Oct. 17, 1950 R. B. EDELMANN 2,526,210

FLARING TOOL

Filed July 9, 1949 2 Sheets-Sheet 1

Fig. 1.

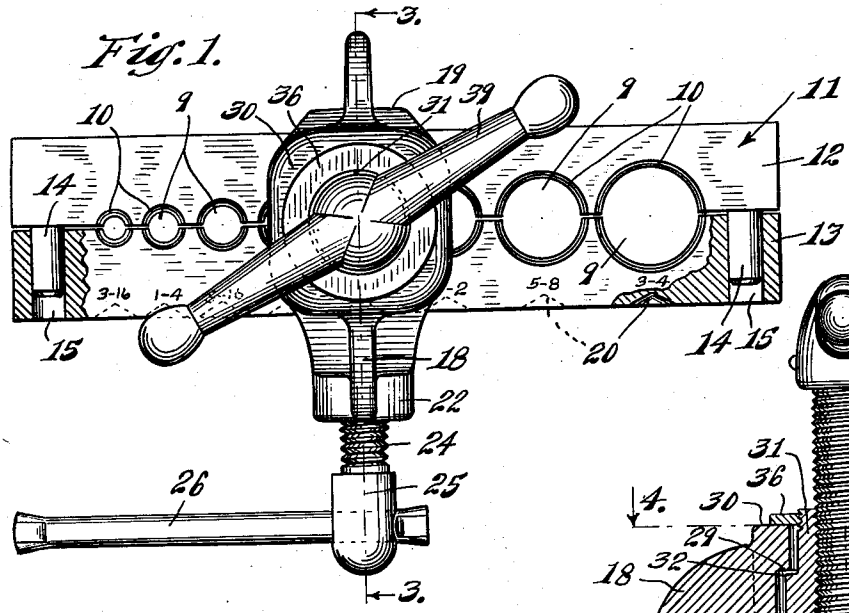


Fig. 2.

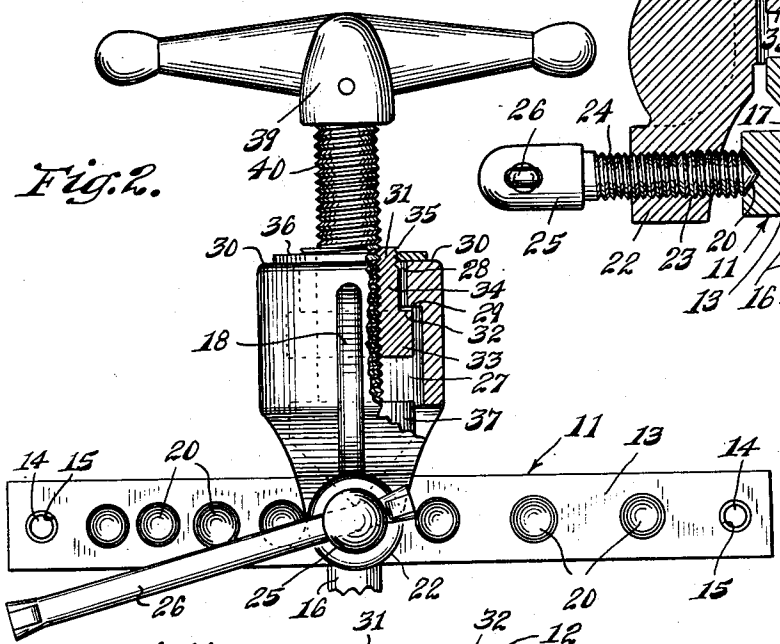


Fig. 3.

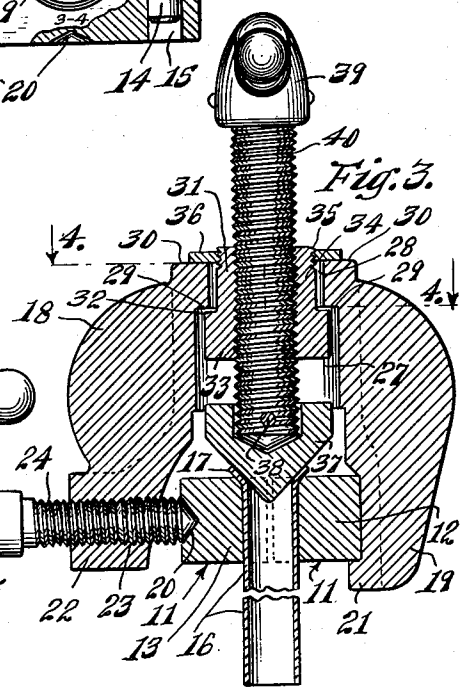
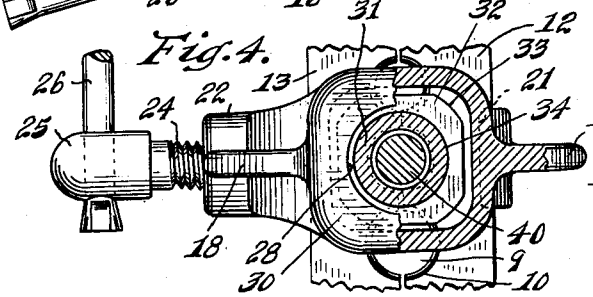


Fig. 4.



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Fig. 5.

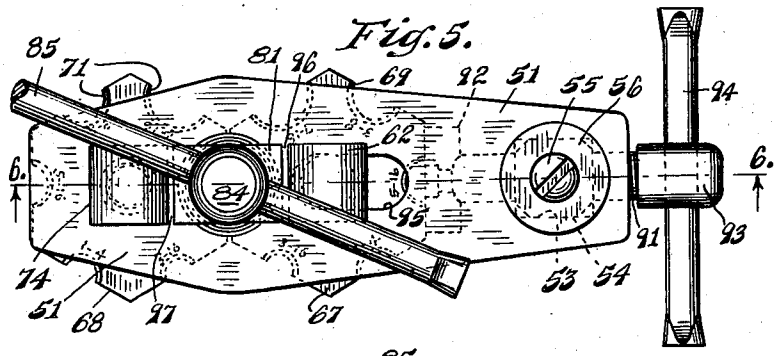


Fig. 7.

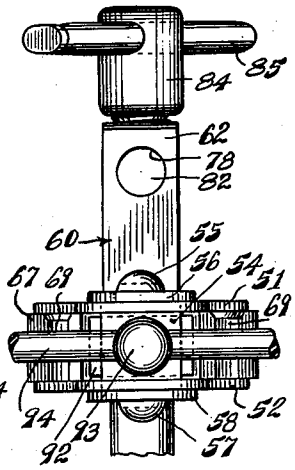


Fig. 6.

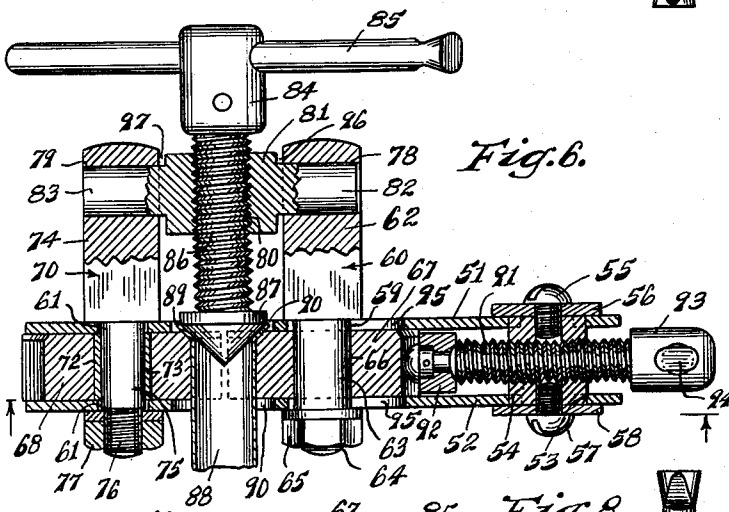
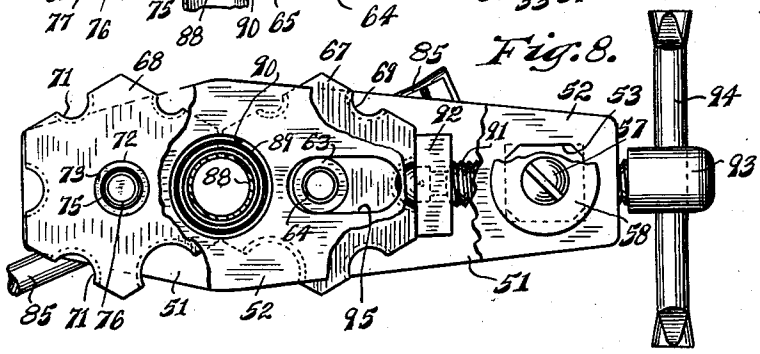


Fig. 8.



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UNITED STATES PATENT OFFICE

2,526,210

FLARING TOOL

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12 Claims. (Cl. 153—79)

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This invention relates to flaring tools and particularly to flaring tools for providing flares on thin walled tubing; such tubing is usually formed of copper, steel or aluminum alloy.

In flaring tools which have heretofore been available, difficulty has been encountered in centering the flaring portion of the tool with respect to the tube and with respect to the center of the opening in a plate or the like in which the tube is secured during the flaring operation.

It is an object of the invention, therefore, to insure that the flaring portion of the tool is properly centered and that a concentric, uniform flare is provided on the tube.

It is another object of the invention to provide a flaring tool in which universal movement of the flaring portion is afforded, so that it is self-centering.

It is a further object of the invention to provide improved flaring tools which are readily manufactured and assembled and which are relatively inexpensive.

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

Figure 1 is a top plan view of a flaring tool constructed in accordance with one embodiment of the invention, with parts thereof broken away for the sake of clearness,

Figure 2 is a side elevational view of the flaring tool shown in Figure 1, with parts thereof in section,

Figure 3 is a sectional view of the flaring tool taken on line 3—3 of Figure 1,

Figure 4 is a partial sectional view of the flaring tool taken on line 4—4 of Figure 3,

Figure 5 is a top plan view of a flaring tool constructed in accordance with a second embodiment of the invention,

Figure 6 is a sectional view of the flaring tool shown in Figure 5 taken on line 6—6 thereof,

Figure 7 is an end view of the flaring tool shown in Figure 5, and

Figure 8 is a bottom view of the flaring tool shown in Figure 5, with parts thereof broken away for the sake of clearness.

Referring specifically to Figures 1 to 4 inclusive for a detailed description of the first embodiment of the invention, numeral 11 designates generally a tube supporting means or flaring block formed of two rectangular pieces of metal 12 and 13.

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The rectangular metal pieces 12 and 13 are provided with a plurality of complementary openings which provide cylindrical openings 9 when the two pieces are assembled together. The tops of the openings 9 are provided with a slight bevel as shown at 10. One of the rectangular members 13 is provided with an opening 15 and the other rectangular member 12 is provided with pins 14 which extend into the openings 15 and retain the members 12 and 13 in proper position relative to each other. The pins 14 preferably enter the openings 15 and engage the member 13 with a frictional fit so that the parts 12 and 13 normally stay together.

As best shown in Figure 3 the tube to be flared is shown at 16 and the flare thereof at 17. The tube 16 is disposed in the proper aperture 9 depending on its size and, as will be apparent as the description proceeds, the flare 17 is formed on the tube 16 by operation of the tool.

A relatively heavy body member 18 contains the flaring mechanism and is provided with a downwardly extending leg 19 having a shoulder or flange 21 which is adapted to engage the underside of the block 11. The block 11 is limited in its upward movement by the internal shape of the leg 19. One side of the block 11 is provided with a plurality of depressions 20, for a purpose hereinafter described.

A second downwardly extending leg 22 is provided in alignment with and spaced from the leg 19. The leg 22 is provided with internal threads 23 for receiving a threaded stud 24. The stud 24 is provided with a smooth outer end 25, through which the vise-type handle 26 extends. The forward end of the stud 24 is adapted to enter one of the apertures 20 in the block 11 and retain the body member 18 in position, substantially aligned with the desired opening 9, depending on the size of the tube to be flared.

The body member 18 is provided with a rectangular opening or chamber 27 in the central lower portion thereof and with a circular communicating opening or chamber 28 in the upper central portion thereof. A shoulder 29 is provided at the top of the opening 27 and an outer seating surface 30 is provided on the top of the body member 18. A block or plug 31 having a shoulder 32 adapted to engage with the shoulder 29 is formed with a lower substantially rectangular portion 33 and an upper substantially circular portion 34. If desired, the corners of the rectangular portion 33 may be rounded. The lower rectangular portion 33 is positioned in and is spaced from the walls of the opening 27. The

upper circular portion 34 is positioned in and spaced from the walls of the upper circular opening 28. The upper portion 34 of the plug 31 is threaded at 35 and a washer 36 is provided on the threaded portion and is pinned thereto. The washer 36 freely slides on the seat 30 of the body 18.

A generally conical flaring member 37 is secured to a threaded shaft 40 which extends through the block 33 in threaded engagement therewith. The shaft 40 is provided with a suitable turning handle 39. The conical flaring member 37 is preferably pivotally secured to the stud 40 by a pin 38 so that slight relative movement between the flaring member 37 and stud 40 is afforded.

It will be apparent from the above description that the plug 33 is free to move in any horizontal direction in the body member 18 to a limited degree. Furthermore, the flaring member 37 is permitted to move about the axis of the pin 38 to a limited degree. Therefore, when the tube 16 is disposed in the block 11 and the shaft 40 is screwed downwardly, the flaring member 37 will engage with the tube and will center itself with respect thereto. Further downward movement of the shaft 40 and flaring member 37, will form the flare 17 in the tube, which flare is uniform and concentric. Obviously, the position of the block 11 with respect to the body 18 may be changed for different tube sizes and the relative position of the two parts maintained by rotating the stud 24 in leg 22.

Referring specifically to Figures 5 to 8 of the drawings for a detailed description of the second embodiment of the invention, numerals 51 and 52 designate a pair of substantially rectangular plates which are secured together in spaced relation in the following manner:

A square stud 54 is positioned in square openings 53 in the plates 51 and 52 and is held therein by bolts and washers 55, 56 and 57, 58.

Adjacent the other end of the plates 51 and 52 are provided circular openings 59 and 61. A pair of upright spaced studs 60 and 70 are provided to hold the flaring tool, in a manner hereinafter described. The stud 60 has an upper exposed square portion 62 and a lower circular portion 63, which extends through the openings 59 in the plates 51 and 52. The lower extremity of the circular portion 63 of the stud is threaded at 64 and a nut 65 is provided for holding the stud in position.

The stud 70 also has an upper exposed square portion 74 and a lower cylinder portion 75 which extends through the opening 61 in plates 51 and 52. The lower extremity of the cylindrical portion 75 is threaded as shown at 76 and a nut 77 is provided on the threaded portion 76.

A pair of flaring blocks 67 and 68 having semicircular cut-outs 69 and 71 in the periphery thereof are disposed between the plates 51 and 52. The flaring blocks have respective central apertures 66 and 72 therein. The flaring block 67 is therefore capable of rotation about the cylindrical portion 63 of stud 60, since the portion 63 extends loosely through the opening 66 therein.

The plates 51 and 52 are held in spaced relation by a sleeve 73 which is inserted in the opening 72 of the flaring block 68. The sleeve 73 encompasses the cylindrical portion 75 of stud 70 and abuts against the plates 51 and 52 to properly space the plates. The flaring block 68 is, of course, rotatable about the sleeve 73. It is therefore clear that the sleeve 73 properly spaces one end of the plates 51 and 52, and stud 54 properly spaces the other end of the plates, and that the flaring blocks 67 and 68 are freely rotatable between the plates.

Horizontal cylindrical bearings 78 and 79 are provided at the upper ends of the studs 60 and 70 respectively. A substantially rectangular block is provided with horizontally extending pins or shafts 82 and 83 which are journalled in bearings 78 and 79, respectively, in the upstanding studs. The block 81 is internally threaded vertically thereof as shown at 80.

A flaring member 84 is preferably formed in one piece and includes a handle 85 and a threaded bolt 86 which engages with the threads 80 in the block 81. A generally conical flaring portion 87 is formed at the bottom of the flaring member 84, and extends through a circular aperture 90 in the top plate 51 when screwed down.

The tube to be flared is shown at 88 and the flare thereon at 89.

A bolt 91 is threaded through the block 54 and has a block 92 rotatably secured to its inner end. The bolt 91 is provided with a smooth portion 93 at its outer end through which a vise-type lever or handle 94 extends.

As best shown in Figure 6, the block 81 is spaced as shown at 96 and 97 from the studs 60 and 70. The block, as well as the bolt 86 and conical member 87, are therefore free to move a limited distance in one horizontal direction. Furthermore, since the block 81 is horizontally rotatable in the bearings 78 and 79, it, as well as the bolt 86 and conical member 87, may rotate in such bearings. It is apparent, therefore, that limited substantially horizontal movement of the conical member 87 in another direction is afforded. Thus a universal mounting is provided. The extent of the horizontal movement in the first direction may be varied by providing a slot 95 in the plates 51 and 52 through which the stud 60 extends.

When it is desired to flare a tube, the flaring blocks 67 and 68 are rotated so that complementary cut-outs 69 and 71 of the desired size are facing each other. It is noted that the cut-outs are provided with an upper beveled edge. When the desired complementary cutouts are properly positioned, the bolt 91 is rotated so that block 92 engages with the side of flaring block 67 to hold the blocks 67 and 68 in proper position. A tube 88 is then inserted in the circular aperture thus formed and the bolt 86 is rotated to move the conical member 87 into the tube. Obviously, the conical end member 87 will center itself in the tube because of the universal movement permitted by the mounting of the flaring member 84. Furthermore, further downward movement of the conical member 87 provides a uniform and concentric flare 89 on the tube 88.

From the foregoing it will be apparent that I have provided improved flaring tools wherein the flaring member is capable of universal movement and is therefore self-centering. This insures uniform and concentric flares. Furthermore, the flaring tools are readily manufactured and assembled, and are relatively inexpensive.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support affording movement of said conical member in any direction substantially transverse to the longitudinal axis of said cylindrical aperture and preventing movement of said block in a direction toward or away from said aperture.

2. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support affording limited movement of said conical member in any direction substantially transverse to the longitudinal axis of said cylindrical aperture and preventing movement of said block in a direction toward or away from said aperture.

3. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support affording movement of said conical member in any direction substantially transverse to the longitudinal axis of said cylindrical aperture and preventing movement of said block in a direction toward or away from said aperture, said conical member being pivotally secured to said shaft.

4. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support having an aperture formed therein adapted to be substantially aligned with the aperture in said tube supporting means, means formed on said block and said support substantially preventing movement of said block toward or away from said tube supporting aperture, means for limiting rotational movement of said block in said support, said block being spaced from said support to afford limited horizontal movement of said conical member in any direction substantially transversely of the longitudinal axis of said tube receiving aperture.

5. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support having an aperture formed therein adapted to be substantially aligned with the aperture in said tube supporting means, means formed on said block and said support substantially preventing movement of said block toward or away from said tube supporting aperture, means for limiting rotational movement of said block in said support, said block being spaced from said support to afford limited horizontal movement of said conical member in any direction substantially transversely of the longitudinal axis of said tube receiving aperture, said conical member being pivotally secured to said shaft.

6. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support having an aperture formed therein adapted to be substantially aligned with the aperture in said tube supporting means, means formed on said block and said support substantially preventing movement of said block toward or away from said tube supporting aperture, means for limiting rotational movement of said block in said support, a portion of the aperture in said block being substantially cylindrical and another portion being substantially rectangular, said block having substantially cylindrical and rectangular portions spaced from the cylindrical and rectangular portions of said aperture to afford limited movement of said conical member in any direction substantially transversely of the longitudinal axis of said tube receiving aperture.

7. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support having an aperture formed therein adapted to be substantially aligned with the aperture in said tube supporting means, means formed on said block and said support substantially preventing movement of said block toward or away from said tube supporting aperture, means for limiting rotational movement of said block in said support, a portion of the aperture in said block being substantially cylindrical and another portion being substantially rectangular, said block having substantially cylindrical and rectangular portions spaced from the cylindrical and rectangular portions of said aperture to afford limited movement of said conical member in any direction substantially transversely of the longitudinal axis of said tube re-

ceiving aperture, and means for pivotally securing said conical member to said shaft.

8. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, a support for said block adapted to be rigidly secured to said tube supporting means, said support comprising bearing means extending transversely of the longitudinal axis of the tube receiving aperture, and a shaft secured to said block and supported by said bearing to afford pivotal movement of said block and to prevent substantial movement thereof toward and away from said tube receiving aperture, said block being spaced from said support to afford limited sliding movement of said block relative to the support.

9. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a general conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, a support for said block adapted to be rigidly secured to said tube supporting means, said support comprising bearing means extending transversely of the longitudinal axis of the tube receiving aperture, a shaft secured to said block and supported by said bearing to afford pivotal movement of said block and to prevent substantial movement thereof toward and away from said tube receiving aperture, said block being spaced from said support to afford limited sliding movement of said block relative to the support and means for varying the space between the block and support.

10. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, a support for said block adapted to be rigidly secured to said tube supporting means, said support comprising a pair of bearing members with bearings therein extending transversely of the longitudinal axis of the tube receiving aperture, a pair of shafts secured to said block and supported by said bearings to afford pivotal movement of said block, said block being spaced from said bearing members to afford limited sliding movement of said block relative thereto.

11. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, a support for said block adapted to be rigidly secured to said tube supporting means, said support comprising a pair of bearing members with bearings therein extending transversely of the longitudinal axis of the tube receiving aperture, a pair of shafts secured to said block and supported by said bearings to afford pivotal movement of said block, said block being spaced from said bearing members to afford limited sliding movement of said block relative thereto and means for varying the space between the block and said supports.

12. A tool for flaring thin walled tubes comprising a tube supporting means having a cylindrical aperture therein for receiving the end of a tube, a threaded shaft, a generally conical flaring member secured to one end of said shaft, a threaded block for receiving the threaded shaft and affording movement of said flaring member toward and away from said aperture upon rotation of said shaft, and a support for said block adapted to be rigidly secured to said tube supporting means, said support affording movement of said conical member in any direction substantially transverse to the longitudinal axis of said cylindrical aperture and preventing movement of said block in a direction toward or away from said aperture, said shaft and conical flaring member being rigidly secured together.

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