Nov. 27, 1962 T. H. THOMPSON 3,065,657

SHEET METAL TUBING CUTTER

Filed April 16, 1956 3 Sheets-Sheet 1

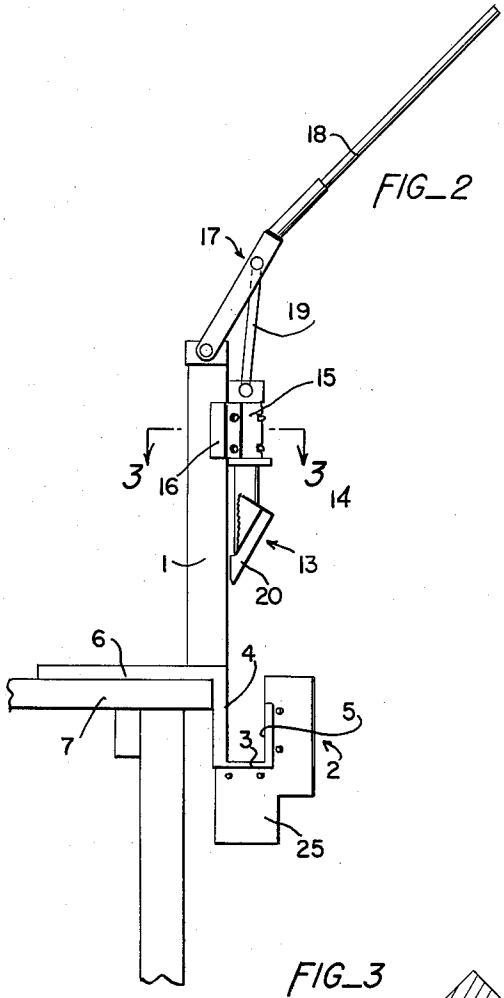


FIG_2

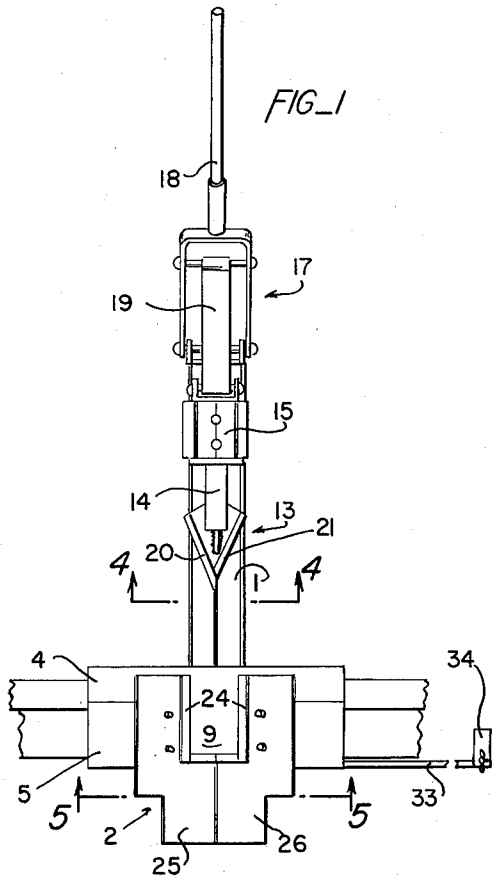


FIG_1

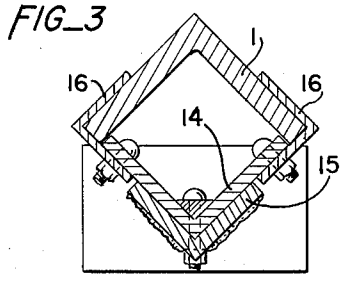


FIG_3

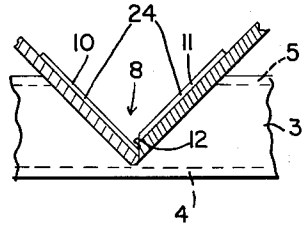


FIG_5

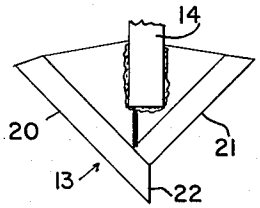


FIG_4

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SHEET METAL TUBING CUTTER

Filed April 16, 1956 3 Sheets-Sheet 2

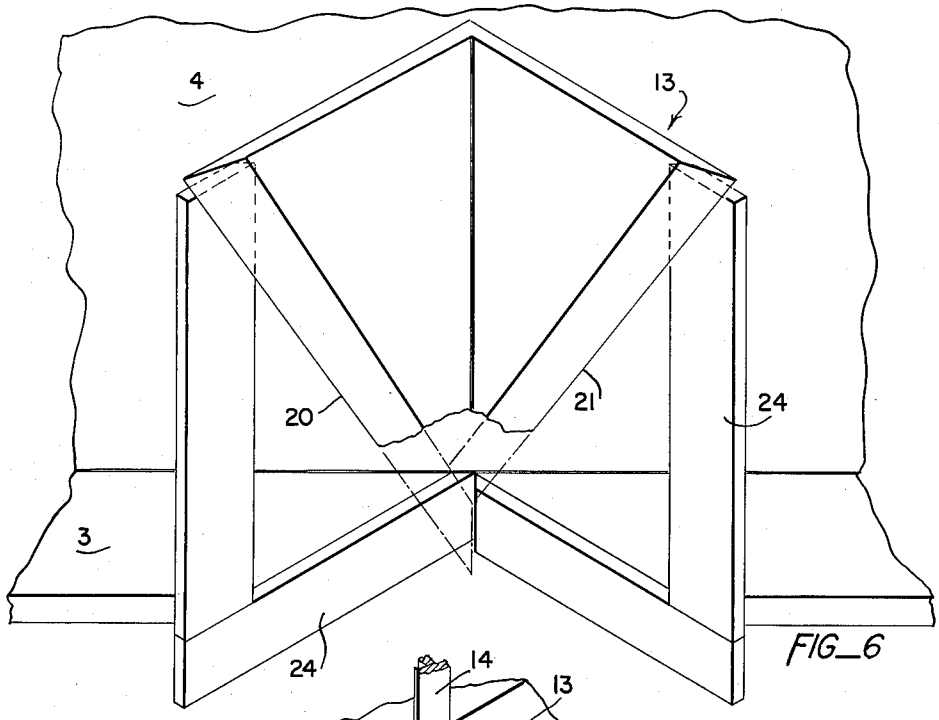


FIG_6

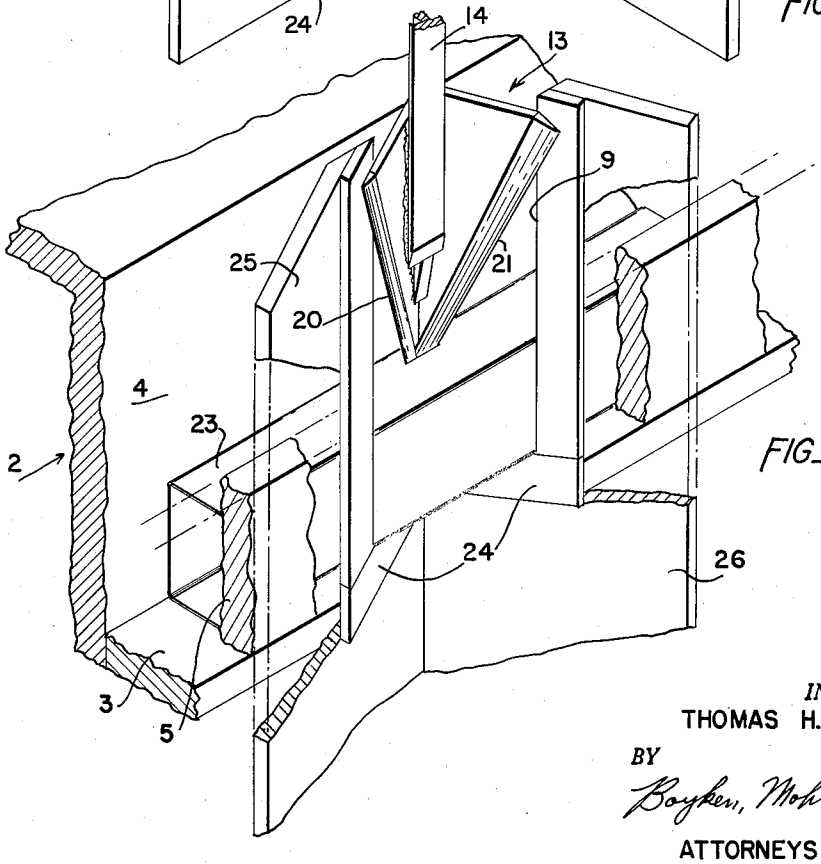


FIG_7

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SHEET METAL TUBING CUTTER

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FIG_11

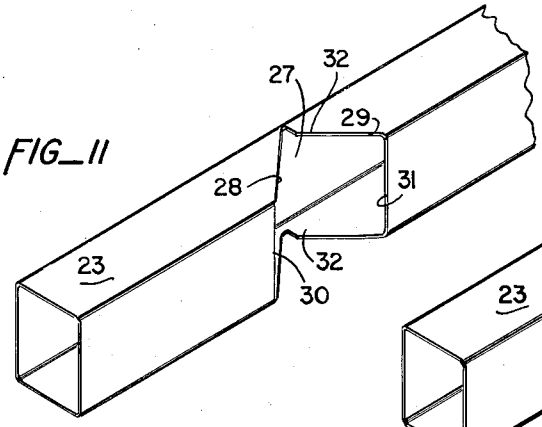


FIG_12

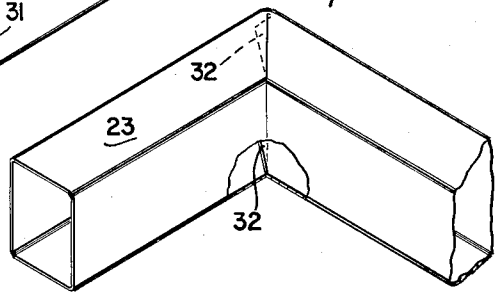


FIG_9

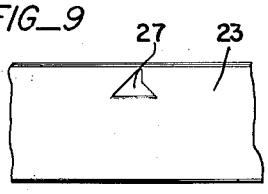


FIG_10

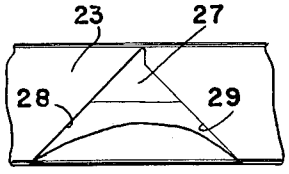
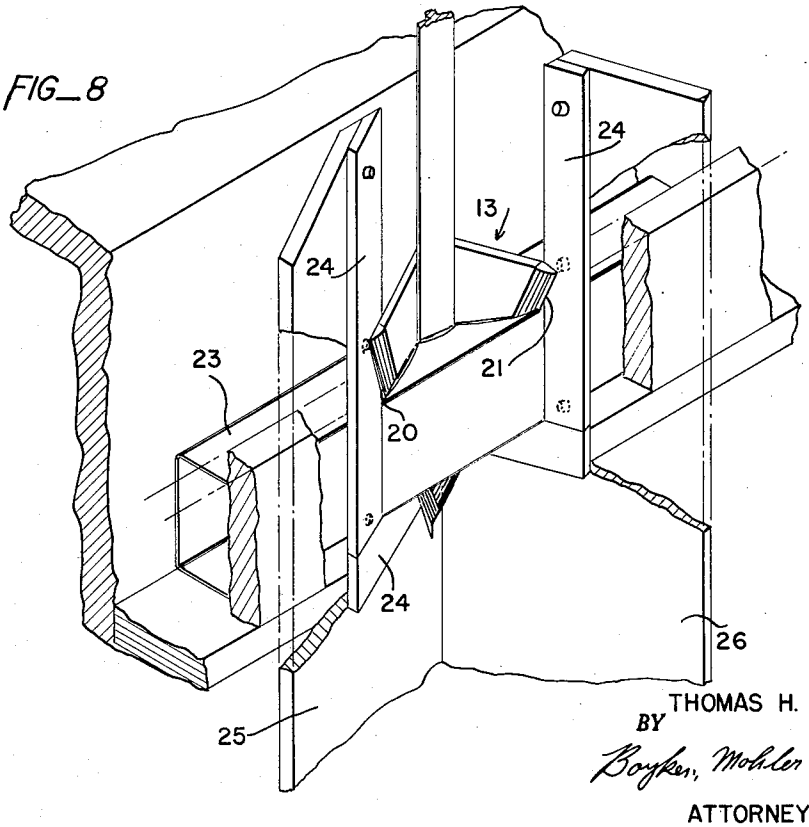


FIG_8



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3,065,657

SHEET METAL TUBING CUTTER

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2 Claims. (Cl. 83—451)

This invention relates to a device for cutting sheet metal tubing and more particularly to such a device for cutting a notch in tubing to facilitate bending the same.

The device of this invention is adapted to be used with relatively light gauge sheet metal tubing of the type commonly used for rain gutter down spouts and the like. In order to form angles or joints in such tubing it is customary practice to cut the tubing walls on an angle and then join the cut edges with solder or the like.

It has been customary to cut the sheet metal tubing by hand with a pair of tin snips to the desired shape. This practice, however, is both tedious and inaccurate and results in substantial delay in making the down spout joints.

It is therefore an object of this invention to provide a device for rapidly and efficiently cutting sheet metal tubing for facilitating bending the same.

Another object of this invention is the provision of a device for making accurate cuts in the walls of a length of sheet metal tubing for making an angular joint in the same.

It is a further object of this invention to provide a device for notching sheet metal tubing, which device is rugged and will withstand hard usage under field conditions. Still another object of this invention is the provision of a device for notching a piece of sheet metal tubing to facilitate bending the same, which device provides overlapping edge portions at the tube bend.

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

FIG. 1 is a front elevational view of the device of this invention;

FIG. 2 is a side elevational view of the device of this invention as seen from a position at right angles to FIG. 1;

FIG. 3 is a cross sectional view taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a partial bottom plan view of the cutting blade of the device of this invention as seen generally from line 4—4 of FIG. 1;

FIG. 5 is a sectional view as seen from line 5—5 of FIG. 1;

FIG. 6 is a semischematic perspective view of the cutting blade and anvil of the device of FIG. 1;

FIG. 7 is a perspective view, partly broken away to show structure, of the blade of the device of this invention beginning a cut on a length of sheet metal tubing;

FIG. 8 is a perspective view similar to FIG. 7 but showing the cutting blade advanced substantially half way through the tubing;

FIGS. 9, 10 are side elevational views of a piece of sheet metal tubing after being cut by the device of this invention to the extent shown in FIGS. 7, 8 respectively;

FIG. 11 is a perspective view of a length of sheet metal tubing as cut by the device of this invention, but before the same is bent to form a joint; and,

FIG. 12 is a perspective view of the piece of sheet metal tubing of FIG. 11 after the same has been bent to form a joint.

In detail, referring to FIGS 1, 2 the device of this invention comprises an elongated frame member 1 having a tubing holder, generally designated 2, secured to one end thereof. Said tubing holder is generally U-shaped in cross section and provides a bottom wall 3 and a pair

of opposed side walls 4, 5 for embracing three sides of a length of sheet metal tubing. Side wall 4, where it is secured to frame 1, may be formed with a relatively large flange 6 (FIG. 2) for securing the device of this invention to a bench 7 or the like.

Bottom wall 3 of holder 2 is provided with a generally V-shaped opening or notch 8 which opens into a parallel edged gap 9 (FIG. 1) in side wall 5. The edges 10, 11 (FIG. 5) of notch 8 diverge in a direction from side wall 4 toward side wall 5. Edge 10 terminates adjacent side wall 4 but edge 11 terminates at a point spaced from side wall 4 to provide a straight, nondiverging, offset portion 12 connecting edges 10, 11. Gap 9 is formed in side wall 4 in continuation of the divergent ends of notch 8.

Notch 8 and gap 9 in effect form an opening in tube holder 2 through which a cutting blade, generally designated 13, is adapted to pass in cutting the tubing. Blade 13 is mounted on the end of a bar 14 which extends from a slider 15. Slider 15 is provided with a pair of flanges 16 (FIGS. 2, 3) extending over frame member 1 for mounting said slider for reciprocation on said frame member. Hence, blade 13 is mounted for reciprocation longitudinally of frame member 1.

A toggle linkage, generally designated 17 (FIGS. 1, 2) is provided for moving blade 13 toward and away from holder 2. Toggle linkage 17 comprises a lever handle 18 pivotally connected at one end to frame member 1 and a link 19 pivotally connected at one end to lever 18 intermediate the ends thereof, and at the other end to slider 15. In this manner, swinging lever 18 drives blade 13 toward holder 2.

Blade 13 is provided with a pair of diverging cutting edges 20, 21 (FIGS. 1, 4, 6) which slant outwardly away from frame member 1 (FIG. 2). As seen in FIG. 4 the projected contour of cutting edges 20, 21 corresponds to that of edges 10, 11 of notch 8. In other words, cutting edge 20 terminates at a point adjacent frame 1 and side wall 4 whereas cutting edge 21 terminates at a point spaced from said side wall providing an offset section 22 of nondiverging cutting edge joining the ends of edges 20, 21.

As seen in FIG. 7, cutting edges 20, 21 slant away from frame member 1 and side wall 4 a sufficient distance to overlap the parallel edges of gap 9 when blade 13 is moved to a position shown in FIG. 7. To aid in cutting or shearing the length of sheet metal tubing 23 (FIGS. 7, 8) the edges of gap 9 and edges 10, 11 of notch 8 may be lined with a hardened anvil 24. Said anvil may be supported by backing plates 25, 26 which are disposed in the form of a V and secured to side wall 5 and bottom wall 3 of holder 2.

In operation, a length of tubing 23 is placed in holder 2 so as to be embraced by bottom wall 3 and side walls 4, 5 thereof. Cutting blade 13 is urged toward holder 2 by lever 18 and the point of the cutting edge 20 first enters the wall of the tubing. Because of the offset between cutting edges 20, 21 provided by nondiverging section 22, the first portion of the hole 27 cut in tubing 23 is shaped as shown in FIG. 9, similar to the configuration of the bottom of V-shaped notch 8 (FIG. 5).

As blade 13 progresses through tubing 23, edges 20, 21 cut diverging lines 28, 29 (FIG. 10) through the side wall of the tubing. By this time the forward point of blade 13 has progressed through the opposite side wall of the tubing as shown in FIG. 8. When the cutting edges 20, 21 have reached the juncture between the tubing side walls, said cutting edges form straight parallel cuts 30, 31 (FIG. 11) in the side wall of the tubing adjacent the wall in which the V-shaped notch has been cut. It will be noted that cutting edges 20, 21 cooperate with the anvil 24 lining the edges of gap 9 in making said parallel cuts.

At the same time the pointed end of blade 13 is cutting a V-shaped notch in the lower or opposite side wall of the tubing in cooperation with the anvil 24 lining the sides of notch 8. The length of tubing 23 with a V-shaped portion entirely cut out by blade 13 in the above described manner is shown in FIG. 11. Instead of a plain V notch in the tubing, the device of this invention cuts out a notched portion in the opposing tubing walls leaving a projection 32 on each said wall on the same side of hole or notch 27. Upon bending the length of tubing 23 about the uncut side wall, as shown in FIG. 12, projections 32 overlap the edges of the tubing on the opposite side of the notch. In this manner, when the joint in the tubing is soldered along the cut edges of the notch, the same may be more easily made water tight. The offset of cutting edges 20, 21 shown in FIG. 4 therefore provides for the overlapping joint shown in FIG. 12.

Tubing holder 2 may also be provided with an elongated arm 33 (FIG. 1) on which an adjustable stop 34 is slidably mounted. By placing a length of tubing with one of its ends against stop 34, a notch in the tubing may be cut at the desired predetermined point.

It has been found that with the device of this invention, joints in sheet metal tubing may be easily and readily formed by notching said tubing as hereinbefore described. An operator of this tubing cutter may cut all the tubing necessary for a particular job in a relatively short time and will be assured of a good fit when bending the tubing to form the angle joints.

Although the invention has been described and illustrated in detail, such is not to be taken as restrictive thereof, since it is obvious that modifications could be made therein without departing from the spirit and scope of the invention.

I claim:

1. A device for cutting a notch in sheet metal tubing for facilitating bending the same, said device comprising: an elongated frame, a tubing holder secured to said frame and extending transversely thereof and having a generally U-shaped cross section for embracing a length of tubing, a notch provided in the bottom wall of said holder having a pair of diverging edges, one of said edges terminating adjacent one side wall of said holder, the other of said edges terminating at a point spaced from said one side wall and connected to said one edge by an offset portion diverging from said one edge by an angle less than the angle between said edges, a parallel-edged gap provided in the other of said side walls in continuation of the divergent ends of said notch, and a shearing blade mounted on said frame for reciprocation longitudinally thereof and along an axis parallel to the edges of said gap and through said notch, said blade having a pointed piercing end and a pair of diverging edges mating with the edges of said notch and extending outwardly of said holder through said gap.

2. A downspout miter cutter comprising an upper piercing die and a lower die, first die means on the lower die having a pair of angularly divergent, intersecting inwardly facing cutting edges thereon, second die means on the lower die having a pair of inwardly facing, parallel cutting edges thereon, each of which perpendicularly intersects one of the divergent cutting edges of said first lower die means a predetermined distance from the point of intersection of the latter, a pipe retaining member extending parallel to the plane defined by the parallel cutting edges and closely beyond the intersection of the divergent cutting edges on the first die means for retaining a rectangular pipe of predetermined width upon the first die means and between the retaining member and the second die means, a pair of intersecting cutting edges on the piercing die disposed in planes defining an angle similar to that defined by the divergent cutting edges of the first die means, the cutting edges of the piercing die sloping upwardly away from their point of intersection, and guided actuating means for moving the dies from an open condition with the cutting edges of the upper die on the opposite side from the first die means on the lower die of a pipe retained by the retaining member, to a shut condition along a path parallel to the perpendicular cutting edges of the lower die, whereby the piercing die makes an initial V-shaped cut in the unsupported wall of such pipe adjacent thereto, followed by the making of contiguous parallel shear cuts along the parallel edges of the lower die, and a final contiguous V-shaped cut in the wall of such pipe upon the first die means of the lower die, thereby to make a miter cut in such pipe.

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