April 11, 1939. F. NEUKIRCH 2,153,935

TUBE BENDER

Filed Sept. 3, 1936

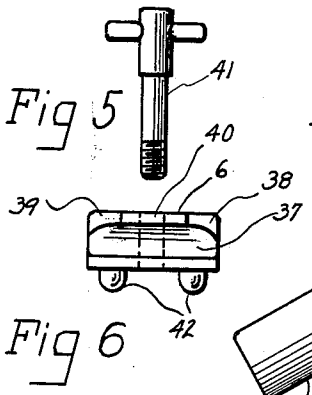


Fig 5

Fig 6

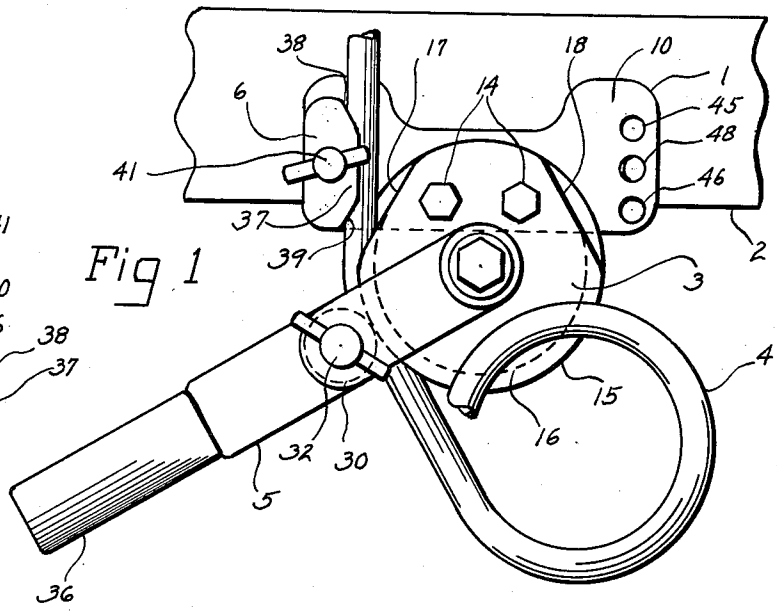


Fig 1

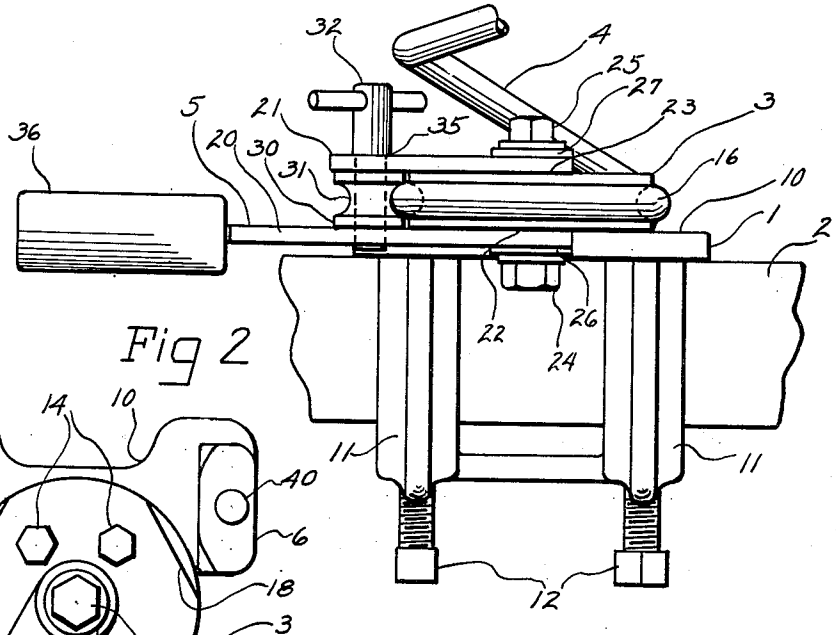


Fig 2

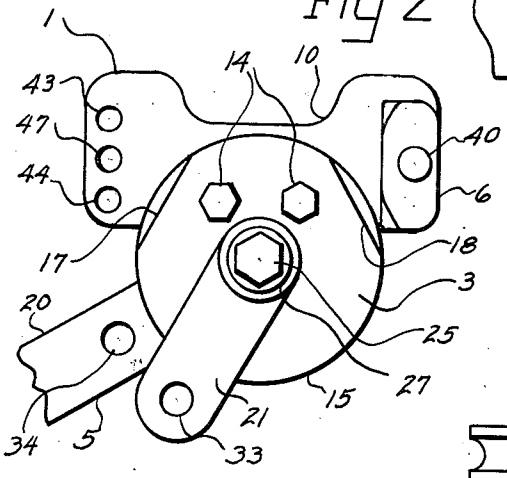


Fig 3

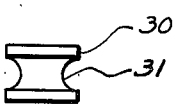


Fig 4

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INVENTOR.

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TUBE BENDER

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6 Claims. (Cl. 153—45)

My invention relates to tools and particularly to bending tools for pipe and tubing.

The object of my invention is to provide a new and improved tool for making bends of various angles and directions in pipe or tubing.

Another object is the provision of a new and improved tube bender for bending pipe or tubing into coils of any number of turns.

Another object is the provision of a tube bender having a frame and forming member and a compound bending lever associated therewith for pressing tubing into a curve against the forming member the lever being separable to release the tubing from the bender after the operation of bending. Another object being also to equip the bending lever in the tool herein described with a roller for ironing the tube against the forming member, provision being made for separating the roller from the lever when it is desired to release the tube.

Still another object is the provision of a pipe or tube bender having a forming block associated therewith which contains a groove around which the pipe or tubing may be bent, provision being made for an exit from the groove for the pipe or tubing to allow bends to be made in excess of 180 degrees.

A further object is to provide a bending tool for tubing having a stationary forming member and a retaining block for holding the tubing, positioned at a distance from each other, so that sufficient space is provided between them to allow extraction of the tubing after the bending operation, the block being cooperable in different positions to allow left hand or right hand bends.

Still a further object is to provide a tube bending tool of a type to be clamped to a stationary object in which a frame supports a forming member on which a compound bending lever is pivoted, the bending lever having a demountable roller for ironing the tube against the forming member and being separable to allow extraction of the tube, provision being made in the forming member for exit of the bent tubing as successive coils are built up during the bending operation, there being also a retaining block for holding the tubing during the operation positioned to allow release of the tubing from the tool after bending.

Further objects and advantages of my invention will become apparent as the description proceeds taken in connection with the accompanying drawing which forms a part of this specification.

As shown in the drawing:

Fig. 1 is a top view of my device with a tube inserted for bending.

Fig. 2 is a front view of the device.

Fig. 3 shows the device opened for release of the tube.

Fig. 4 is a side view of the ironing roller.

Fig. 5 is the screw stud and Fig. 6 is the retaining block with which it functions.

While I have shown in the drawing and shall herein describe in detail the preferred embodiment of my invention it is to be understood that I do not intend to limit my invention to the specific form disclosed, but aim to cover all the modifications and alternative constructions falling within the scope and spirit of the invention as expressed in the appended claims.

The bending tool described herein consists of a frame 1 adapted to be clamped or otherwise secured to some solid support such as a bench or beam 2. On the frame is a former 3 around which pipe or tubing 4 is bent. A bending lever 5 exerts the bending force and a retaining block 6 holds the pipe or tubing stationary during the bending operation.

The frame 1 is shown with a flat upper portion 10 the bottom side of which rests on top of the beam or bench 2, the frame being equipped with two U shaped legs 11 which curve around under the bench or beam. These legs are provided with set screws 12 by means of which the frame is securely clamped in place on the support.

On the flat upper portion 10 of the frame the former 3 is secured rigidly in place by bolts 14. Only the rear portion of the former overlaps the flat portion 10, the front part being allowed to freely overhang so as to facilitate the bending operation. An edge 15 of the overhanging part of the former is made in the form of the curve in which tubing is to be bent. The edge has in it a grooved recess 16 having a radius to fit the desired size of tubing, which recess extends entirely around the part of the former used for bending. On the former, slightly to the rear of the center, the upper wall of the groove 16 is cut away as at 17 on the left and 18 on the right to a depth equal to the depth of the grooved recess 16 to form an exit for the tubing from the groove when bends in excess of 180° are to be made.

The bending lever 5 has two arms 20 and 21, both pivoted to the former 3 at the center of the radius of the curved bending edge 15 at the points 22 and 23 respectively. Nuts 24 and 25

and washers 26 and 27 respectively hold the arms in place. Both arms may be swiveled independently as shown in Fig. 3.

An ironing roller 30 is adapted to fit between the arms 20 and 21 and has a circumferential groove 31 to correspond with the grooved recess 16 in the former 3. The roller is held in place by a pin 32 made to fit holes 33 and 34 in the lever arms, the pin having a shoulder 35 to prevent it slipping into the holes beyond the necessary distance. The pin can be readily withdrawn to allow the roller to be removed and the lever arms separated for extraction of the tubing from the recess. To facilitate bending the lower lever arm 20 is extended and provided with a handle 36.

In Fig. 1 the retaining block 6 is shown positioned on the frame for a right hand bend. A face 37 of the block is grooved in a shape similar to the groove 31 in the roller and the grooved recess 16 in the former. The front corners 38 and 39 of the block are broken so that when the block is in place as illustrated there is sufficient space between it and the former at the cut away portion to permit the tube to be removed at any time. In the center of the block is a clear hole 40 to accommodate the stud screw 41 and on the bottom sides are pegs 42. These pegs are designed to fit into the sets of apertures 43 and 44 or 45 and 46 on the frame. In the frame are also threaded holes 47 and 48 associated with the apertures and tapped to fit the thread of the stud screw 41. The retaining block may be positioned as in Fig. 1 for a right hand bend or as in Fig. 3 for a left hand bend.

A summary of operation is best given by describing the procedure necessary to make coils of tubing with this tool, since the steps for any bend less than a coil are exactly the same and the procedure in making a bend of less than 180° will be quite obvious.

For making coils, the tubing is placed in the tool with a free short end protruding some distance in front of the tool. No clamping of the tool is requisite, it being only necessary to lay the tube in place. Then the lever arms are brought into position over one another and the roller 30 is inserted between them and there secured by the pin 32. By ironing the tube against the former in successive steps a partial loop may be formed in the tubing as shown in Fig. 1. Then another short length of tubing is pushed out and the bend started. When the loop is pushed around it need be bent slightly upwards by hand so that it leaves the groove 16 in an upward direction at the cut away part 18. Each time a new short length is bent the preceding loop at the point of exit will fall in the cut away part 18 and the coils will progress continuously upwards as their number increases. When a desired number of complete loops have been formed the bending lever is broken open and the tube turned to an angle so that the remaining straight portion can be slipped out between the cut away part 17 and the broken corner 39 of the retaining block 6. The widely separated coils of tubing can later be squeezed together as desired. It will be apparent from the foregoing that any number of successive bends, right or left, up or down, can be made in the same piece of tubing by the expedient of shifting the retaining block to right or left hand and by turning the tubing up or down at right angles to the preceding bend.

What I claim, therefore, and seek to secure by Letters Patent is:

1. A bender for tubing comprising a supporting frame having means therein for releasably attaching it to a solid support, a former secured to the frame having a groove therein to form a mold against which tubing may be bent, said former being provided with relieved portions at either side communicating with the groove constituting exits therefrom for the tubing, a lever means, pivoted on the former having an extension for a hand hold and a demountable ironing element secured to said lever means adapted to form an aperture between itself and the former for confining the tubing and for ironing the tubing against the groove in the former, said ironing element being separable from said lever means to permit release of tubing from the aperture, a retaining member for holding the tubing during bending positionable on the frame adjacent a relieved portion of the former at a distance from said former greater than the diameter of the tubing and adapted during a bending operation to temporarily engage a protruding straight portion of the tubing while the adjoining portion is being bent around the former and adapted after bending to permit removal of the tubing through the space between itself and the former.

2. A bender for tubing comprising a supporting frame having means for clamping said frame to a solid support, said frame having a flat upper surface and a flat former secured thereon, said former having a groove extending in a curve around the edge to form a mould against which tubing is bent and having relieved portions on the edge communicating with the groove constituting exits therefrom for the bent tubing, a bending lever permanently pivoted on the former comprising a pair of arms, one having an extension for a hand hold, and a demountable roller secured by a removable pin between said arms for ironing the tubing against the groove in the former, said lever arms being separable to release the tubing when bent, a retaining means on the frame for holding a portion of the tubing in position while an adjacent portion is ironed against said groove comprising a block, a screw stud, and pegs on said block, said frame having two sets of holes cooperable with said pegs to secure said block in different positions with respect to said former for forming left hand and right hand bends, the arrangement of said sets of holes being such that the block is secured in positions at a greater distance from the former than the diameter of the tubing to thereby allow extraction of the tubing at any stage of the bending upon being released from the hand lever.

3. A bender for tubing having a body portion comprising a frame, means on the frame having a curved groove therein for forming the curve of the tubing, a cut-away section on said means providing access to the groove constituting a lateral passage for the tubing from the groove; lever means for ironing the tubing against the curved groove, having component parts independently pivoted to the body portion on opposite sides of the tubing and an ironing element removably pinned between them, said parts being separable to release the tubing when bent by said elements, retaining means positionable on the body for holding an outward extending portion of the tubing in place while the adjacent portion is bent on the forming means, said retaining

means being changeable in position with respect to the curved groove for producing left hand and right hand bends.

4. A continuous coil bender for making 360° bends in tubing comprising a frame, forming means thereon stationary with respect to the frame having a curved portion for determining the curve of the tubing, lever means pivoted centrally of the forming means including an ironing element for forcing successive sections of tubing against the forming means, and means on said frame formed with a groove facing the forming means and serving to retain the tube in position in the bender, one wall of the groove being relieved adjacent the forming means to provide an exit for portions of the 360° bends placed in the tubing by successive bending operations.

5. A bender for tubing comprising a frame, means on the frame for forming a curve in the tubing, a bending lever cooperable with said means including a pair of mutually separable arms independently swiveled with respect to said means, an ironing element, and means for holding the ironing element adapted to releasably pin said arms together in a position for ironing the tube into the forming means, said arms and said ironing element being adapted when separated to release said tubing after a bending operation is complete, and retaining means for holding a portion of the tube in position with respect to said forming means while an adjacent portion is bent about said forming means.

6. A bender for tubing comprising a frame, forming means on the frame for determining the curve of the tubing, a lever member pivoted thereon including an ironing element for pressing the tubing into a curve against the forming means, a single symmetrical tube retaining member provided with an elongated curved recess for reception of a straight section of tubing and engaging means on each side of the frame cooperable with corresponding engaging means on the retaining member to securely position said retaining member on the frame at one side at a time leaving a clear space on the other side for the formation of a 180° bend and positioned with respect to the forming means so that the bottom of the curved recess lies adjacent one end of the curve of the forming means to prevent formation of a secondary bend in the tubing adjacent the desired bend, said retaining member having a portion of the wall at the top thereof adjacent the forming means removed to permit extraction of the tubing after the bend is made.

FRANK NEUKIRCH.