April 3, 1956 C. E. MARTIN, SR 2,740,309

TUBE STRAIGHTENING AND BENDING TOOL

Filed May 4, 1953

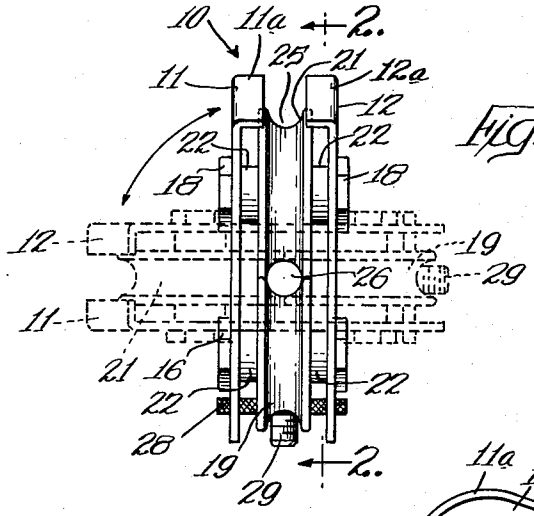


Fig. 1.

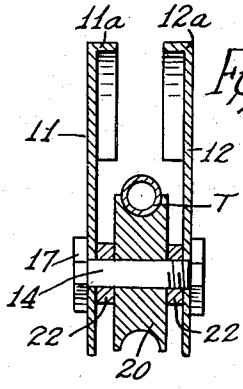


Fig. 4.

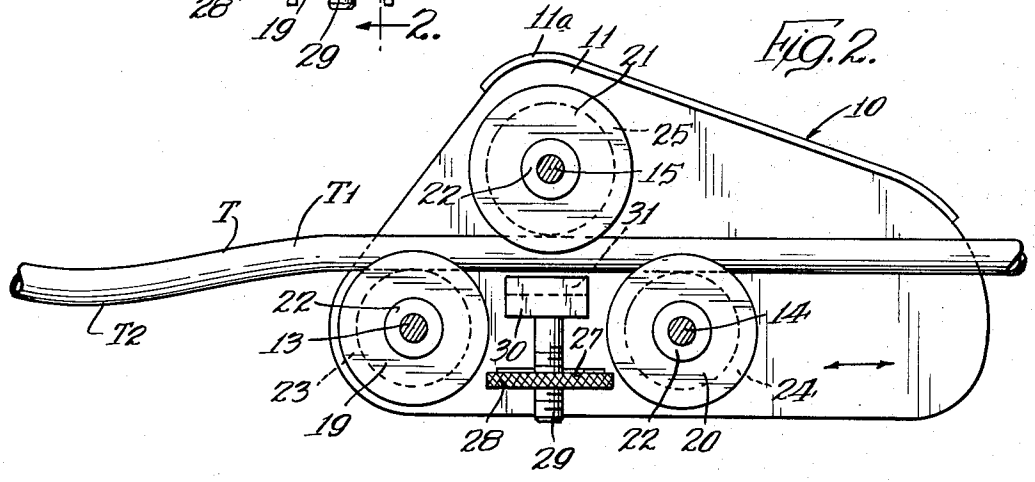


Fig. 2.

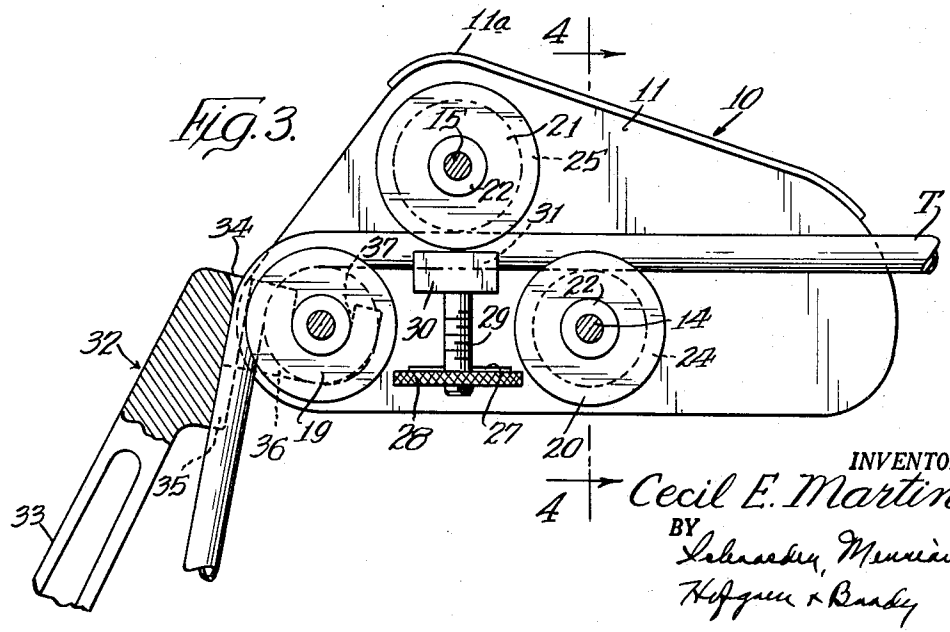


Fig. 3.

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United States Patent Office 2,740,309 Patented Apr. 3, 1956

2,740,309

TUBE STRAIGHTENING AND BENDING TOOL

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Application May 4, 1953, Serial No. 352,932

5 Claims. (Cl. 81—15)

This invention relates to a combined tube straightening and bending tool.

In the use of metal tubing of the sort which is employed in fluid connections, and more particularly in refrigeration lines and fuel and oil lines in automobiles and aircraft, it is often necessary to straighten a bend in a piece of tubing preparatory to changing the connections, and the tubing must thereafter be bent to a new desired shape. Furthermore, certain types of such tubing are quite soft and become accidentally bent during installation and must be straightened to make a clean connection.

In order to manipulate metal tubing in any desired manner, it is necessary to employ both tube straightening tools and tube bending tools.

The principal object of the present invention, therefore, is to provide a simple, compact tool with may be used both for tube straightening and for tube bending.

A further object of the invention is to provide such a tool in which certain of the tube straightening elements cooperate with certain added elements when the tool is used for tube bending.

Yet another object is to provide such a tool in which the bending elements do not interfere with the tube straightening functions of the tool, and in fact are completely out of the way when the tool is being used as a tube straightener.

Other objects and advantages will be apparent from the following detailed description taken in connection with the accompanying drawings in which:

Fig. 1 is an end elevational view of a combined tube straightening and bending tool made in accordance with the present invention, the view in broken lines and the arrow showing how the tool is oscillated when it is being used to straighten a piece of tubing;

Fig. 2 is a section taken as indicated along the line 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 2 showing the tool in use for bending a piece of tubing, and

Fig. 4 is a section taken as indicated along the line 4—4 of Fig. 3.

While I have shown and shall hereinafter describe one embodiment of the invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

Referring to the drawings in greater detail and referring first to Figs. 1 and 4, the tool of this invention has a frame, indicated generally at **10**, which is composed of a pair of parallel plates **11** and **12** which are retained in parallel spaced relationship by means of shouldered assembly members **13**, **14** and **15** which are threaded at their ends to receive assembly nuts **16**, **17** and **18**, respectively. The assembly members **13**, **14** and **15** serve as spindles for rollers **19**, **20** and **21**, respectively, which are journalled thereon and centered between the plates **11** and **12** by means of identical pairs of spacer members **22**. The plates **11** and **12** are of a size to fit

conveniently in the palm of the hand, and are tapered at the end away from the rollers so they are easily gripped. Inturned flanges **11***a* and **12***a* provide a smooth surface where the flesh in the crotch of the thumb is stretched in gripping the tool.

The rollers **19**, **20** and **21** are provided, respectively, with circumferential grooves **23**, **24** and **25**. The assembly members **13**, **14** and **15** are arranged at the apices of an isosceles triangle with its base along a line between the members **13** and **14**, and its apex at **15**, the triangle being of such dimensions that the adjacent margins of the rollers **19**, **20** and **21** lie in a plane which is parallel to the base of the triangle.

When the tool is in use for tube straightening as shown in Fig. 2, a piece of tubing is introduced into the cylindrical space **26** defined by lines drawn tangent to the circumferential roller grooves **23**, **24** and **25** and parallel to the line forming the base of the triangle, and the tool is moved manually along the tube to pass any bends, such as T1 and T2, in the tube through said space. The tool ordinarily is oscillated through an angle of about 90° as it is passed over any bend in the tubing as indicated in dotted lines in Fig. 1; and several passes usually are made.

As best seen in Figs. 2 and 3 there are a pair of registering slots **27** which are formed in the frame plates **11** and **12** adjacent a margin thereof and parallel to the space **26**. Rotatably mounted in said slots is a finger wheel **28** which, as seen in Fig. 1, extends through the slots so that it may be readily turned with the fingers. The finger wheel **28** is provided with a threaded aperture into which is screwed a threaded stud **29** on the inner end of which is a tube gripping block **30** which has in its forward face a tube receiving groove **31**. Rotation of the finger wheel **28** moves the tube gripping block **30** between an idle position, shown in Fig. 2, where it is clear of a piece of tubing in the space **26**, to a tube gripping position, shown in Fig. 3, in which its forward edges, which comprise the outer margins of the groove **31**, are close adjacent the margin of the roller **21**. When the tube gripping block **30** is in the position shown in Fig. 3 a piece of tubing T is held firmly in place so that it may be bent around the grooved roller **19**.

In order to accomplish the bending operation, the device includes a bending lever, indicated generally at **32**, which is provided with a handle **33** and a bending block **34** which has a tube receiving groove **35**. Flanking the bending block **34** is a pair of spaced hooks **36** which span the roller **19** and are provided with registering recesses **37** which partially encircle the spacers **22** on the spindle for said roller so that the bending lever may be pivoted about said spindle, and is detachable therefrom. The length of the hooks **36** is such that the face of the bending block **34** flanking the groove **35** is substantially in contact with the margin of the roller **19**.

When the device is in use for tube bending, as seen in Fig. 3, a straight piece of tubing is introduced into the space **26** between the rollers **19**, **20** and **21**, and the tool gripping block **30** is moved into gripping engagement with a piece of tubing. The hooks **36** on the bending lever **32** are then engaged with the spindle for the roller **19** with the bending block **34** positioned above the tubing T in the same plane with the groove **25** in the upper roller **21**. The tubing may then be bent to any desired angle by swinging the bending lever **32** downwardly, using the recesses **37** and the hooks **36** to pivot the arm around the spindle. The bending block **34**, which has its forward surfaces substantially in contact with the margin of the roller **19**, bends the tubing around said roller, which therefore serves as a bending die.

I claim:

1. A hand operated tube straightening and bending

tool comprising: a frame; three grooved rollers journalled on spindles in said frame, said spindles being disposed at the apices of an isosceles triangle of such dimensions that the adjacent margins of the rollers lie in a plane parallel to the base of the triangle to provide a straight tube receiving space defined by the grooves in the rollers; a grooved tube gripping block which is movable between an idle position and a position in which the outer margin of the groove is close adjacent the margin of one of said rollers; and a bending lever pivoted on the spindle of a second of said rollers, said lever having a bending block provided with a groove which may be aligned with that in said one of said rollers, the outer margins of the groove in said bending block being substantially in contact with the margin of said second of said rollers.

2. The device of claim 1 in which the bending lever has a pair of spaced hooks which span the second roller and partially encircle the spindle of said roller whereby the bending lever is detachable from said spindle.

3. A hand operated tube straightening and bending tool, comprising: a pair of plates secured together in parallel, spaced relationship to provide a frame, said plates having registering slots adjacent and parallel to one margin; three grooved rollers journalled on spindles in said frame, said spindles being disposed at the apices of an isosceles triangle of such dimensions that the adjacent margins of the rollers lie in a plane parallel to the base of the triangle to provide a straight tube receiving space defined by the grooves in the rollers, said space being parallel to the slots in the plates; a finger wheel which has its periphery projecting through said slots in the plates, said wheel having a threaded aperture; a threaded stud extending through said aperture; a grooved tool gripping block mounted on the inner end of said stud so that rotation of said finger wheel moves said block between an idle position and a position in which the outer margin of the groove therein contacts

the margin of the roller at the apex of the isosceles triangle; and a bending lever having a bending block provided with a groove which may be aligned with that in said roller at the apex of the triangle, said bending lever having a pair of spaced hooks which span a second roller and partially encircle the spindle of said second roller whereby the bending lever may be detachably secured in pivotal relationship to said second roller, the lengths of said hooks being such that the outer margins of the groove in the bending block are substantially in contact with the margin of said second roller when the bending lever is engaged with said spindle.

4. The device of claim 1 in which the frame is provided with a pair of registering slots and said tube gripping block is mounted on a threaded stud extending through a finger wheel, said finger wheel having a periphery projecting through the slots in the frame.

5. The device of claim 1 in which the frame comprises a pair of parallel plates which are proportioned and tapered to fit the hand and having matching inturned flanges along one margin providing a smooth surface.

References Cited in the file of this patent

UNITED STATES PATENTS

299,615	Borchardt	June 3, 1884
730,549	Mallett	June 9, 1903
806,085	Green	Nov. 28, 1905
1,165,779	Humphrey	Dec. 28, 1915
1,285,987	Grunhow	Nov. 26, 1918
1,857,325	Ottenstein	May 10, 1932
2,086,974	Belfore	July 13, 1937
2,127,185	Parker	Aug. 16, 1938
2,345,102	Dick	Mar. 28, 1944
2,396,182	Kibler	Mar. 5, 1946

FOREIGN PATENTS

285	Great Britain	Jan. 5, 1910