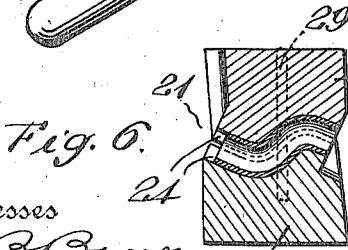
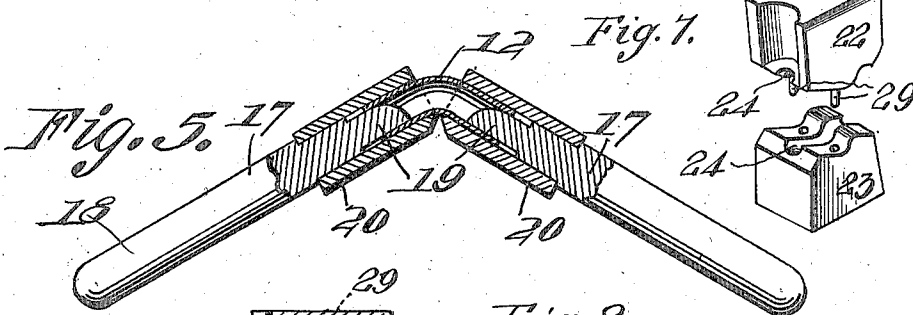
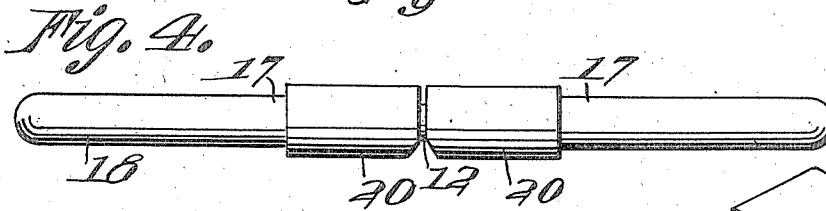
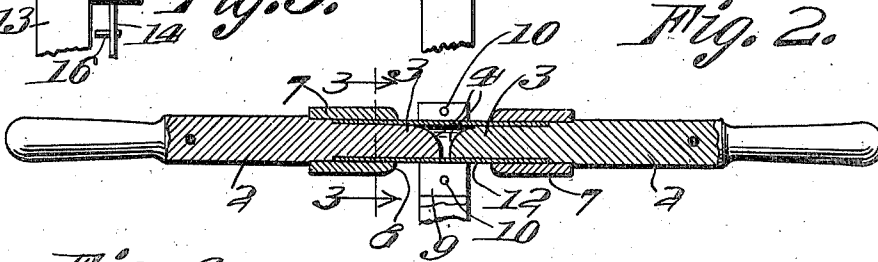
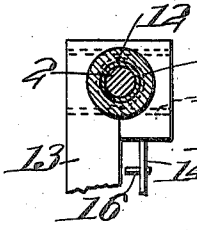
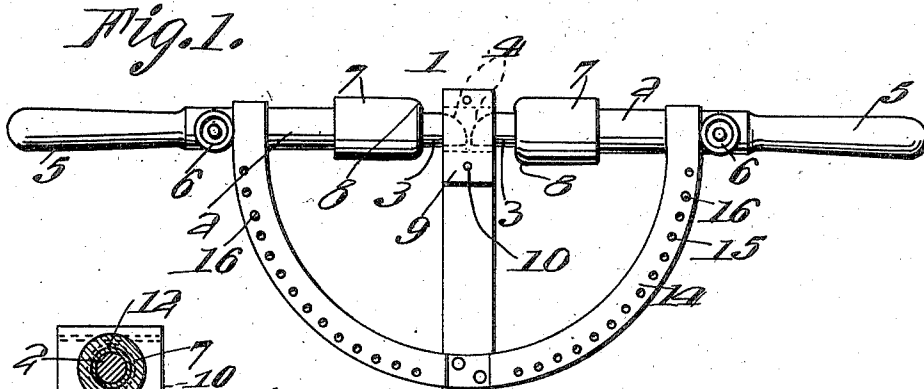


G. F. ANDRES.
TUBE BENDER.

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951,717.

Patented Mar. 8, 1910.



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UNITED STATES PATENT OFFICE.

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TUBE-BENDER.

951,717.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed April 29, 1909. Serial No. 493,204.

To all whom it may concern:

Be it known that I, GEORGE F. ANDRES, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Tube-Benders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in tube benders.

The object of the invention is to provide a device of this character by means of which perfect bends may be made in tubes without the use of a core or filling of any kind.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side view of a bending tool constructed in accordance with the invention; Fig. 2 is a vertical longitudinal sectional view through the tube holding and bending portion of the tool, showing a tube in position; Fig. 3 is a cross sectional view on the line 3—3 of Fig. 2; Fig. 4 is a side view of a similar form of the tool; Fig. 5 is a longitudinal sectional view of Fig. 4, showing the operation of the tool. Fig. 6 is a cross sectional view of the finishing die employed in connection with the bending tool showing an elbow arranged therein for finishing; Fig. 7 is a perspective view of the die, showing the parts separated; Fig. 8 is a view of the tool used for finishing the bend or elbow in the die.

Referring more particularly to Figs. 1 and 2 of the drawings, 1 denotes the bending tool which comprises a pair of tube engaging bars 2 having reduced inner ends 3 which are rounded off on one side, as shown at 4. The bars 2 are provided on their outer ends with handles 5 and on one side of the bars, adjacent to the handles 5 are revolubly mounted guide rollers 6. On the reduced inner ends of the tube engaging bars 2 are tube holding sleeves 7, said sleeves having their inner ends rounded or beveled off, as shown at 8.

In connection with the form of the tool

shown in Figs. 1 and 2, I provide a tube holding block 9 which is preferably formed in separable sections which are held together by dowel pins 10. Each section of the block is formed with a transversely disposed semi-circular groove which, when the sections of the block are brought together, forms a cylindrical passage or seat to receive the tube 12. One section of the block 9 is secured to the upper end of a supporting bar 13 to which is also secured a semi-circular guide bar 14 with which is slidably engaged the bars 2 and with the outer edge of which is engaged the guide rollers 6 which are revolubly mounted on the bars 2, as hereinbefore described. By means of the guide bar 14, the tube engaging bars 2 will be steadied and guided in their movement. In the bar 14 is formed a series of apertures 15 in which are adapted to be inserted stop pins 16 which limit the movement of the bars 2 and thus regulate the amount of bend to be given to the tube.

In Figs. 4 and 5 of the drawings is shown a simpler form of the bending tools in which the holding block 9 and the guide bar and stop mechanism is dispensed with. The form of tool shown in these figures comprises tube bending bars 17 provided with handles 18 and reduced ends 19 which are inserted into the opposite ends of the tube to be bent. On the reduced ends of the bars 17 are arranged sleeves 20 which fit over the ends of the tube and thereby hold the same in position while being bent. After the bars 17 are thus engaged with the tube, the handles 18 are moved toward each other, thereby bending the tube to the desired extent or curvature.

In connection with the bending tool herein shown and described, I employ a finishing or "boling" die, in which any irregularities or imperfections in the bends or bows formed by the bending tool are removed and the bends completed to form perfectly smooth even elbows.

The finishing die 21 is preferably constructed in separable sections 22 and 23 which are formed, as shown in Figs. 6 and 7. In the engaging faces of the sections 22 and 23 of the die, are formed tube receiving grooves 24 into one or the other of which is placed the tube which has been previously bent by the bending tool in the manner described. After the bent tube has thus

been engaged with the groove in one or the other section of the die, the sections of the die are placed together thus securely holding the elbow or bent tube to permit the bend therein to be completed and any irregularities or imperfections removed therefrom by means of the "bollling" tool 25.

The "bollling" tool 25 employed in connection with the die, comprises a handle portion 26 having a tapered outer end which is bent or curved, as shown at 27 and is provided on its outer end with a ball 28 which is adapted to be inserted in one end of the tube or elbow in the die and forced there-through, thus straightening out the imperfections or irregularities in the bends of the tube by forcing the bent walls thereof into engagement with the walls of the groove formed in the die. During the finishing operation of the elbow, the sections of the die are preferably held together in a vise or other suitable clamping device and said sections of the die are preferably provided with dowel pins 29 by means of which the grooves therein are held in perfect alignment.

A tube bending tool of this character is especially adapted for forming elbows, return bends or angle ells employed in the manufacture of brass musical instruments. The same may be employed, however, for forming elbows or bends in any form of sheet metal tubing.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention, will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claims.

Having thus described my invention, what I claim is:

1. In a tube bending tool, a corresponding hand operated pair of bending bars to be engaged with the ends of the tube to be bent, tube engaging sleeves on said bars, a tube holding block to receive the tube, a block supporting bar and handles arranged on the outer ends of said bending bars.

2. In a tube bending tool, a pair of corresponding bending bars having curved or rounded integral inner ends adapted to fit the ends of the tube to be bent, tube holding sleeves on said bars adapted to be engaged with the ends of the tube, a separable tube

holding block to receive the tube, a block supporting bar, and means whereby said bending bars are guided and limited in their movement.

3. In a tube bending tool, a pair of bending bars adapted to be engaged with the ends of the tube to be bent, tube holding sleeves on said bars, a tube holding block, a supporting bar secured to said block, a guide bar secured to said supporting bar and having formed therein a series of apertures, guide rollers revolubly mounted on said bending bars and adapted to engage the edge of said guide bar, stop pins adapted to be engaged with the apertures in said guide bar to limit the movement of said bending bars and thereby regulate the bend or curvature of the tube, and operating handles arranged on said bending bars.

4. In a tube bending tool, a pair of corresponding hand operated bending bars having reduced rounded inner ends to fit in the ends of the tube to be bent, tube holding sleeves on the inner ends of said bars to receive the ends of the tube, a separable tube holding block comprising a pair of corresponding sections, a block supporting bar, and means secured to said supporting bar and engaging the ends of the bending bars, whereby said bars are guided and limited in their movement.

5. In a tube bending tool, a pair of corresponding hand operated bending bars having reduced rounded inner ends to fit in the ends of the tube, a separable tube holding block, a block supporting bar, and means secured to said supporting bar and engaging the ends of the bending bars for guiding the bending bars in the arc of a circle during the bending operation.

6. In a tube bending tool, a pair of bending bars to be engaged with the ends of the tube to be bent, tube holding sleeves on said bars, a tube holding block, a supporting bar secured to said block, a semi-circular guide bar secured to said supporting bar and adapted to guide the movement of the bending bars during the bending operation, and rollers on the bending bars to bear upon the outer edge of said guide bar.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE F. ANDRES.

Witnesses:

PATRICK J. MONAHAN,
T. D. ULRICH.