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METAL TUBE CUTTING TOOL

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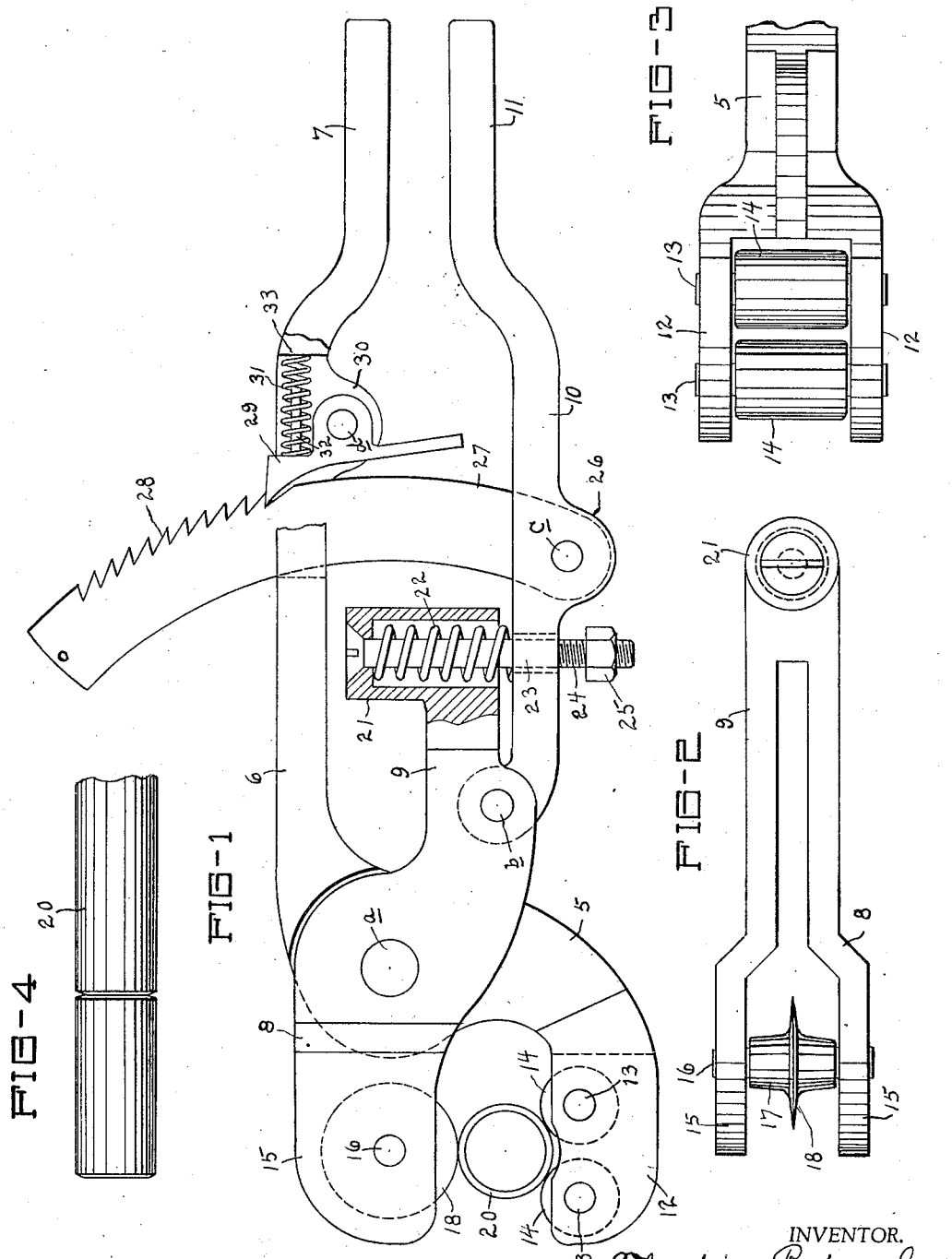

FIG-1

FIG-3

FIG-2

FIG-4

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METAL TUBE CUTTING TOOL

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5 Claims. (Cl. 81—198)

My invention has reference to a tool for cutting metal tubing, and is of special advantage for severing pieces of steel tubing, such as is used for conduits for electric wires and the like. It is not limited to such use, however, but is of equal utility for cutting brass or copper tubing, gas-pipes, and similar pipes or tubes of relatively hard material. It has been the practice to cut tubing of the kind mentioned by means of a hack-saw, which is a more or less laborious operation, as well as destructive to the blade of a saw, calling for occasional replacement thereof. It is also difficult to make a perfectly true cut in this way, and the inner edges of the cut are left with a rough projection, or burr, making it necessary to ream the ends, especially where the tubes are to be used for conduits for wires, which conduits are required to be perfectly smooth on the inside.

By the use of my invention all of the foregoing difficulties can be overcome, and the operation, which is a comparatively rapid one, results in a clean, smooth cut, and in a plane at right angles to the axis of the tubing.

The particular construction, arrangement, and manner of operation of the invention will be more fully understood from the following specification, reference being had to the accompanying drawing, in which:

Fig. 1 shows the invention in side view, in position when in use.

Fig. 2 is an edge view of the jaw 8 and cutter head thereon.

Fig. 3 is a similar view of the jaw 5, and head thereon.

Fig. 4 shows a fragmentary portion of metal tubing.

The invention consists of a jaw 5, projected at one end into an arm 6, ending in a handle 7, and a jaw 8, having a pivotal connection with the jaw 5 at *a*, and projected at one end into a short arm 9, with which an auxiliary arm 10 has a pivotal connection at *b*. The arm 10 is also formed into a handle 11, to be used in connection with the handle 7, as hereinafter described.

The jaw 5 is projected in a direction opposite to the arm 6 into a head, formed of spaced plates 12, in which is seated a pair of pins 13, upon which rollers 14 are mounted for rotation. The jaw 8 is also projected into a head formed of spaced plates 15, in which is supported a pin 16, upon which is rotatably mounted a barrel 17, carrying at a central point a cutting wheel 18. A piece of tubing 20 is shown in position between the rollers 14 and cutting wheel 18.

At the inner end of the arm 9 is fixed a cylindrical housing 21, in which is a coiled spring 22, bearing at one end against the closed end of the housing, and at the other end against the arm 10. A bolt 23 has its head seated in the end of the housing and passes freely through an opening in the arm 10, with a nut 25 on its threaded end. The arm 10 is slotted to receive one end of an arcuate arm 27, pivotally connected with said arm at *c*, and passing through a slotted opening in the arm 6. Said arm 27 is provided with a series of ratchet teeth 28, engageable by a pawl 29, pivoted in an enlargement of the arm 6 at 30, as at *d*. The pawl is held in yieldable engagement with said teeth by a coiled spring 31, on a pin 32 fixed in said pawl, and bearing against a shoulder 33 on the arm 6. Said pawl is also fitted with a thumb-lever 34, by means of which it can be disengaged from the ratchet.

In the operation of the tool the tube is first engaged thereby, in the manner shown in Fig. 1. The handles 7 and 11 are then forced toward each other, causing a compression of the spring 22, and storing power therein. The engagement of the pawl 29 with one of the teeth of the ratchet locks the arms 6 and 10 from separation, and prevents any loss of the stored power of the spring, except such as is occasioned by the cutting of the tube. To accomplish this the tool is rotated about the pipe, the wheel 18 gradually eating into the same, as shown in Fig. 4. With the smaller size tubing three or four revolutions of the tool about the same will serve to cut the pipe in two. As the operation proceeds the heads 12 and 15 approach each other, and the housing 21 moves away from the arm 10, with a corresponding loss of power in the spring. In the cutting operation no force is applied to the handles 7 and 11, except such as is necessary to cause a rotation of the tool about the tubing, the cutting force being supplied entirely by the spring. In cutting tubing of greater thickness, in case the force of the spring becomes exhausted before the cutting is completed, the spring can be given a renewed force by again operating the handles 7 and 11, with the pawl 29 engaging another tooth in the ratchet. This can be done more than once if necessary. In the heavier tubing to be severed by a tool of approximately the size shown, some ten or twelve revolutions about the tubing are requisite to accomplish the work. A tool similar thereto will adapt itself to three standard sizes of tubing, half-inch, such as shown, three-fourths inch, and inch. In the larger diameters the arms 6 and 10 will be at a greater distance

from each other, but the relative positions of the arm 10 and housing 21 are always approximately the same.

If tubing of greater diameters than those mentioned is to be cut, a tool of greater proportions can be used. and a small sized tool can be employed for severing small copper tubing and the like, such as is used for gasoline feed lines and oil lines.

The chief purpose of the bolt 23 and nut 25 is to prevent a separation of the arm 10 and housing 21 in case the ratchet arm is entirely disengaged with the arm 6. The spacing of the arms 6 and 10 is always determined by the diameter of the tubing with which the tool is engaged.

The length of the rollers 14 is such as to give a considerable amount of bearing thereof against the side of the tubing and tending to hold the cutting wheel always in position in a plane at right angles with the axial line of the tube.

The tool is not only adjustable to the diameters of tubing mentioned, but it can also be readily adapted to sizes between those mentioned.

In the adjustment of the arc-plate 27 it moves along a circular line the center of which is the pivot *a*, but in the movement to compress the spring 22 the arc-plate and arm 10 both move on the pivot *b* as a center.

When the tool is first positioned on a section of tubing the initial movement of the arms 6 and 10 serves to engage the tube tightly between the rollers and cutter, with the arms locked in that position. A continued movement of the arm 10 with reference to the arm 6 compresses the spring 22, and relocks the arms in closer relation with each other. This is the case regardless of the diameter of the tubing, with the compression of the spring operating to cause an automatic feed of the cutting wheel during the rotation of the tool. In a tool of average size a force of approximately two hundred pounds can be stored in the spring, the leverage of the arm 10 being multiplied several times, or about four to one as shown in the drawing. This is further increased by a multiplied leverage of the arm 9 upon the pivot *a* of about two to one, with a consequent force of four hundred pounds on the cutter wheel. For some lighter types of tubing this force would have to be reduced somewhat.

In case it is desired to change the spring in the housing 21, this can be done by disconnecting the ratchet arm and removing the nut from the bolt 23, permitting the arm 10 to be swung away from the housing. After replacement the arm is moved inwardly again and secured in place by the nut. In this position there is no possibility of release or escape of the spring.

What I claim, and desire to secure by Letters Patent, is:—

1. A tool for cutting metal tubing, comprising a jaw having an arm extension and handle thereon, roller bearings supported in said jaw, a jaw pivotally connected with said first-named jaw and provided with a relatively short arm, an auxiliary arm pivoted to said short arm and provided with a handle for use with said first-named handle, a cutter wheel rotatably mounted in said last-named jaw, a power storing device supported by said short arm, and operable in conjunction with said auxiliary arm, and ratchet means for holding said arms initially in position with the roller bearings and cutter wheel in engagement with a section of tubing, and secondarily in position to cause an automatic feed of the cutter wheel during the operation of the tool.

2. A tool for cutting metal tubing, comprising a jaw and operating arm extended therefrom, roller bearings supported by said jaw, a second jaw pivotally connected with said first-named jaw, an operating arm extended from said second jaw, including a pivoted section, a ratchet arm attached to said pivoted section, a spring pressed pawl pivoted in the other arm and engageable with said ratchet arm, a cutter wheel rotatably mounted in said second jaw, mechanism for storing power interposed between said last-named operating arm and pivoted section and capable of being held under stored power.

3. A tool of the class described, comprising a jaw and operating arm extending therefrom, roller bearings supported in said jaw, a jaw pivoted to said first named jaw and having an operating arm projected therefrom, consisting of a relatively short arm and pivoted extension thereof, a cutter wheel rotatably mounted in said last-named jaw, a spring housing supported on said short arm, a coiled spring in said housing bearing against said pivoted extension, and ratchet mechanism connecting said operating arms, and adapted to hold the same with said spring under stored power tension.

4. A tool of the class described, comprising a pair of jaws pivotally united, a roller bearing in one of said jaws, a cutter wheel in the other of said jaws, an arm projected from said roller bearing jaw, an arm projected from said cutter wheel jaw, consisting of a relatively short arm, and a pivoted section extended therefrom, a housing for a spring on said short arm, a coiled spring in said housing, having a bearing against said pivoted section, ratchet mechanism connecting said first-named arm and said extension for automatically locking said parts in position, and means for preventing the accidental movement of said pivoted extension away from the spring when the ratchet mechanism is released.

5. A tool for cutting metal tubing, comprising a pair of jaws pivotally united, roller mechanism supported in one of said jaws, a cutter wheel rotatably mounted in the other of said jaws, a pair of operating arms projected from said jaws, in coacting relation, one of said arms having a relatively fixed part and a movable part, means between said parts capable of storing power upon a coacting movement of said arms, and means for locking said arms in position with the power stored in said first named means.

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