Sept. 22, 1931. W. H. BURT 1,823,966

TUBE FLANGING TOOL

Filed Jan. 3, 1930

Fig. 1.

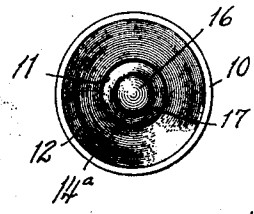


Fig. 2.

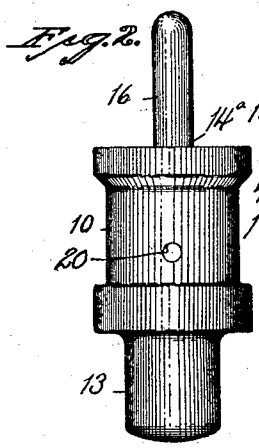


Fig. 3.

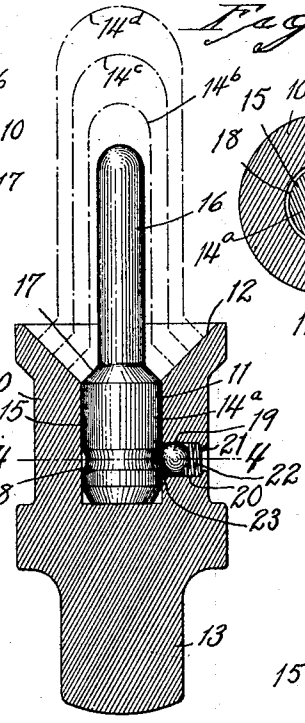


Fig. 4.

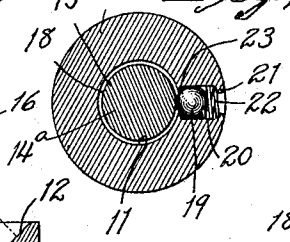


Fig. 6.

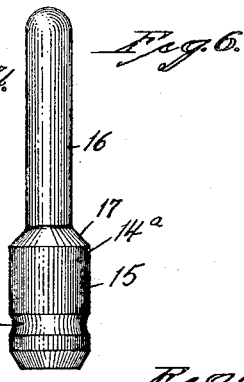


Fig. 7.

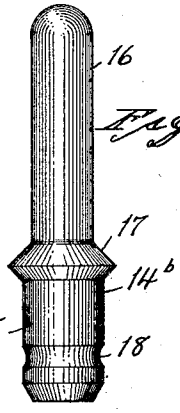


Fig. 8.

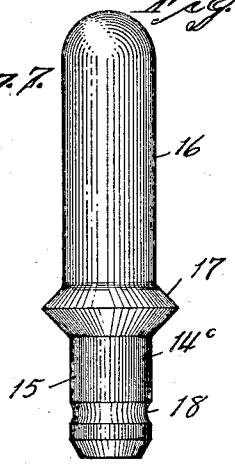


Fig. 5.

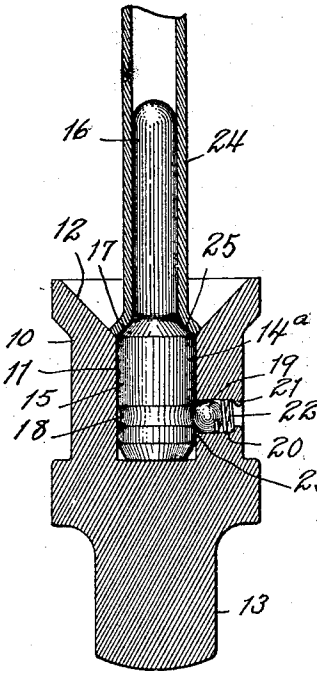


Fig. 10.

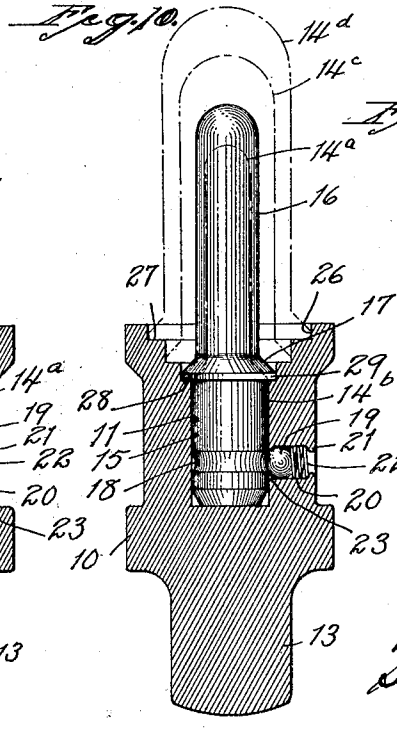
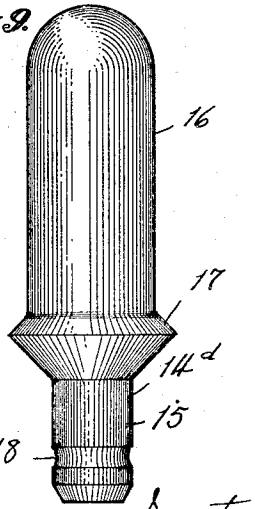


Fig. 9.



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UNITED STATES PATENT OFFICE

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TUBE-FLANGING TOOL

Application filed January 3, 1930. Serial No. 418,200.

This invention relates to an improvement in flanging-tools for forming flanges upon the ends of tubes or pipes of malleable metal, such as copper, lead, etc.

The main object of this invention is to provide a simple and convenient tool of the type referred to characterized by its capacity for being readily converted to flange tubes or pipes of various diameters, whereby a flanging outfit may be provided at a low cost for manufacture and with minimum bulk and weight for flanging tubes or pipes of various diameters.

With the above and other objects in view as will appear from the following, my invention consists in a tube-flanging tool having certain details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

In the accompanying drawings:

Fig. 1 is an end view of one form which a flanging-tool constructed in accordance with my invention may assume;

Fig. 2 is a view thereof in side elevation;

Fig. 3 is a view thereof in central longitudinal section;

Fig. 4 is a view thereof in transverse section on the line 4—4 of Fig. 3;

Fig. 5 is a view corresponding to Fig. 3 but showing a tube sleeved over the pilot and flanged by engagement with the deflecting-surface of the mandrel-member;

Figs. 6, 7, 8 and 9 are corresponding views in side elevation illustrating a series of interchangeable mandrel-members capable of being organized with the body-member to adapt the tool to flange tubes of various diameters; and

Fig. 10 is a central, longitudinal, sectional view of another form which my invention may assume.

In carrying out my invention as shown in Figs. 1 to 9 inclusive, I employ a relatively-heavy body-member 10 formed in its forward end with a cylindrical axially-arranged socket 11 intersecting an annular flaring or conical flange-stop surface 12 opening through the forward end of said body-member.

The end of the body-member 10 opposite the flange-stop surface 12 above described is provided with a head 13 designed to be struck by a hammer or mallet for the purpose as will hereinafter appear.

In connection with the body-member 10 above described, I employ a series (four, more or less) of mandrel-members 14^a, 14^b, 14^c and 14^d, (called generally 14) corresponding in general form though differentiated in size and each comprising a shank 15 adapted to snugly fit the socket 11 of the body-member, an axial pilot 16, and an annular conical deflecting-surface 17 interposed between the shank 15 and pilot 16 and diverging from the base of the latter, as clearly shown in the drawings.

The mandrel-members 14^a, 14^b, 14^c and 14^d correspond to each other with the two exceptions that their respective annular deflecting-surfaces 17 are of different length and their respective pilots 16 are of different diameters to adapt them to act to flange tubes of various diameters. For instance, as herein shown, the mandrel-member 14^a has the diameter of its pilot 16 proportioned to snugly fit the interior of a tube of $\frac{3}{8}''$ diameter and its deflecting-surface 17 of the proper length to provide a flange 25 of suitable length for that diameter of tube. Similarly, the mandrel-members 14^b, 14^c and 14^d have the diameters of their respective pilots 16 and the length of their respective deflecting-surfaces 17 proportioned to coact with tubes of $\frac{1}{2}''$, $\frac{3}{4}''$ and $1''$ diameters respectively.

To provide for yieldingly holding any given one of the mandrel-members 14^a, 14^b, 14^c and 14^d in coacting position with respect to the body-member, I form the shank 15 of each of the said mandrel-members with an

annular groove 18 which is adapted to be entered by a ball-catch 19 located in a radial socket 20 formed in the said body-member and extending between the axial socket 11 and the outer periphery of the same. The said socket 20 is formed at its outer end with a retaining-shoulder 21 against which is seated the outer end of a short helical spring 22 interposed between the said shoulder and the outer face of the ball-catch 19 so as to constantly urge the same inward into engagement with the annular groove 18 of the particular mandrel-member at the time installed in the socket 11. To limit the inward movement of the ball-catch 19 so as to prevent the spring 22 from forcing the same into the socket 11 when no mandrel is in place therein I locate a stop-shoulder 23 at the inner end of the radial socket 20.

In Fig. 3 of the drawings I have shown by full lines the mandrel-member 14^a installed in the socket 11 of the body-member, and have also shown by broken lines the remaining mandrel-members 14^b, 14^c and 14^d installed in the said body-member and it will be noted by reference to the said figure that the flange-stop surface 12 is adapted to function to limit the flaring action of the deflecting-surface 17 upon a tube such as 24 (Fig. 5) when the end of the same is flared outward by the deflecting-surface of any given one of the mandrel-members to form a flange 25.

In the use of the form of my invention illustrated in Figs. 1 to 9 inclusive, the first step is to select from the set the proper size mandrel-member 14 for the particular size of tube which it is desired to flange or flare and to organize the mandrel-member so selected with the body-member 10. This may be readily done by inserting the shank 15 of the appropriate mandrel-member into the socket 11 of the body 10 to seat it against the bottom of the said socket and engage its annular groove 18 with the ball-latch 19 so that the two said members are united with capacity for ready separation.

The pilot 16 of the mandrel-member 14 so selected and installed is now axially inserted in a tube such as 24, after which hammer or mallet blows upon the head 13 of the body-member will serve to drive the deflecting-surface 17 into engagement with the end of the tube to outwardly deflect the same to form a flange 25. The driving of the tool into the tube is continued until the edge of the flange 25 thereof firmly abuts against the conical flange-stop surface 12 of the body-member which serves to limit and determine the degree to which the end of any given size of tube may be flanged or flared.

In the form of my invention shown in Fig. 10, instead of providing the body-member 10 with a continuous conical flange-stop surface 12, I substitute therefor a series of annular flange-stop shoulders 26 (three, more or less) extending substantially parallel with the axis of the body-member and of different diameters, as clearly shown in Fig. 10.

The flange-stop shoulders just above referred to are separated from each other by annular seats 27 arranged in a plane transverse to the axis of the tool and adapted to be engaged by the underface 28 of an annular flange 29 extending around each of the mandrels of the set with the exception of the smallest size 14^a.

The flanging-tool illustrated in Fig. 10 may be used in the same manner as the form used in Figs. 1 to 9 inclusive, i. e., after the appropriate size mandrel-member 14 has been installed in the body-member 10, the pilot 16 is entered into the end of the tube to be flanged and driven home by blows upon the head 13 of the body-member until the edge of the flange 25 of the tube abuts against the particular annular flange-stop shoulder 26 complementing the mandrel-member in question.

While I have herein shown and described the mandrel-members 14 as retained in place in the body-member by a yielding ball-latch 19, it will be apparent without further illustration that my invention comprehends other modes of securing the parts together.

I wish to call attention to the fact that the angle of the deflecting-surfaces 17 of the mandrel-members with respect to the axis of the same may vary widely to meet different requirements, and I wish to have it understood, therefore, that my invention is not limited to the inclination of the said deflecting-surfaces to produce an obtuse-angled flange upon tubes.

It will be seen from the foregoing that by employing a body-member having a socket and a series of interchangeable mandrel-members capable of being organized with the said body-member, I provide a flanging outfit of minimum bulk and weight, which will be conveniently converted to accurately flange or flare the ends of tubes of various diameters.

I claim:

1. In a flanging-tool, the combination with a body-member provided in one end with a mandrel-receiving socket and with an annular flange-stop surrounding the open mandrel-receiving end of the said socket; of a removable mandrel-member provided at one end with a shank adapted to fit into the socket in the said body-member, at its opposite end with a pilot projecting outward from the open end of the said socket and intermediate its ends with an annular deflecting-surface diverging from the base of the said pilot and positioned so as to deflect the end of a tube against the annular flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their be-

ing concurrently driven toward the end of a tube.

2. In a flanging-tool, the combination with a body-member provided in one end with a mandrel-receiving socket and with an annular flange-stop surrounding the open mandrel-receiving end of the said socket; of a removable mandrel-member provided at one end with a shank adapted to fit into the socket in the said body-member, at its opposite end with a pilot projecting outward from the open end of the said socket, and intermediate its ends with an annular transverse flange having its outer face inclined with respect to the axis of the said pilot and diverging from the base thereof and positioned so as to deflect the end of a tube against the annular flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their being concurrently driven toward the end of a tube.

3. A flanging-tool having a body-member provided in one end with a mandrel-receiving socket and with an annular flange-stop surrounding the open mandrel-receiving end of the said socket which latter is adapted to receive any one of a plurality of interchangeable mandrel-members each characterized by being provided at one end with a shank adapted to fit into the socket in the said body-member, at its opposite end with a pilot projecting outward from the open end of the said socket, and intermediate its ends with an annular deflecting-surface diverging from the base of the said pilot and positioned with respect to the said shank so as to deflect the end of a tube against the annular flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their being concurrently driven toward the end of a tube.

4. In a flanging tool, the combination with a body-member provided with an axial mandrel-receiving socket having a bottom-wall and opening through one end of the said body-member and with an annular flange-stop surrounding the open end of the said socket; of a mandrel-member provided at one end with a shank adapted to fit into the open mandrel-receiving end of the socket in the said body-member, at its opposite end with a pilot projecting outward from the open end of the said socket, and intermediate its ends with an annular deflecting-surface diverging from the base of the said pilot and positioned to deflect the end of a tube against the annular flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their being concurrently driven toward the end of a tube.

5. In a flanging-tool, the combination with a body-member formed in one end with a mandrel-receiving socket and with an annular flange-stop surrounding the open end of the said socket; of a mandrel-member provided at one end with a shank adapted to fit into the socket in the said body-member and provided with an annular groove, provided at its opposite end with a pilot, and intermediate its ends with an annular deflecting-surface diverging from the base of the said pilot and positioned to deflect the end of a tube against the annular flange-stop of the said body-member; and a spring-pressed latch mounted in the said body-member in position to engage the annular groove in the shank of the said mandrel-member to yieldingly retain the latter in place in the said body-member.

6. In a flanging-tool, the combination with a body-member provided in one end with a mandrel-receiving socket and with an annular conical flange-stop surrounding the open end of the said socket; of a mandrel-member provided at one end with a shank adapted to fit into the open mandrel-receiving end of the socket in the said body-member, at its opposite end with a pilot projecting outward from the open end of the said socket, and intermediate its ends with an annular deflecting-surface diverging from the base of the said pilot and positioned to deflect the end of a tube against the annular conical flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their being concurrently driven toward the end of a tube.

7. In a flanging-tool, the combination with a body-member provided in one end with a mandrel-receiving socket and with an annular flange-stop surrounding the open mandrel-receiving end of the said socket; of a mandrel-member provided at one end with a shank adapted to fit into the socket in the said body-member, at its opposite end with a pilot projecting outward from the open end of the said socket, and intermediate its ends with a conical annular deflecting-surface diverging from the base of the said pilot and positioned to deflect the end of a tube against the annular flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their being concurrently driven toward the end of a tube.

8. In a flanging-tool, the combination with a body-member provided in one end with a mandrel-receiving socket and with an annular conical flange-stop surrounding the open mandrel-receiving end of the said socket; of a mandrel-member provided at one end with a shank adapted to fit into the socket in the said body-member, at its opposite end with a pilot projecting outward from the

open end of the said socket, and intermediate its ends with a conical annular deflecting-surface diverging from the base of the said pilot and positioned so as to deflect the end of a tube against the annular conical flange-stop of the said body-member; the said body-member, stop-flange and mandrel-member being organized together in a manner to provide for their being concurrently driven toward the end of a tube.

In testimony whereof, I have signed this specification.

WILLIAM H. BURT.