GEAR-OPERATED TOGGLE-CONTROLLED CRIMPING TOOL

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2 Sheets-Sheet 1

Fig. 1

Fig. 2

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This invention relates to a metal working tool and more specifically provides a tool for crimping or beading light gauge sheet metal pipe.

An object of this invention is to provide a metal working tool for crimping or beading sheet metal pipe which is light in weight, easy to operate and inexpensive to manufacture.

Another object of this invention is to provide a metal working tool for crimping or beading sheet metal pipe wherein the tool is portable in nature and the pressures between the beading rolls are adjustable.

A further object of this invention is to provide a device which is portable in nature and easily handled by the skilled craftsman.

Yet another object of this invention is to provide a metal working tool having novel structure wherein it is well adapted for the purposes intended.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a top plan view of the metal working tool of this invention showing details of the crimping rolls and operating means;

Figure 2 is a longitudinal, vertical section, taken substantially along section line 2-2 in Figure 1 showing details of the driving means and handle lever and pivotal jaw;

Figure 3 is a side elevational view taken from the handle side of the tool and showing details of the handle and driving gear;

Figure 4 is a transverse, vertical section taken substantially along section line 4-4 of Figure 2 showing details of the driving gears and end forming rolls; and

Figure 5 is a perspective detailed view of the movable jaw showing the arrangement of the axle mounting and pivot axis.

Referring now more specifically to the drawings, it will be seen that the numeral 10 generally designates the metal working tool of this invention for crimping or beading relatively thin sheet metal pipes.

Referring now more specifically to Figures 1-3, it will be seen that the tool 10 has a pair of handle members 12 and 14 pivotally interconnected and forming a handle when they are in adjacent position wherein an operator or user may grasp the tool by the adjacent handle members 12 and 14. The handle member 12 is generally elongated in shape and has a bifurcated end portion forming ears 16 and 18, with a pair of lugs 20 projecting from the extreme end of the bifurcated portions 16 and 18. Rotatably journaled in suitable apertures in lugs 20 is a shaft 22 having a worm gear 24 mounted thereon between the lugs 20 and having a projecting portion to one side thereof, having an elongated handle 26 secured there to, wherein the handle 26 is provided with a suitable offset gripping member 28. Straddling the bifurcated portions 16 and 18 is a pair of upstanding bearing members 30 which project above the upper surface of the bifurcated portions 16 and 18. Rotatably journaled in the members 30 is a shaft 32 having a worm gear 34 thereon between the members 30 and a pinion gear 36 extending from the forward end of the shaft 32 and in meshing engagement with the worm gear 34 which is actuated by the handle 26.

In the center portion of the bifurcated portions 16 and 18 is a rotatable axle 38 journaled in suitable apertures in the bifurcated portions and extending from both edges thereof.

Straddling the axle 38 is a pinion gear 40 in meshing engagement with the worm gear 34 and at one extreme end of the axle is a spur gear 42, and at its other extreme end on the opposite side of the handle member 12 is a forming or crimping roll 44 having a peripheral groove 46 in the circumference thereof.

It will be understood by turning the handle 26 the shaft 22, worm gear 24, pinion gear 36, worm gear 34, pinion gear 40, spur gear 42 and the forming roll 44 will all be rotated and it will be seen that the gearing system provides a gear reduction wherein the handle 26 is rotated much faster than the forming roll 44 and the ideal reduction has been found to be eight to one.

Referring now more specifically to Figures 2 and 5, it will be seen that the handle member 14 which is pivotally interconnected with handle member 12 includes a pivotal jaw 48 having a pair of upstanding apertured ears 50 for straddling the handle member 12 and pivotally secured thereto by a suitable pivot pin 52. It will be seen that the pivotal jaw 48 is provided with a suitable bore 54 for rotatably receiving an axle 56 having a spur gear 58 secured to one end and a second forming or crimping roll 60 secured to its opposite end.

The spur gear 58 is in mesh with spur gear 42 and the crimping roll 60 having a bead 62 on its outer periphery is in engagement with the forming roll 44 and the bead 62 is located in the groove 46 when the handle member 14 is in position adjacent the handle member 12. As best seen in Figure 2, it will be noted that the pivotal jaw 48 has a recess portion 64 at its lower midpoint forming an entrance slot for the end of the handle member 14 which is pivoted therein on a suitable axis 66. A spring 68 is secured to the pivotal jaw 48 and the handle member 12 by suitable fastening means 70 for normally urging the pivotal jaw about its axis 52 so that the gears 42 and 58 and the rolls 44 and 60 are not in engagement. A toggle link member 72 is pivotally mounted to the handle member 14 by suitable bearing axis 74 and the other end of the link 72 extends into a recess 76 in the handle member 12 for sliding movement therein.

The link 72 has a recessed end portion 78 for engaging the end of an abutment member 80 which is adjustably received in a threaded aperture in the handle member 12. The link member 72 is further provided with a stop member 82 which engages the surface of the handle member 14 when the handle member 14 is in adjacent position to the handle member 12. It will be seen that the threaded abutment member 80 has a knurled thumb screw portion 84 and a projecting end portion 86 for engaging the recessed end portion 78 of the link 72.

The operation of the device will be readily understood. With the handle member 12 and the handle member 14 pivoted about the point of interconnection so that they are in their remote positions, the rolls 44 and 60 are placed astraddle the end of a sheet metal pipe or sheet metal member and the handle member 14 is urged toward the handle member 12. As this is done the recessed end 78 of the link 72 abuts the end portion 86 of the abutment member 80 and the force exerted thereon by the leverage of the handle member 14 urges the rolls 44 and 60 toward each other and engages the spur gear 42 with the spur gear 58 due to the specific relationship of the pivot axis 52, 66 and 74. It will be seen that the pivot axis 74 shifts about the pivot axis 66 as the handle member 14 is
raised and the axis 74 shifts over the line of force between the pivot axis 66 and the abutment member 80. The stop member 82 on the link 72 limits the shifting of the pivot axis 74. The amount of force with which the pivotal jaw 48 and the bifurcated portions 16 and 18 are urged toward each other may be adjusted by rotating the abutment 80 through the use of the knurled thumb screw portion 84 and due to the change in length of the force exerted by the link 72 will be greater or lesser as desired. The coil spring 65 normally urges the pivotal jaw 48 to an inoperative position for straddling the sheet metal work to be crimped or beaded. Obviously, the projecting rib 62 and the groove 46 mate with each other for beading the edge of a sheet metal pipe or other member. After the handle members 12 and 14 have been brought adjacent each other and the gears 42 and 58 are in meshing relation, the handle 26 may be turned by gripping the hand grip 28 and it will be seen that the handle 26 rotates the shaft 22, worm gear 24, pinion gear 36, worm gear 34, pinion gear 40, spur gear 42, spur gear 58, and the forming rolls 44 and 60. As the forming rolls 44 and 60 rotate in opposite directions, the edge of the sheet metal member to be crimped will be drawn through the space between the rolls 44 and 60 and a bead placed thereon by the action of the rib 62 and the complementary groove 46.

The tool of this invention is light in weight and easy to operate by the craftsman and it will be noted that it is small and compact as well as being portable, thereby affording the sheet metal worker with a tool which he may carry with him to the job, as desired. This eliminates the necessity of performing all the work at a central location and then taking the various pieces to positions where the work is to be performed. Any suitable material meeting the requirements of this device which is known to the industry may be employed in the construction of the metal working tool of this invention.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of an appended claim.

I claim:

A sheet metal crimping tool comprising a pair of pivotally interconnected handle members, one of said handle members having a rigid jaw thereon, the other of said handle members having a jaw pivotally mounted thereon, means pivotally interconnecting the jaws and forming means interconnecting the handle members for permitting swinging movement in relation to each other, each jaw including a transverse shaft, a crimping roller mounted on each shaft, a spur gear mounted on each shaft, said spur gears being disposed in alignment for meshing engagement when the handle members are disposed in adjacent relation, said rollers being disposed in adjacent relation when the gears are meshed for receiving sheet metal therebetween, a toggle link pivotally connected at one end to said other handle member, abutment means on said one handle member, the other end of said toggle link engaging said abutment means when the handle members are pivoted into adjacent relation thereby urging the pivotal jaw towards the rigid jaw for meshing the gears and clamping the sheet metal between the rollers, and means mounted on said rigid jaw for rotating the shaft mounted thereon for rotating said spur gears and rollers when the handle members are in adjacent relation, said rollers having a complementary ridge and groove construction for crimping the sheet metal as it is moved between the rollers during rotation thereof.

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