

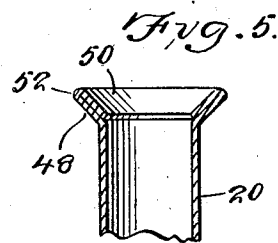
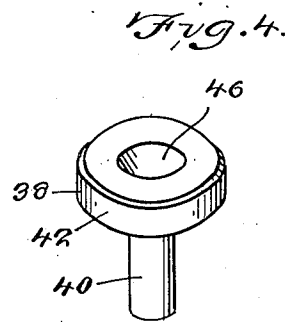
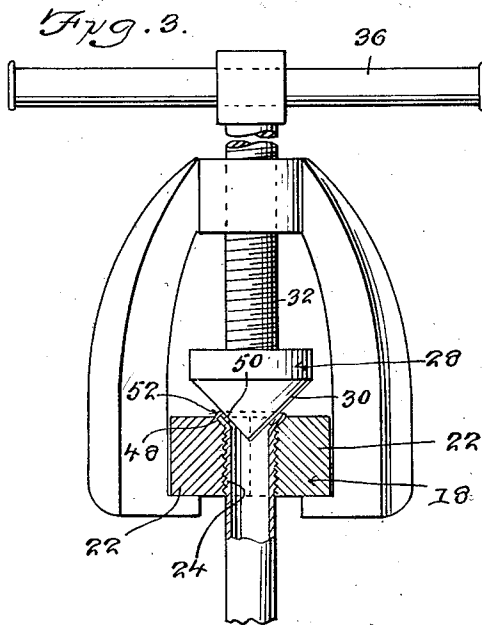
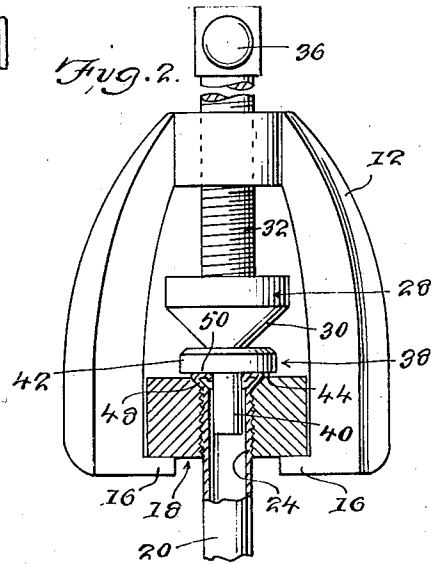
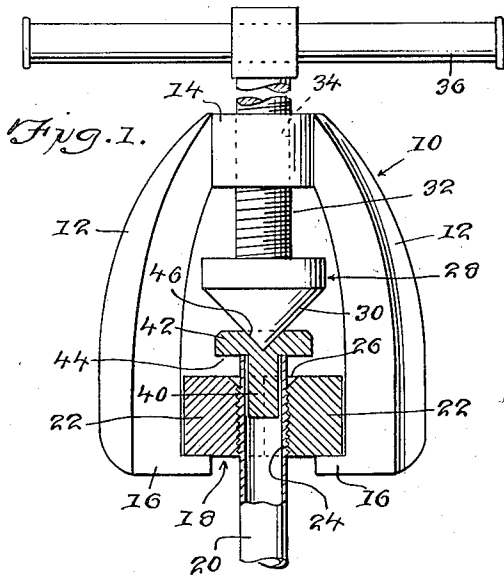
Feb. 20, 1945.

T. H. SWYERS

2,370,089

TUBE FLANGING TOOL

Filed July 21, 1943



Tamplin H. Swyers
INVENTOR.

BY

Victor J. Evans & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE

2,370,089

TUBE FLANGING TOOL

Tamplin H. Swyers, St. Albans, W. Va.

Application July 21, 1943, Serial No. 495,663

2 Claims. (Cl. 153-79)

My invention relates to the forming of coupling flanges on thin walled and small diameter tubing, and has among its objects and advantages the provision of an improved preliminary shaping die designed for flanging operation in connection with conventional tube flanging devices.

Copper tubing is easily worked, particularly when shaping an expanded flare at the tube end to provide a coupling flange. Tools for shaping such flanges usually comprise a sectional clamp die having a flared face arranged coaxially with the tube gripping recesses. This die is supported in a small frame in which a screw operated expanding head or flaring element is arranged coaxially with the tube. The flange is formed by turning the screw to bring the tapered head into pressure engagement with the end of the tube. As the head is turned home, the tube end is expanded, to form a flange corresponding to the contour of the flared face on the die, the expanding head having a taper in conformity with the face. Such coupling flanges are easily formed by merely expanding the end of the copper tube, but forming similar flanges in steel tubes by the same method presents many difficulties. The steel tubes split through the flange being formed, particularly at the welded joint of the tubing. The splitting tendency of steel is such as to render conventional flanging tools entirely unsuitable.

One object of my invention is to provide a preliminary shaping die of novel and improved construction for use with conventional tube flaring tools and adapted to preliminarily shape the end of a tube so that the regular flaring element of the tool is effective to form a double flange thereon, thus avoiding splitting of the tube during the forming operation.

In the accompanying drawing:

Figure 1 is a view of a conventional flange forming tool showing my shaping die applied thereto, and in association with a tube to be flanged.

Figure 2 is a similar view illustrating the first flange step.

Figure 3 is a similar view illustrating the second and final flanging operation.

Figure 4 is a perspective view of the preliminary shaping die, and

Figure 5 is a sectional view of the tube and the finished flange.

In the embodiment of the invention selected for illustration, I make use of a flanging tool 10 comprising arms 12 fixedly related at one end by a head 14. Shoulders 16 are formed on

the arms 12 to constitute a support for a flanging die or clamping device 18 for gripping a tube 20. Such dies usually comprise two sections, as indicated generally at 22, and suitable means are provided for clamping the sections together and upon the tube 20. Such dies and clamping devices are old and well known in the art, and need not be described in detail. Suffice it to say that the sections 22 are provided with roughened faces 24 conforming to the curvature of the tube 20 so as to secure a firm grip thereon. The die 18 is usually of considerable length and is provided with a plurality of meeting recesses to define openings of different diameters for coaction with tubes of a large range of diameters.

The die 18 is provided with a flared flange forming face 26 arranged coaxially of the opening defined by the recesses 24. Coacting with the flared face 26 is a flanging head or flaring element 28 provided with a tapered nose 30 arranged coaxially with the face 26. This element is fixed to a screw 32 arranged coaxially with the tube 20 when the latter is clamped in the die 18, and the screw is threadedly connected in an opening 34 in the head 14 and is provided with an operating handle 36.

With respect to the structure so far described, copper tubing is easily flanged by clamping the tube in the die 18 and allowing the necessary length of the tube to project beyond the face 26. The flaring element 28 is then brought into engagement with the tube to press the nose 30 into the tube and expand that end of the tube against the face 26, this face being angled in conformity with the taper 30.

To render the tool suitable for flanging steel tubing, or tubing of other metals or plastic material which do not permit flanging in the conventional manner, I make use of an adapter or preliminary shaping die 38. This shaping die, in its preferred form, includes a cylindrical stem 40 which is receivable in the tube 20. The stem 40 is fixed to a head 42 having one side formed to define a plane pressure face 44 preferably arranged at right angles to the axis of the stem 40. As herein shown, the head is provided on the side opposite said pressure face with a recess 46 shaped in conformity with the taper 30 to receive a portion of the nose end of the flaring element 28.

In operation, the tube 20 is clamped in the device 18 as shown in Figure 1 with the pressure face of the shaping die 38 engaging the end of the tube and the screw 32 is turned down to exert pressure on the end of the tube through the

medium of the shaping die. The pressure of the face 44 against the end of the tube causes the latter to buckle outwardly in a zone between the face and the tapered face 26 thereby forming a peripheral bead adjacent the end of the tube. As the die 28 is pressed home, to the position of Figure 2, the end of the tube is buckled outwardly to bear against the face 26 as at 48, the outer marginal edge portion of the bead being pressed inwardly into substantially right angular relationship to the longitudinal axis of the tube end taking the form of an annular flange 50 lying flatwise against the pressure face 44 and closely embracing the stem 40. With the tube end formed according to Figure 2, the shaping die 38 is removed, after which the flaring element 28 is pressed home to the position of Figure 3 for bending the flange 50 downwardly against the portion 48. This results in the formation of a double coupling flange 52, as in Figure 5. This coupling flange is devoid of splits or other imperfections.

Without further elaboration, the foregoing will so fully explain my invention, that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. The combination with a tube flaring tool having tube clamping means and a generally conical flaring element, of a preliminary shaping die comprising a rigid head, a plane pressure

face on one side of said head adapted for engagement with the end of a tube clamped in said clamping means, a conical recess in the opposite side of said head adapted to receive said flaring element and thereby locate said pressure face in operative relation to the tube, said flaring element being operable to push said head axially against the tube and thereby form a peripheral bead adjacent the end of the tube, said plane pressure face acting to press the outer marginal edge portion of said bead inwardly into substantially right angular relationship to the longitudinal axis of the tube.

2. A preliminary shaping die for use with a tube flaring tool having tube clamping means and a conical tube flaring element aligned axially with a tube held in said clamping means, said die comprising a rigid head having one side formed to present a pressure face engageable with the end of the clamped tube, the opposite side of said head having a central recess shaped to receive said conical flaring element, a stem projecting from said one side of said head and being receivable in the tube for locating the head relative thereto, said flaring element being operable to push said head against the end of the clamped tube for forming a peripheral bead thereon with the marginal edge portion of said bead pressed inwardly to shape it for subsequent action by said flaring element.

TAMPLIN H. SWYERS.