21, 23 and 25 act to properly space the nuts relative to the flare pins so that the flares will be properly formed without jamming the nuts. The use of such a flange on the largest flare pin 19, was not found to be necessary because of the size of the nut. It will, of course, also be appreciated that if desired all of the flare pins could be used at one time to form different sized flare nut unions, but in any event the tool simultaneously flares the tubing on the two opposite nuts to form the flare nut union in a simple and efficient manner.

The tool illustrated in Fig. 4 is identical with the tool illustrated in Figs. 1-3 and previously described, with the exception that the upper flare pins 19', 21', 23' and 25' are rigidly connected with the upper plate member 15 instead of being movable relative thereto, as in the previous embodiment. This tool is used in substantially the same manner as that previously described except, instead of striking or moving each pin individually, the top plate is struck by an impact imparting tool adjacent the pin being used to form the flare nut union, or the device is placed in a vise and the upper plate moved or forced toward the lower base plate. Again the flare pins are dimensioned and arranged relative to each other to properly form the flare nut union without damaging the nuts on the tubing.

It will thus be seen that with either tool of this invention flare nut unions can be easily formed to provide a flare nut union wherein the nuts are disposed in an almost abutting back-to-back relationship, and it will furthermore be appreciated that this tool provides a mechanic or user with a plurality of flare pins which will accommodate and form flare unions of conventional sizes used in, for example, refrigeration work wherein such flare nut unions are often employed. Furthermore, it will be appreciated that the tool of this invention is simple to use, relatively inexpensive to manufacture and very compact in nature.

What is claimed is:

1. A portable tool for simultaneously flaring tubing on two opposed, closely spaced nuts to form a flared nut union, including, in combination, a base, a first post connected with said base and projecting upwardly therefrom over which a nut is slidably receivable, a reduced projection on the upper end of said first post adapted to hold one end of a piece of tubing inserted thereover and joining

with the adjacent enlarged portion of said first post to provide a tube flaring shoulder, an upper plate member, a second post connected with said upper plate member, adapted to be slidably receivable in a second nut inserted over said tubing and resting on said first nut, means releasably interconnecting said base and plate members for maintaining said first and second posts in an opposed aligned relationship to each other, said second post having a reduced projection on the lower end thereof adapted to fit into the opposite end of the tubing and joining its adjacent enlarged post portion to provide a tube flaring shoulder so that when said second post is moved toward said first post said post shoulders will simultaneously flare the opposite ends of said tube into engagement with said nuts to provide a flare nut union, and means for limiting the travel of said second post whereby said nuts are free to rotate relative to said tubing when the opposite ends of said tubing are flared into engagement with said nuts.

2. A portable tool for simultaneously flaring tubing on two opposed, closely spaced nuts to form a flare nut union, including, in combination, a first upstanding element over which a nut is slidably receivable, said element including a reduced projection on the upper end thereof, over which one end of a piece of tubing is insertable, an arcuate shoulder joining the lower end of said projection and the adjacent enlarged portion of said element, adapted to flare said one end of said tubing when said tubing is forced thereagainst, a second element disposed above said first element, adapted to be slidably receivable in a second nut inserted over the opposite end of said piece of tubing and resting on the upper end of said first nut, a reduced projection on the lower end of said second element, receivable in the upper end of said tubing, an arcuate shoulder between the upper end of said second element reduced projection and its adjacent enlarged element portion adapted to flare the opposite end of said tubing when the tubing is forced thereagainst, said elements being the sole support for said tubing, means releasably retaining said elements in an aligned relationship relative to each other, whereby when one of said elements is moved toward the other the opposite ends of the piece of tubing will be simultaneously flared to provide a flare union with said nuts, the length of each of said reduced projections being proportioned to the length of the adjacent nut whereby the inner ends of said projections are disposed in abutting relationship and said nuts are free to rotate when the opposite ends of said tubing are flared into engagement with said nuts.

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