June 7, 1938. T. M. LILLEBERG 2,120,029

TUBE FLARING DEVICE

Filed Oct. 23, 1936

Fig. 1.

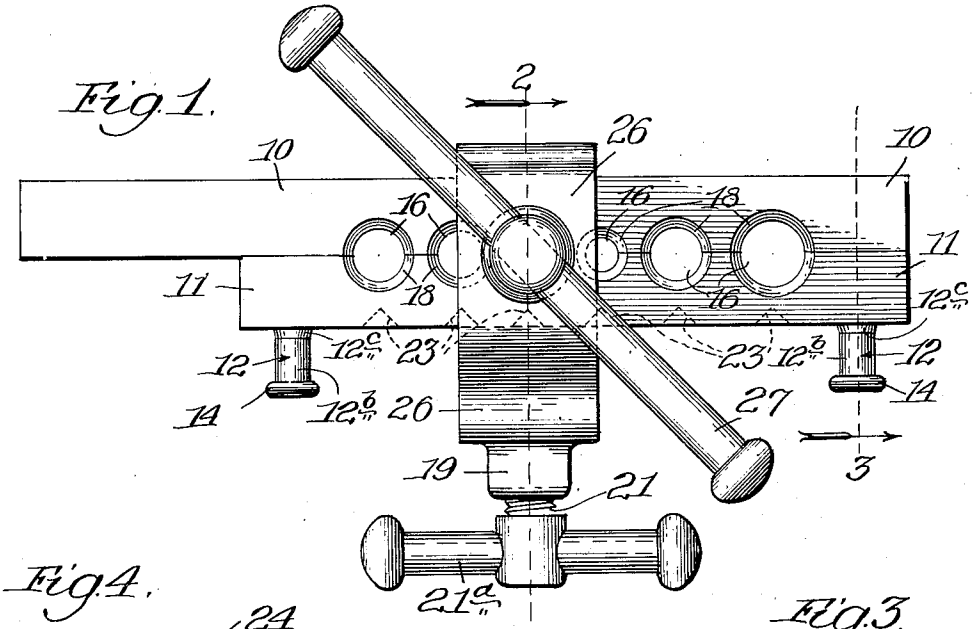


Fig. 4.

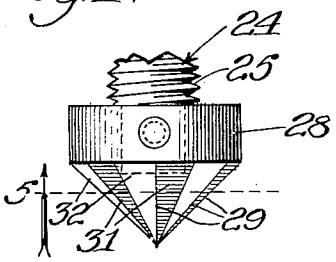


Fig. 3.

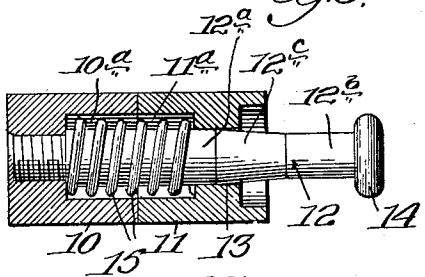


Fig. 2.

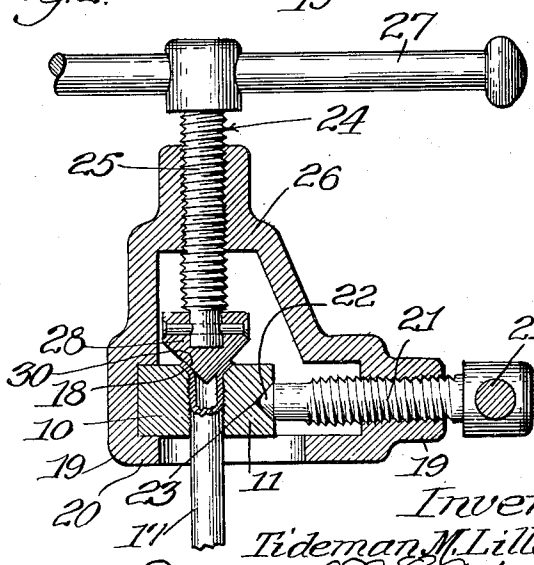
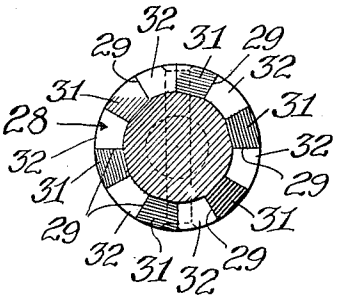


Fig. 5.



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TUBE FLARING DEVICE

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Application October 23, 1936, Serial No. 107,293

3 Claims. (Cl. 153—79)

My invention relates to devices for flaring the ends of tubes commonly so operated on to adapt them for the making of the desired coupling joints with other members; and more particularly to such devices of the type comprising a pair of bars recessed at opposing faces to receive the tubes to be operated on, means clamping the bars against the tubes, and a tool for flaring the tubes.

My objects are to provide improvements in devices of this kind to the end that they will be better adapted to perform the service for which they are provided; to produce a flare which will be smoother and more nearly of the desired contour; to provide for the augmenting of the grip of the bars against the tubes; and other objects as will be manifest from the following description.

Referring to the accompanying drawing:

Figure 1 is a plan view of a tube-flaring device embodying my invention.

Figure 2 is a sectional view taken at the line 2 on Fig. 1 and viewed in the direction of the arrow.

Figure 3 is a sectional view taken at the line 3 on Fig. 1 and viewed in the direction of the arrow.

Figure 4 is a fragmentary view in side elevation of a flaring tool forming a part of the device; and

Figure 5, a sectional view taken at the line 5 on Fig. 4 and viewed in the direction of the arrow.

The preferred illustrated embodiment of my invention comprises a pair of clamping bars 10 and 11 connected together for movement toward and away from each other as by pins 12 projecting laterally from the bar 10 and slidingly extending into registering openings 13 in the bar 11. Heads 14 on the outer ends of the pins 12 prevent accidental disconnection of the bars under the action of coil springs 15 surrounding the pins 12 between the bars and yieldingly spreading the bars, these springs being shown as extending into sockets 10^a and 11^a in the bars.

Preferably the pins 12 are of the general tapered form shown providing a cylindrical portion 12^a at one end, a cylindrical portion 12^b at its opposite, outer end of less diameter than the portion 12^a and an intermediate frusto-conical portion 12^c, the portion 12^a which is of such diameter as to have a close sliding fit in the opening 13 being of such length that it extends only part way into the opening as shown when the bars 10 and 11 are in closed position.

The clamping bars are shown as provided on their opposed surfaces with sets of registering semicircular recesses 16 which, when the bars 10 and 11 are forced together, form substantially circular openings to receive tubes, ends of which are to be flared, and securely hold the tubes against lengthwise and rotary movement under the action of the flaring means hereinafter described, one such tube so positioned in the device being represented at 17. The sets of registering recesses which flare at one face of the clamp assembly as shown at 18, are preferably, as shown, of different sizes to adapt the device for operating on tubes of different sizes.

The device also comprises an open-bottom stirrup-shaped member 19 to receive the bars 10 and 11 which are slidingly supported on the base 20 of the stirrup and with which cooperates means acting against the bar 11 to force this bar toward the other bar 10, which bears against a side of the stirrup, and thus securely clamp the tube to be flared between these bars. The means shown for this purpose comprises a screw 21 threaded in the stirrup 19 and provided at its outer end with a handle 21^a by which to turn it and pointed at its inner end, as represented at 22, to enter centering recesses 23 in the bar 11 disposed in registration transversely of the bars, with the several sets of semi-circular recesses 16, the means thus provided operating to apply the pressure by which the bars are clamped to the tube, in direct line with the tube to be operated on and thus effectively for producing the clamping action, regardless of the adjustment of the clamping bars lengthwise in the stirrup.

The flaring means hereinbefore referred to are shown as comprising a tool 24 formed of a screw-shaft 25 threaded in the top portion 26 of the stirrup 19 and having a handle 27 at its outer end and a flaring or expanding head 28 at its inner end, which, in the lengthwise adjustment of the bar assembly 10 and 11 in the stirrup for positioning the tube to be operated on in transverse registration with the pressure-applying device 21, is positioned concentric with, and above, the end of the tube to be flared.

The lower portion of the head 28 is preferably of general conical shape, but instead of being truly circular in cross section is of such shape as to provide on its outer surface tube-engaging edge portions 29 extending generally in the direction of the length of the head which, when the head is forced into the tube and rotated by rotating the shaft 25 clockwise in Fig. 1, engage the inner surface of the tube-end, forcing the latter,

by a deforming operation, against the flaring portions 18 of the recesses 16 into flared condition as represented at 30. The edge portions 29 are preferably transversely rounded to a slight degree to render them blunt as distinguished from providing them as sharp edge portions, whereby these edges do not cut into the metal of the tube but operate merely to exert an outwardly deflecting action thereon.

The edge portions 29 may be provided in any suitable way, as for example and preferably, by providing the head 28 of cone shape, circular in cross section, except for spaced apart narrow flat surfaces represented at 31, radiating from the apex of the cone and formed, as for example, by removing surface portions of the cone, the advance marginal edge of the surface portions of the head of the curved shape in cross section and indicated at 32, constituting the edge-portions 29.

As will be understood from the foregoing the bar assembly is adjusted lengthwise in the stirrup 19 to a position in which the set of recesses 16 corresponding in size to the tube to be operated on register, transversely of the device, with the pressure-applying means 21. The tube is then inserted into this set of recesses, the pressure applying means 21 operated to clamp the bars against the tube, the recesses being preferably rough surfaces as for example by threading them to enhance the grip on the tube, and the flaring tool operated to perform the flaring operation.

It may here be noted that it has been found in practice that by providing the flaring tool with an edge portion as stated at which the tool engages the inner surface of the tube end, as distinguished from providing it of true circular form in cross-section resulting in circular contact of the tool with the tube, the inner surface of the flared portion of the tube is much smoother and the flared portion more accurately deformed and with the application of much less force, than in the case of the use of a tool having circular contact with the tube.

The feature of providing the taper pins 12 as shown and described is of advantage as thereby binding of the bar 11 on the pins when the clamping action on the bars by the screw 25 is exerted adjacent the end ones of the tube-receiving recesses therein as is liable to occur were the pins 12 of uniform diameter throughout their lengths and closely fit the openings 13 in the bar, is avoided.

Preferably the thread on the screw 25 is relatively fine, as for example 24 threads to the inch, this being very desirable in conjunction with a tube flaring head having the multiple tube deforming portions as stated.

While I have illustrated and described a particular construction embodying my invention I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered and the invention embodied in other forms of structure without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent, is:

1. A device of the character described comprising a pair of separate clamping bars having sets of registering, substantially semi-circular, recesses in their opposing surfaces for receiving tubes the ends of which are to be flared, tapered pins on one of said bars and extending in openings in the other of said bars, a member in which said bars extend, said bars and member being relatively slidable in a direction lengthwise of the bars, a tool on said member for flaring the ends of tubes clamped between the bars, and bar-engaging means on said member for clamping said bars against the tubes.

2. A device of the character described comprising a pair of separate clamping bars having sets of registering, substantially semi-circular, recesses in their opposing surfaces for receiving tubes the ends of which are to be flared, tapered pins on one of said bars and extending in openings in the other of said bars, springs normally holding said bars in spread apart position, a member in which said bars extend, said bars and member being relatively slidable in a direction lengthwise of the bars, a tool on said member for flaring the ends of tubes clamped between the bars, and bar-engaging means on said member for clamping said bars against the tubes.

3. A device of the character described comprising a pair of separate clamping bars having sets of registering, substantially semi-circular, recesses in their opposing surfaces for receiving tubes the ends of which are to be flared, tapered pins on one of said bars and extending in openings in the other of said bars, a member in which said bars extend, said bars and member being relatively slidable in a direction lengthwise of the bars, a tool on said member for flaring the ends of tubes clamped between the bars, and means for clamping said bars against the tubes.

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