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R. D. McINTOSH

2,242,831

FLARING TOOL

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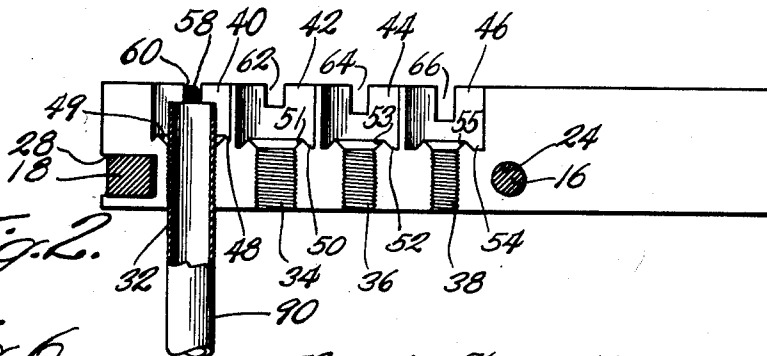
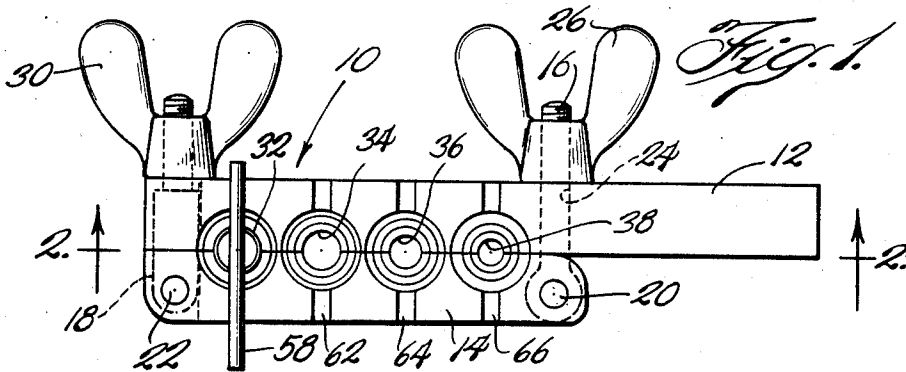


Fig. 6.

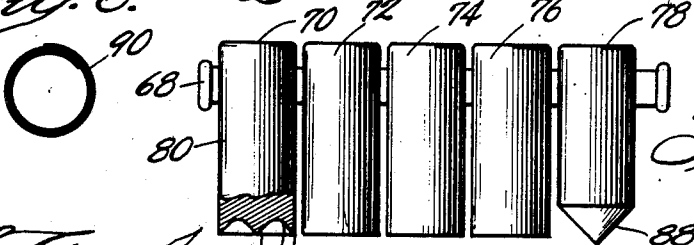


Fig. 4.

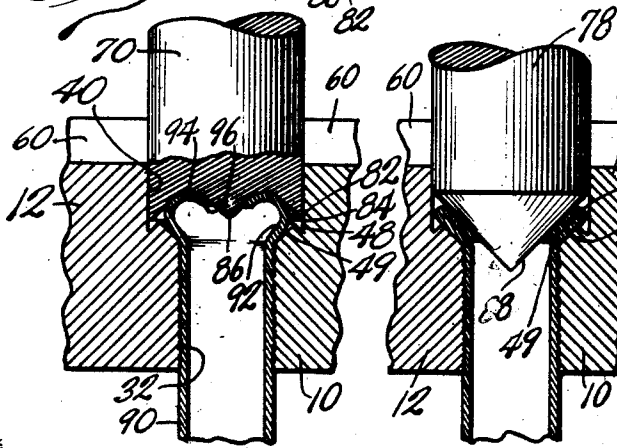


Fig. 5.

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FLARING TOOL

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2 Claims. (Cl. 153—79)

My invention relates to flaring tools and particularly to tools capable of the production of a double walled flare on tubing.

Among the objects of my invention is to produce on the end of tubing a flare which has a wall thickness double that of the wall of the tubing.

Another object of my invention is the provision of a new and improved flaring tool which is capable in two short simple operations of setting up a double walled flare at the end of a piece of tubing.

Still another object is the provision of a new and improved tool which is capable of producing double walled flares on tubes of several sizes which utilizes a single clamping device for holding any one of the several tubes, a group of initial forming members, one suitable for each of the tubes, and a common flaring member adapted to the production of a finished flare on tubes of any of the several sizes after a preliminary forming operation has been completed by use of one of the initial forming members.

A further object is the provision of a new and improved flaring tool which is adapted to measure the length of tubing to be flared and to clamp it into place so that the measured portion may be utilized and which is further supplied with a set of flaring members including an initial forming member guided into contact with the tube by a portion of the clamping device in order to initially set up the exposed end of tubing preparatory to a final flaring operation and a finish flaring member, the operation of which follows the initial forming member, which is adapted to flatten adjacent portions of the end of the tube against each other and form them into a flare by pressure exerted against a suitable flaring surface in the clamping device.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawing, in which:

Figure 1 is a top view of the clamping device embodied in my invention.

Figure 2 is a side elevation through the center of the clamping device taken on the line 2—2 of Figure 1 showing a tube in section positioned for flaring.

Figure 3 shows the flaring members used with the clamping device.

Figure 4 is an enlarged sectional elevation showing the initial forming operation.

Figure 5 is an enlarged sectional elevation showing the final flaring operation; and

Figure 6 is an end view of a laminated-walled tube which may be flared with the tool of my invention.

The art of flaring tubes in order to produce a somewhat conical flare at the end of ductile tubing has been well known in the past but the flares produced in each instance have always been flares having a thickness substantially equal to that of the tubing wall and nothing greater. As a matter of fact, when flares of this sort are produced the necessary stretching of metal in order to have it spread into a flare of greater diameter than the tubing wall itself causes the tubing wall to thin down at the flare so that as a matter of practice the wall of the flare is usually somewhat thinner than the wall of the tube.

A further difficulty has arisen especially in connection with what is termed laminated walled tubing of the so-called "Bundy" type. Tubing of this sort is made from a single wide sheet of metal rolled into the form of a tube wherein the laminations are welded together. When it is attempted to flare tubing of this sort by using the flaring tools now commonly used for flaring copper tubing it is practically impossible to form a flare without actually splitting the laminated tubing.

It has been found, however, that the production of a double walled flare upon tubing of this sort prevents splitting and is productive of a flared end which satisfies all of the requirements of rigidity, strength and durability. The same double walled flare has likewise been found highly satisfactory in thin walled tubing of other kinds where the danger of weakening the joint due to thinning down the wall of the tubing at the flare is present.

In order to produce a double walled flare on tubing of the sort herein referred to the present invention practices the operation of first curving an exposed end of the tubing of a specified length into a somewhat arcuate shape as viewed in section, that is, a portion of the exposed end of the tubing is bowed slightly outward in the direction a normal flare would take while the edge of the tubing at the cut end is bowed slightly inward producing what appears to be a reverse curve in section.

The succeeding operation consists of forcing the inwardly curved portion downward and simultaneously flattening it against the outwardly curved portion and flattening both portions to-

gether against a truncated conical surface in the flaring tool.

In the embodiment of my invention here shown there is provided a flaring device 10 comprising a pair of bars 12 and 14 secured together by means of bolts 16 and 18, which are pivoted to the bar 14 at the points 20 and 22 respectively. The bar 16 extends through an aperture 24 in the bar 12 which is secured tightly into place against the bar 14 by means of a wing nut 26 attached to the bolt 16. At the other end the bolt 18 pivots into a slot 28 in the bar 12 wherein it is fastened by a wing nut 30. Each of the bars 12 and 14 is provided with a series of various sized recesses 32, 34, 36 and 38 adapted to receive and hold therein tubes of corresponding diameters. To assist in gripping the tubes each of the recesses is provided with a surface roughened by means of threaded projections.

At the top of the respective recesses are enlargements 40, 42, 44 and 46, and at the bottom of the enlargements are limiting means or stop shoulders 48, 50, 52 and 54. Between the stop shoulders and the recesses there are provided flaring surfaces 49, 51, 53 and 55, the angular direction of the sides of which is the same for each size of tubing. The enlargements are likewise provided with kerfs or apertures 60, 62, 64 and 66 extending a predetermined distance inward from the upper edges of such a suitable depth that they may be used in conjunction with a pin 58, for example, in order to gauge the length of tubing held in any one of several recesses which is exposed above the flaring surfaces 49, 51, 53 and 55.

Cooperable with the recesses and their respective enlargements is a set of initial forming members 70, 72, 74 and 76 suspended for convenience upon a pin 68. A single flaring member 78 is provided which has a form which will fit any one of the several recesses. The initial forming members have each a similar construction sufficient so that a description of one will serve as an example for the rest. The member 70 therefore, shown partly in section in Figure 3, has a generally cylindrical shape and an outside diameter 80 slightly smaller than the diameter of the enlargement 40 so as to provide a loose fit to permit insertion of the member 70 into the enlargement 40. The diameters of the members 72, 74 and 76 are the same.

At one end the member 70 is provided with a rounded annular depression 82 and in forming this there remains an outer rim 84 at the outer circumference and a central projection 86, the functions of which will subsequently be described.

Flaring member 78 has the same general shape and diameter as the initial forming members 70, 72, 74 and 76, but at the lowermost end is provided with a conical tip 88 which in operation is used as a flaring anvil.

In operation a tube 90 having a diameter corresponding, for example, to the diameter of recess 32 in the clamping device is positioned in the device as shown in Figure 2 and there tightly secured. The positioning is accomplished by means of an instrument, such as the pin 58, which can be inserted in the aperture 60 in order to set the tubing in position with the proper length exposed within the enlargement. A knife blade, saw blade or any suitable straight edge will serve the same purpose. This operation, as noted, determines the length of the tubing which is exposed above the recess within the enlarged portion 40 and is the proper amount which is to be

used for a flare upon a tubing of particular size. Flares for smaller sizes of tubing will require a much shorter length exposed as exemplified by the depth of the kerf 66 adjacent the recess 38.

When the tubing has been secured tightly in place the initial forming member 70 is inserted into the enlargement 40 and is guided by the walls of the enlargement into an aligned contact with the end of the tube 90. When the member 70 has been forced against the end of the tube by driving it with a hammer or some suitable instrument the exposed end of the tubing will be curved into the form of an arc as shown in Figure 4.

A portion 92 of the tubing adjacent the end and above the flared surface will be bowed slightly outwards and a portion 94 at the end of the tubing will be bowed slightly inwards toward the projection by the curved annular depression 86. The member 70 will be driven tightly into the clamping device until it is stopped by contact of the rim 84 with the shoulder 48. At the termination of this inward motion of the forming member the tube will have a generally curved or annular bead like form at the end with an opening 96 at the center.

In the next operation, the flaring member 78 is inserted into the enlargement 40 and the point of the flaring cone 88 is inserted into the aperture 96 previously formed in the tubing. The flaring member is then driven tightly into the clamping device and serves thereby to flatten the inwardly arched portion 94 and the outwardly arched portion 92 together and to force them both against the flaring surface 49.

There has therefore been provided a tool which is capable of producing a rolled over double walled flare at the end of tubing by means of two simple operations and in addition a tool of simple design which can be operated manually by a person of average skill.

I claim as my invention:

1. A tube flaring tool comprising a clamping device having cooperating recessed elements forming an aperture for holding the tube and an enlargement at one end of the aperture having walls greater in diameter than the diameter of said recess elements, there being a flared portion at the inner end of said enlargement, said enlargement having an annular recess forming a stop shoulder outside the flared portion, and flare forming means including an initial forming member insertable in said aperture having an annular depression therein curving first axially inward from the outside edge and then axially outward and adapted to fit over the exposed end of tubing and to be forced against said end, the curve of said depression being adapted to press a portion of the tube adjacent said exposed end first into an outward extending arch and next at the end portion thereof into an inwardly and downwardly extending arch until the outer portion of said initial forming member contacts said stop shoulder thereby forming the tube into a preliminary form of predetermined size and shape prior to the final flaring operation, and a flaring member insertable into the preliminarily formed end of the tubing adapted to flatten the arched portions together against the flared portion of said clamping device.

2. A flare forming tool comprising clamping members having recesses therein including clamping portions adapted to secure tubing of different sizes, substantially cylindrically shaped enlargements of uniform diameter at one end of each and flared portions joining said enlargements

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with said recesses, initial forming members of uniform outside diameter adapted to fit one in each enlarged portion of the recesses and extendable axially thereinto having at one end an annular depression curved axially inward from the edge of said one end, a substantially conical projection extending outwardly from the bottom of the depression having the bottom sides of the projection curved and tangent to the curved sides of the depression, said member being adapted to fit said respective size of tubing and insertable around the rim of tubing, said enlargement walls being substantially in contact with the forming

member in order to guide said member when forced against the tubing, said member being operable when so forced to spread a portion of the tubing adjacent the end thereof outward and to bend the edges radially and axially inward, and a flaring member common to all sizes adapted to be guided by said enlargement forceably into the inward turned end of the tubing thereby to spread the inwardly and outwardly bent end portions respectively of the tubing together against the flared portion of said recess into the form of a double walled flare.

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