

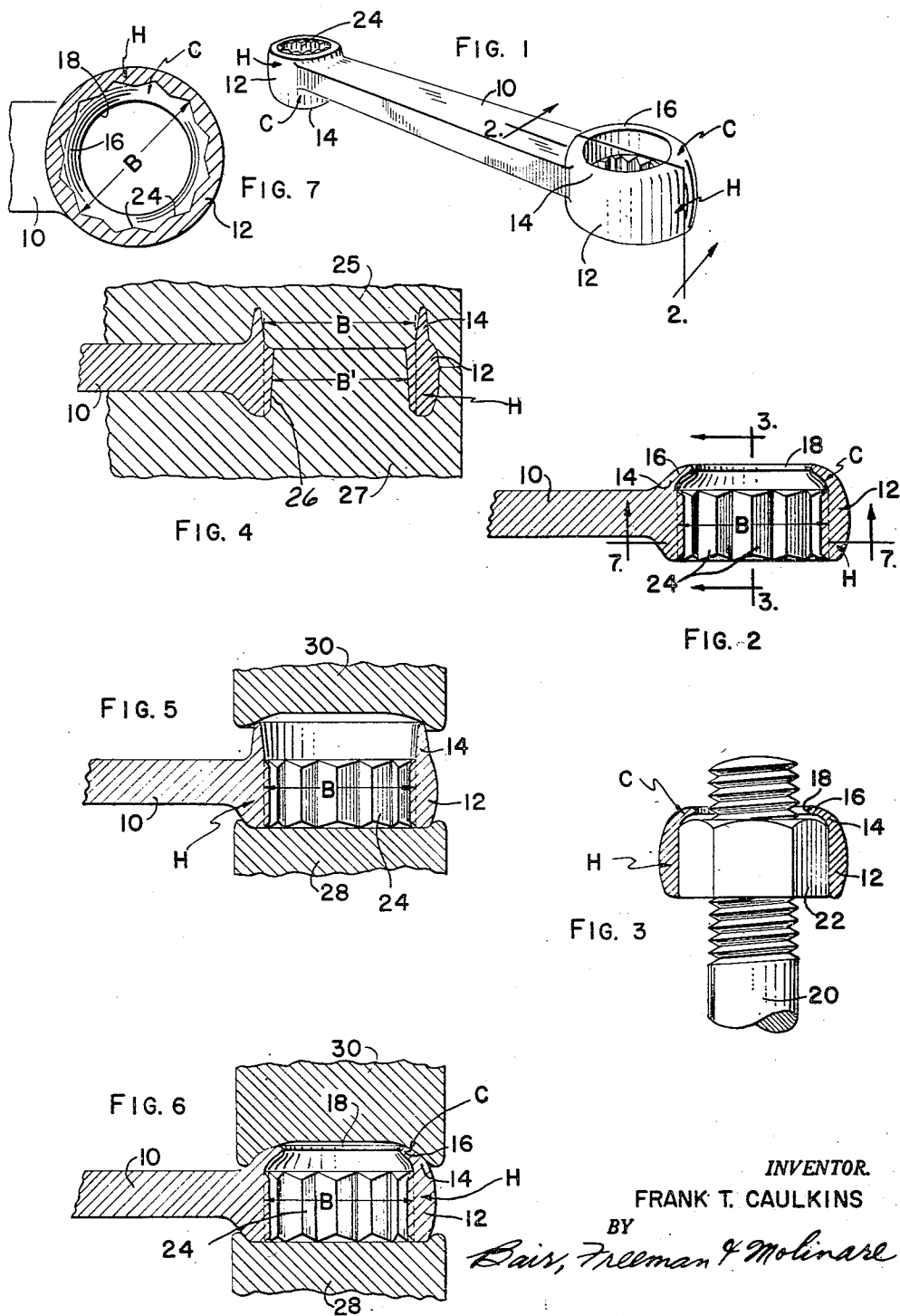
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METHOD OF MAKING BOX WRENCHES

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METHOD OF MAKING BOX WRENCHES

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One object of the invention is to provide a box wrench having the usual wrench head provided with an other-than-round bore to engage a nut, bolt head or the like for turning the same, and a means to prevent the wrench head from falling down over the nut or bolt head when applied thereto, thus facilitating the operation of the wrench by preventing the necessity of having to hold the wrench head in engagement with the nut or bolt head.

Another object is to provide the means of the preceding object in the form of a cylindrical portion forming a perforated, cap-like extension of one end of the wrench head and having the diameter of such perforation smaller in size than the maximum diameter of the other-than-round opening, thereby permitting the wrench head to be supported by its cap-like extension on the top of the nut or bolt head.

A further object is to provide a method for making a box wrench of the character above referred to, consisting of the steps of forging a handle and a substantially cylindrical wrench head at one end thereof in which the wrench head has the characteristics of a thick walled portion having a bore and a thin walled portion of greater internal diameter than said bore and of less external diameter than said wrench head, through-broaching this bore to an other-than-round shape for engaging and turning a nut or the like and the further step of contracting the outer end of the thin walled portion to form it into a cap-like extension of the thick walled portion, which extension has an opening therein of suitable diameter to receive the bolt in the case of the wrench being applied to a nut thereon and for engaging either the top of the nut or the top of a bolt head to support the wrench head thereon without manual attention thereto when the wrench head is applied to the nut or bolt head.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my box wrench and in the steps of a method for forming the same whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawing, wherein:

Fig. 1 is a perspective view of a wrench embodying my present invention;

Fig. 2 is an enlarged vertical sectional view thereof on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2 showing the wrench head in supported position on a nut;

Fig. 4 is a sectional view similar to Fig. 2 showing the first step in the forging operation;

Fig. 5 is a similar sectional view showing the forged blank after it has undergone a second or through-broaching step thereof;

Fig. 6 is a similar sectional view showing the forged blank after it has undergone a third or flange-forming step; and

Fig. 7 is a sectional view of Fig. 2 on the line 7—7 thereof.

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On the accompanying drawing I have used the reference numeral 10 to indicate the handle of my wrench. At each end of the handle 10 is a wrench head H and each head is provided with a cap-like extension C forming the subject matter of my present invention.

Referring to Fig. 2, the head H has a thick walled portion 12 and a thin walled portion 14, which latter portion is contracted as indicated at 16 to terminate in an opening 18. The portions 12 and 14 are substantially cylindrical and the portion 12 is provided with internal teeth 24 for engagement with a nut, bolt head or the like for turning the same. These teeth may be of suitable shape such as shown in Fig. 7 for coacting with either a hexagon or square shape of bolt head or nut and the maximum diameter is indicated at B, to which diameter the other-than-round bore is through-broached, as will hereinafter appear.

The contracted portion 16 of the thin walled portion 14 acts as shown in Fig. 3 as a support for the wrench head in relation to the bolt head or nut, this figure illustrating a nut 22 on a bolt 20 for this purpose. The opening 18 is smaller than the diameter B so that the cap-like extension 16 may be supported on the nut 22 without interference by the bolt 20 and the opening 18 is large enough for this purpose. The portion 16 may likewise be supported by a bolt head in an obvious manner.

The information of a wrench as shown in Figs. 1, 2, 3 and 7 presents a number of problems which I have solved by a relatively simple method for forming the wrench so that it can be manufactured economically and the final cost can thereby be but a small percentage greater than the ordinary type of box wrench. Box type wrenches are usually forged and then the teeth 24 formed by a broaching operation. I, likewise, forge the wrench, for instance, to the shape shown in Fig. 4, by means of upper and lower forging dies 25 and 27 respectively, with the thin walled portion 14 forming a substantially cylindrical extension of the thick walled portion 12. This forging has a bore 26 suitable for the broaching operation and Fig. 5 shows the bore after it has been through-broached to form the teeth 24 with the maximum diameter B and an average minimum diameter B' illustrated in Fig. 4, the various parts of the forging being tapered for die draw during the forging operation. The minimum diameter when broached is slightly larger than the average minimum diameter of the forged bore 26. The broaching operation leaves the thin walled portion 14 as originally formed, as will be seen by comparing Fig. 5 with Fig. 4.

The next step in the operation is to support the wrench head on a supporting die 28, as shown in Fig. 5 and utilize a forming die 30 in the forging press for contracting the thin walled portion 12 to the shape illustrated in Figs. 2 and 3. Fig. 5 illustrates the initial engagement of the forming die 30 with the upper extremity of the thin walled portion 14 and Fig. 6 illustrates the final position of the forming die whereby the thin walled portion 14 has been contracted as indicated at 16 and has provided the central opening 18 of suitable size as hereinbefore referred to. The forming die 30 may be operated in an ordinary press or by means of a forging hammer and the contraction of 14 to form the cap-like extension 16 is preferably done without reheating the wrench after the broaching operation.

From the foregoing specification it will be obvious that I have provided a relatively inexpensive addition to the usual type of box wrench for increasing its utility and a method which enables me to form the wrench with the improvement at very little expense over and above the formation of the usual type of box wrench.

Some changes may be made in the construction and arrangement of the parts of my box wrench and the steps of my method may be varied to some extent without de-

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parting from the scope and purpose of my invention. It is accordingly my intention to cover by my claims any modified forms of structure, use of mechanical equivalents or use of mechanically equivalent steps of my method which may reasonably be included within their scope.

I claim as my invention:

1. In a method for making box wrenches, the steps of forging a handle and a substantially cylindrical wrench head at one end thereof with a thick walled portion having a bore and a thin walled portion of greater internal diameter than said bore and less external diameter than said head, through-broaching said bore to other-than-round shape for engaging a nut, bolt head or the like for turning the same and contracting the outer end of said thin walled portion to form it into an inwardly projecting cap-like extension of said thick walled portion having an opening therein of less diameter than the maximum diameter of said broached bore whereby said cap-like extension may rest on the outer surface of the nut or bolt head to support said wrench head thereon.

2. In a method for making box wrenches, the steps of forging a handle and a substantially cylindrical wrench head at one end thereof with a thick walled portion having a bore and a thin walled portion of greater internal diameter than said bore and less external diameter than said head, through-broaching said bore to other-than-round shape for engaging a nut or the like, and contracting

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the outer end of said thin walled portion by means of a forming die to form it into a perforated cap-like extension of said thick walled portion.

3. A method for making box wrenches comprising the steps of forging a handle and a substantially cylindrical wrench head at one end thereof with thick and thin walled portions, through-broaching said bore at said thick walled portion to other-than-round shape for engagement with work to turn the same and contracting the outer end of said thin walled portion to form it into a cap-like extension of said thick walled portion having an opening therein of less diameter than the maximum diameter of said broached bore.

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