

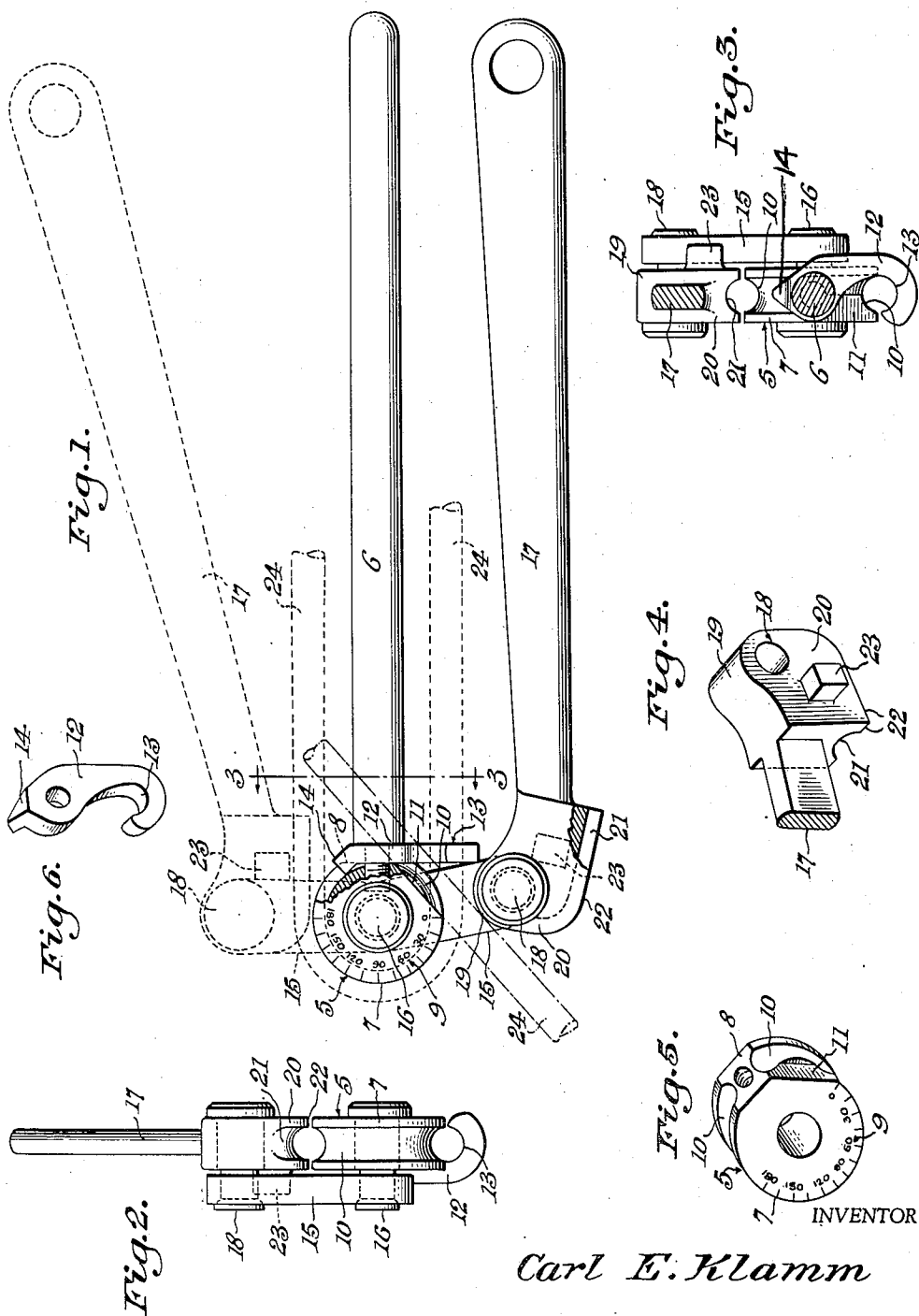
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HAND HELD TUBE BENDING TOOL

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HAND HELD TUBE BENDING TOOL

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5 Claims. (Cl. 81—15)

The invention relates generally to tube bending and primarily seeks to provide a novel inexpensive and yet efficient hand tool for this purpose.

Hand held and actuated tube benders are, of course, known, but presently known tools of this character leave much to be desired because of being complicated in structure and cumbersome, and because in most instances they have no provision for quick insertion or removal of the tubing without endwise threading thereof through receiving openings or complete removal of parts. It is a purpose of the present invention to provide an improved hand tool of the character stated which will eliminate the disadvantages referred to.

In its more detailed nature, the invention resides in providing a hand tool of the character stated including a handle, a radius block or bend defining die fixed on the handle and having a periphery extending about approximately three-fourths of a complete circle and a tube contacting and bend defining groove therein, a link swingable about the die and having a bending die pivoted to the free end thereof for following about the periphery of the fixed die, and an open hook disposed to receive and hold a tube portion in tangential relation to the bend defining groove while the swingable die is swung about to bend the tube, one groove defining side wall of the fixed die being removed to provide an angularly disposed clearance adjacent the hook effective to receive a tube into the hook and between the fixed and swingable dies without necessity of endwise threading the tube.

Another object of the invention is to provide a hand tool of the character stated wherein the tube holding hook is shaped to embrace approximately one-half the circumference of a tube cross section.

Another object of the invention is to provide a hand tool of the character stated wherein the tube holding hook is secured against movement relative to the fixed die.

Another object of the invention is to provide a hand tool of the character stated wherein the fixed die has a scale extending from zero through one hundred and eighty degrees about the periphery thereof, the fixed handle extending perpendicularly with relation to a line traversing said die and passing through the zero and one hundred eighty degree marks on the scale, the hook being disposed to parallel said line, and the groove defining wall cut away being disposed in approximately forty-five degree angular relation to said line starting at the zero mark and extending toward said hook.

Another object of the invention is to provide a hand tool of the character stated wherein the swingable die has a stop lug thereon engageable with the link end to which said die is pivoted to place the tube engaging surface of said die in tangential relation to the periphery of the fixed die.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following

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detailed description, the appended claims and the several views illustrated in the accompanying drawing.

In the drawing:

Figure 1 is a face view of the tool, the handle carrying the swingable die being swung to the tube receiving position in full lines, and to the position for completing a 180° bend in dotted lines.

Figure 2 is an end view with the parts at the bend completion position shown in dotted lines in Figure 1.

Figure 3 is a vertical cross section taken on the line 3—3 on Figure 1 with the swingable die in the bend completion position shown in Figure 2.

Figure 4 is a detail perspective view of the movable die.

Figure 5 is a detail perspective view of the fixed die.

Figure 6 is a detail perspective view of the tube holding hook.

In the practical development of the invention, the improved hand tool is formed to include a radius block or bend defining die 5 fixed in any approved manner to a handle 6. The die 5 has a periphery 7 extending about approximately three-fourths of a circle, and the handle 6 projects radially with relation to said periphery, or in perpendicular relation to the flat or chordal face 8 of the die.

A scale 9 extends about the periphery of the die 5, extending over 180° from a zero mark to an 180° mark, the scale being so placed that an imaginary line drawn through the zero mark and the 180° mark will parallel the flat or chordal face 8 of the die. The peripheral surface of the die is provided with a tube engaging bend defining groove 10 which is approximately half circular in radial cross section, and it will be noted that one side wall defining said groove is cut away at a 45° angle as at 11 to provide for free entrance of a tube to be bent. It will be noted that the cut away 11 starts at the zero mark of the scale and extends to the flat face 8 of the die 5 which is opposed by a tube securing hook 12. The hook is secured in any approved manner between the die face 8 and the adjacent end of the handle 6, and has a tube receiving seat 13 which is shaped to extend about at least half the diameter of a tube held thereby. It is to be noted that the hook end is inturned into the groove of the die 5 as at 14 so as to be secured against swinging movement about the axis of the handle 6. In other words the hook 12 is fixed with relation to the handle 6 and the radius block or bend defining die 5 carried thereby.

A link 15 is pivoted on the axis of the die 5 at one face thereof as at 16, and a handle 17 is swingably mounted on the free end of the link as at 18. The handle 17 includes a part circular portion 19 at the pivotal mounting thereof, and also a die portion 20 having a half-round groove 21 therein. The groove 21 is formed in a face 22 of the die portion 20 so placed as to oppose the periphery of the die 5 slightly out of contact therewith and in tangential relation as the handle 17 and link 15 are swung about the die 5 on the pivotal mounting 16 with the link 15 and arm 17 in the angular relation shown in dotted lines in Figure 1 and held in such relation by the stop lug 23 projecting from the cam portion 20 in position for contacting the link 15.

In the use of the tool, the arm 17 is swung into the full line position illustrated in Figure 1, and in this position a tube to be bent indicated at 24 can be inserted in the die clearance 11 as indicated in dot and dash lines in Figure 1, and then turned into the hook seat 13 and the groove 10 of the die 5, or in other words parallel to the handle 6. With the tube in this position, and held by the hook seat 13, the handle 17 will next be swung to present its die face 22 in tangential relation to the periphery of the die 5 so that the groove 21 therein will

cooperate with the groove 10 in the die 5 in completely encircling the tube. This swinging of the handle to present its die face 22 in tangential relation to the periphery of the die 5 will bring the stop lug 23 against the link 15, and thereafter the handle 17 and link 15 will swing in unison about the pivotal mounting 16, bending the tube to the position illustrated in dotted lines in Figure 1, assuming that a 180° bend is desired.

It will be apparent that tube bends of various degrees can be made, and the tube can be quickly mounted and dismounted by lateral insertion of intermediate portions thereof between the die clearance 11 and the hook 12, without any necessity of endwise threading the tube or the removing of any parts. It will also be apparent that swinging movement of the hook 12 is unnecessary and, in fact, is impossible.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that various changes in the details of construction and arrangement of parts may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A hand tool of the character described comprising, a handle, a bend defining die fixed on the handle and having a periphery extending approximately about three-fourths of a complete circle and a tube contacting and bend defining groove therein, a link swingable about the bend defining die on a fixed pivot, a bending die pivoted to the free end of the link in position for following about the periphery of the fixed bend defining die as the link is swung on its pivot, a handle extending from the swingable bending die for placing the swingable bending die and swinging it with the link, and an open hook fixed as to position with relation to said fixed bend defining die and the groove therein and disposed to receive and hold a tube portion in tangential relation to the bend defining groove while the swingable bending die is swung about to bend the tube, one groove defining side wall of the fixed bend defining die being removed in part to pro-

vide an angularly disposed clearance adjacent the hook effective to receive a tube into the hook and between the fixed and swingable dies without necessity of endwise threading of the tube.

2. A tool as defined in claim 1 wherein the hook is shaped to present a tube opposing clearance in the plane of the fixed bending die groove and shaped to embrace approximately one half the diameter of a tube held thereby during a bending operation.

3. A tool as defined in claim 1 wherein a portion of the hook is indented into a portion of the fixed die so as to be secure against movement relative to said die.

4. A tool as defined in claim 1 wherein the fixed die includes a flat face comprising a chord of the periphery circle, the fixed die handle projecting perpendicularly with relation to said chordal face, the hook lying parallel to said face, and the groove defining wall cut away being disposed in approximately forty-five degree angular relation to said hook and ending directly against said hook.

5. A tool as defined in claim 1 wherein the hook is shaped to embrace approximately one-half the diameter of a tube held thereby during a bending operation, it being provided with a substantially half tube diameter tube embracing clearance directly opposed to the handle axis in the plane of the bend defining die groove and merging with the remainder of the hook through a curving clearance disposed opposite and opening into the angularly disposed clearance in said bend defining die.

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