Dec. 10, 1968 F. J. BRITTS 3,415,100

HAND TOOL

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FIG. 1

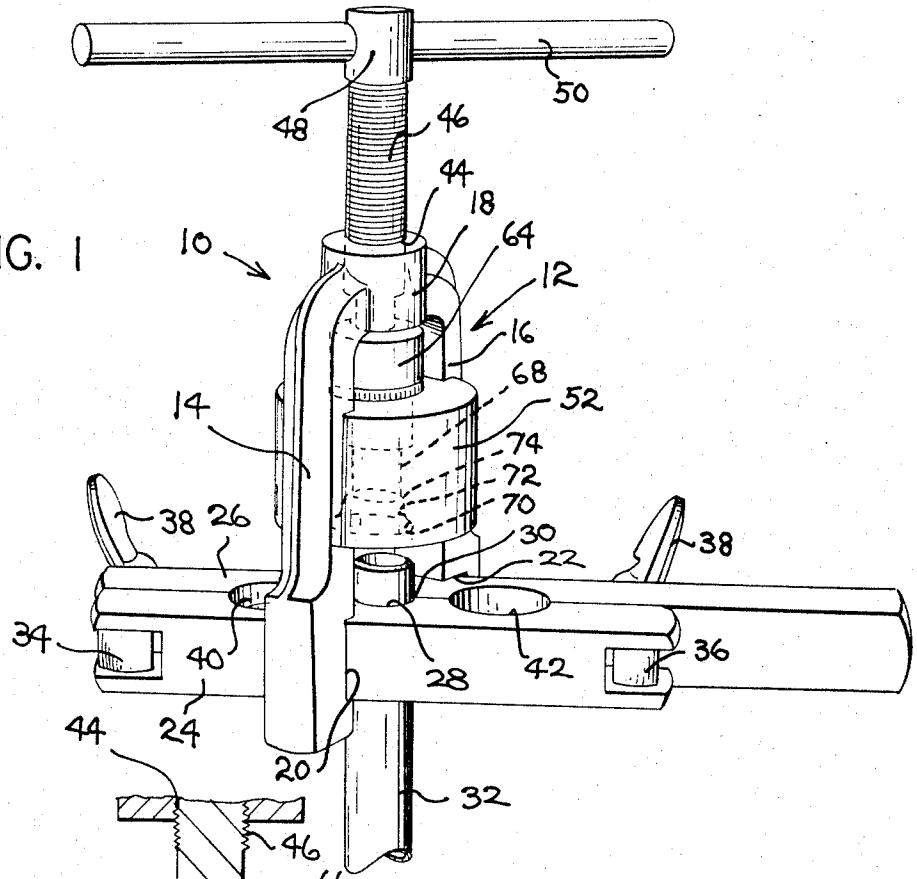
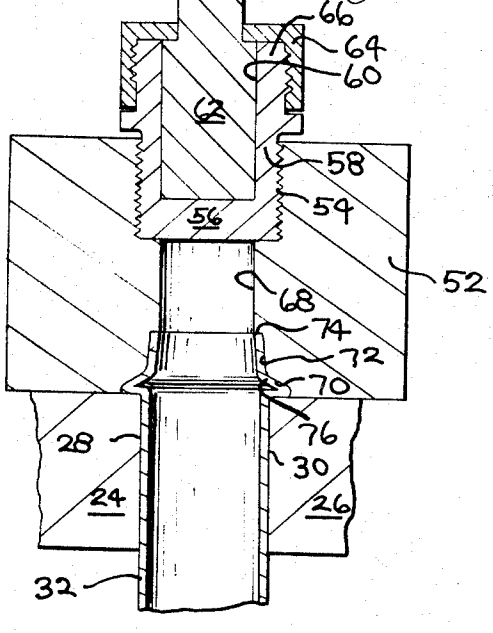



FIG. 2




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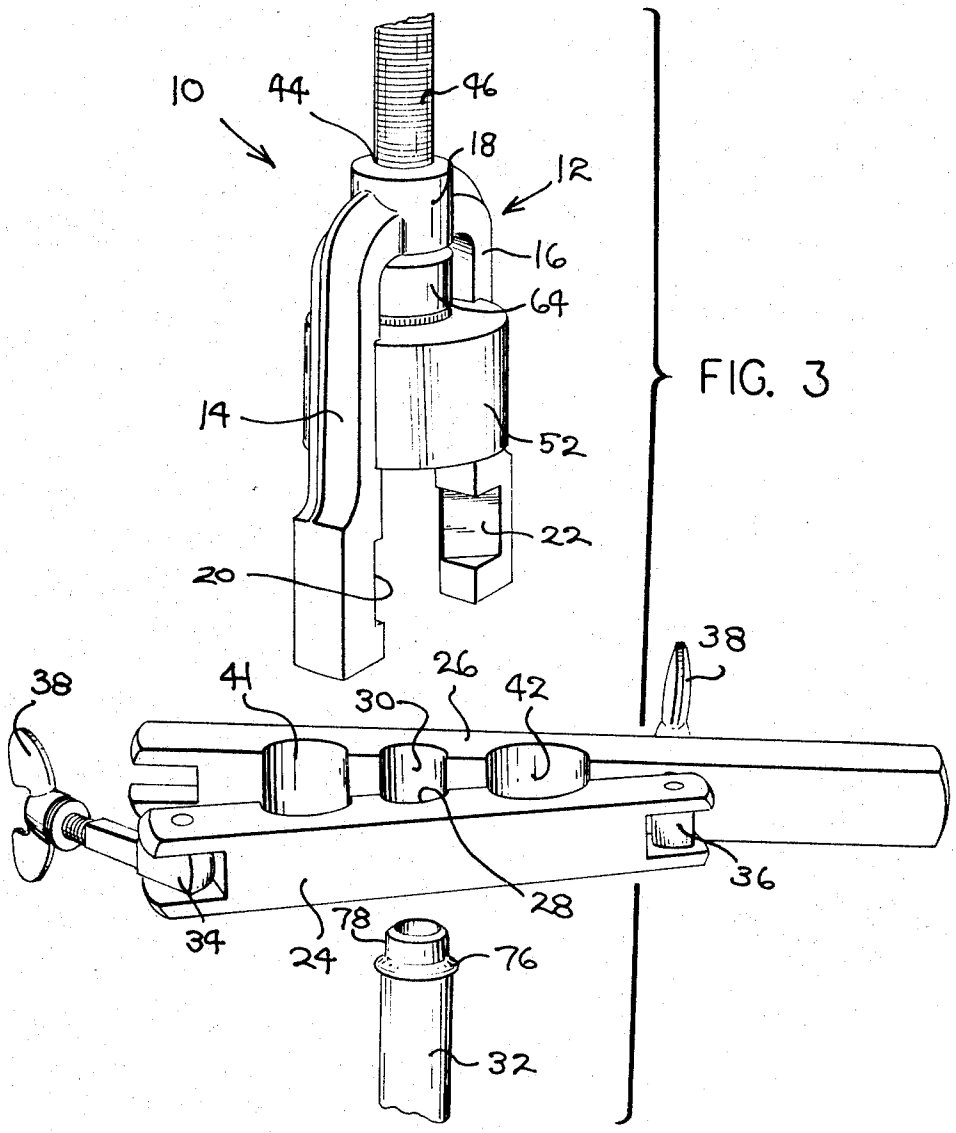



FIG. 3

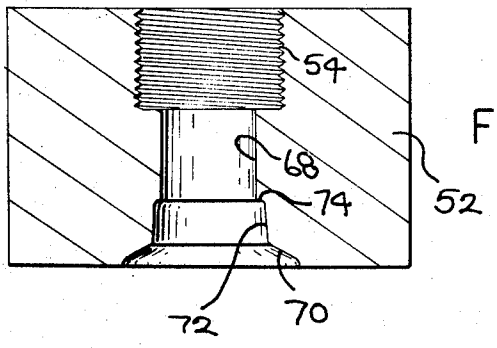



FIG. 4

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United States Patent Office 3,415,100
Patented Dec. 10, 1968



3,415,100

# HAND TOOL

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Filed May 2, 1966, Ser. No. 546,701
3 Claims. (Cl. 72—317)

## ABSTRACT OF THE DISCLOSURE

A hand tool for swaging and flaring the end of a thin walled tubing wherein the tool is capable of simultaneously swaging the end of the tubing and forming an outwardly flared bead spaced inwardly from the end.

The present invention relates to a tube swaging and flaring tool.

It is an object of the invention to produce a new and improved tool for swaging and flaring the end portions of relatively thin walled tubing.

Another object of the invention is to produce a tool for swaging and flaring the end portions of thin walled tubing which is portable and easily employed.

Still another object of the invention is to produce a hand tool for swaging and flaring the end portions of thin walled tubing which is readily and economically manufactured.

The above and other objects of the invention may be achieved by a tool comprised of a frame; a force applying member reciprocably mounted on the frame; a die member mounted for reciprocal movement with the force applying member; and tube clamping means on the frame for holding a tube in axial alignment with the force applying member and the die member, the die member having a recess for receiving the end of a tube, the recess including an annular flare forming opening of a diameter larger than the diameter of the tube and of the diameter of the flared section to be formed, side wall of the opening tapering radially inwardly and terminating in a swaging portion disposed adjacent the flare forming opening and having a tapering side wall, the side wall tapering from termination of the flare forming opening and terminating at a shoulder portion formed at the innermost end of the recess.

Other objects and advantages of the invention will become readily apparent from reading the following detailed description of an embodiment of the invention when considered in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view of a swaging and flaring tool incorporating the principles of the invention in a position of use prior to the forming of the tube;

FIGURE 2 is an enlarged fragmentary sectional view of a portion of the tool illustrated in FIGURE 1;

FIGURE 3 is a perspective view of the tool illustrated in FIGURE 1 showing the tool disassembled after the tube has been swaged and flared; and

FIGURE 4 is an elevational view of the die body of the invention.

Referring to the drawings there is shown an apparatus which comprises a tool **10** including an inverted U-shaped frame portion **12** having a pair of legs **14** and **16** each integrally secured at one end of the base **18** of the U. The opposite ends of the legs **14** and **16** are provided with notches **20** and **22** respectively for engagement with opposing side walls of a pair of tube clamping blocks **24** and **26**. The blocks **24** and **26** are each provided with semi-circular tube holding recesses **28** and **30**. These blocks may be held together at the ends in clamped position upon a length of tubing **32** by means of bolts **34** and **36** pivotally mounted at the ends of the block **24**



and held in position in a hole or slot in the other block **26** by wing nuts **38** in the well-known manner. The blocks **24** and **26** may also be provided with additional recesses **40** and **42** to accommodate tubes of various diameters.

The base **18** of the U-shaped frame portion **12** is provided with a threaded aperture **44** and a threaded shaft **46** is mounted therein. The shaft **46** has a head **48** and a handle **50** extending transversely thereto and adapted to rotate the shaft to move the same up or down.

The swaging and flaring operations are effected by a die body **52** which is provided with an axially extending internally threaded recess **54**. A connector **56** having one end **58** provided with external threads is adapted to be threadably received within the threaded recess **54**. The opposite end of the connector **56** is provided with an axially extending recess **60** for receiving an enlarged cylindrical thrust element **62** of the shaft **46**. The thrust element **62** is retained within the recess by means of an internally threaded collar **64** which engages the threads on the upper portion **66** of the connector **56**. Thereby, the shaft **46** is swivelly secured to the die body **52**.

The lower portion of the die body **52** is provided with an axially inwardly extending recess **68** which includes at the outermost end an annualar flare forming opening **70** which tapers radially inwardly and terminates in a swaging portion **72**. The line where the flare forming opening **70** and the swaging portion **72** merge is typically approximately the same diameter as the original outside diameter of the tube **32** being formed. The swaging portion **72** tapers inwardly and terminates in a shoulder **74** which effectively blocks any inward movement of the end of the tube **32** there beyond. Of course, it will be understood that the die body **52** could likewise be formed with the recess **68** terminating at the shoulder **74** thereby creating a complete wall preventing further inward movement of the end of the tube **32** as the die body is moved into operative position toward the blocks **24** and **26**.

In operation, a length of tube **32** of proper size is initially clamped between the clamping bars **24** and **26** as illustrated in FIGURE 1 with a portion of the tube **32** extending above the blocks. With the tube in place, the U-shaped frame **12** is then slid over the blocks **24** and **26** until the notches **20** and **22** properly engage the side portions of the respective blocks and the die body **52** is properly centered above the open end of the tube **32**. The threaded shaft **46** is screwed downwardly by turning the handle **50** until the end of the tube **32** is received within the flare forming opening **70** of the recess **68**.

As more pressure is exerted upon the handle **50**, the die is thrust over the end of the tube **32** until the end thereof contacts the outermost end of the tapering swaging portion **72**. Further pressure causes the tube **32** to be swaged inwardly by the tapering side wall of the swaging portion **72**. This continues until the end of the tube **32** contacts the shoulder **74**, whereupon further pressure causes the excess of metal of the tubing to be flared outwardly against the side wall of the opening **70** and the annular recess formed at the top of the cooperating tube holding recesses of the blocks **24** and **26**. The thus formed portion of the tubing **32** assumes the shape of an outwardly extending O-ring type flare **76**, as is clearly illustrated in FIGURES 2 and 3.

When the lower surface of the die body **52** comes into contact with the upper surfaces of the blocks **24** and **26**, the operation is completed, forming the end of the tube **32** with a swaged end **78** and an associated outwardly extending O-ring type flare **76** as shown in FIGURE 3.

It will be apparent from the above description that there has been provided a portable hand operated tool which effectively swages the terminal end of a tube and

simultaneously forms an associated outwardly extending O-ring type flare. The resultant formed tube may be used in air-conditioning systems to replace the tubes formed by the presently employed tools which only effect a swaging operation or alternatively a flaring operation of the remote end of the associated tubing.

In accordance with the provisions of the patent statutes I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

What I claim is:

1. In a hand tool for swaging and flaring the end of a thin wall tubing consisting of a frame; a force applying member reciprocably mounted on the frame; a die body mounted for reciprocal movement with the force applying member; and tube clamping means coupled to the frame for holding a tube in axial alignment with the force applying member and the die body: the improvement comprising said die body having a recess for receiving the end of a tubing to be swaged and flared, said recess having an annular flare forming opening of the diameter of the flare to be formed in the tubing, the



side wall of the opening tapering radially inwardly and terminating in a swaging portion disposed adjacent the flare forming opening and having a tapering side wall, the side wall tapering from the termination of said flare forming opening and terminating at a shoulder portion to prevent any movement of the end of the tubing being formed thereby.

2. The invention claimed in claim 1 wherein said shoulder portion is formed at the innermost end of the recess and extends completely thereacross.

3. The invention defined in claim 1 wherein the diameter of the swaging portion adjacent the flare forming opening is substantially the same diameter as the outside of the tube being formed.


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