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WRENCH MAKING METHOD

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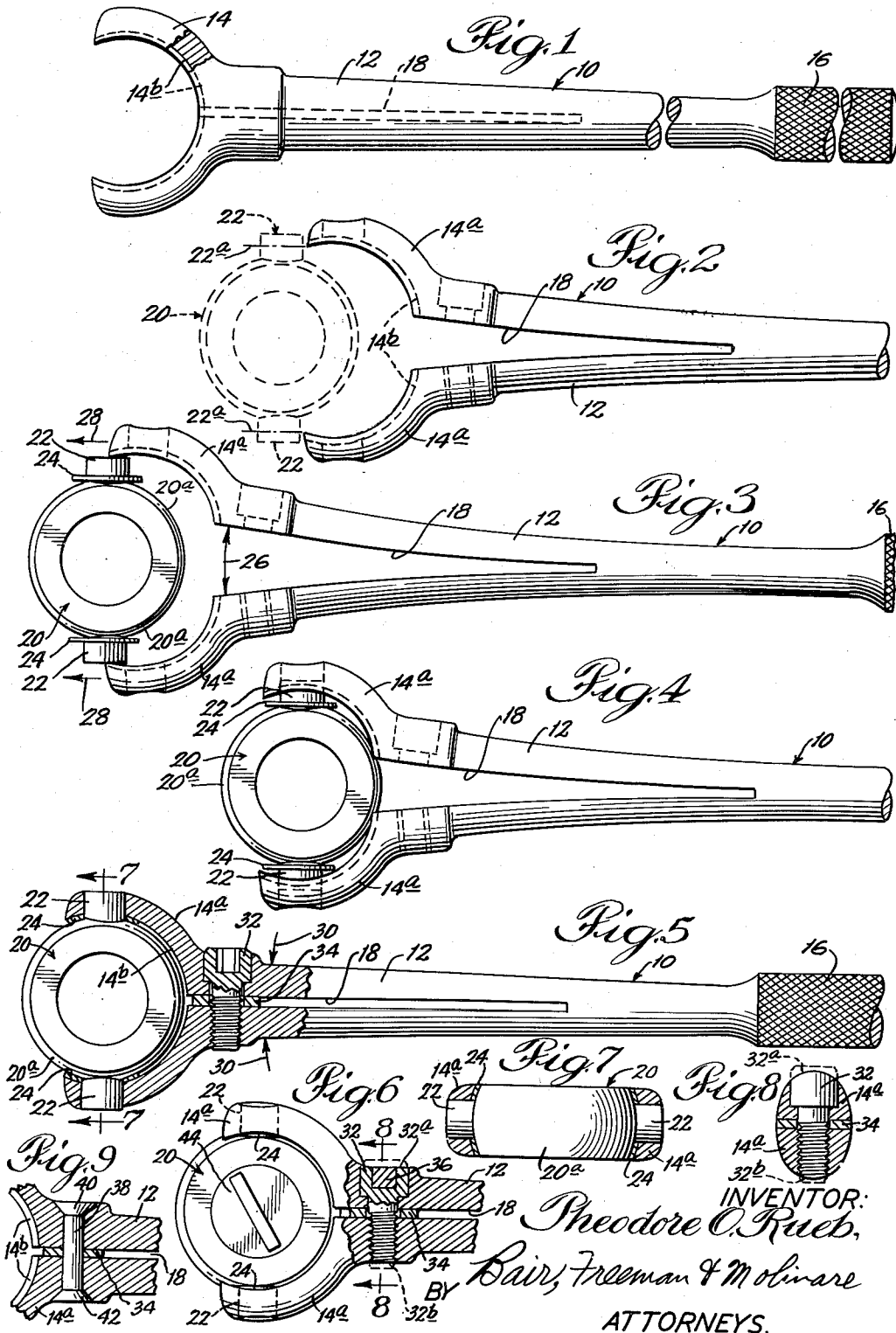


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

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**WRENCH MAKING METHOD**

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2 Claims. (Cl. 76—114)

This invention relates to a method of making a wrench and particularly one of the type in which the wrench head has a pair of trunnions and a handle of yoke or forked type to coact with the trunnions in such manner that the handle can be swung to an overhead position with respect to the wrench head, to a lateral position with respect thereto or to any angle in between the two in accordance with the space available for turning the wrench head by means of the handle.

One object of the invention is to provide a handle which may be made and assembled in relation to the wrench head by my disclosed method to produce a neat appearing assembly, and one which is practical and efficient, and utilizes a minimum of material in the manufacture of the wrench.

Another object is to provide a method that produces a yoke type handle in which the yoke arms are in all effective respects integral, although they are spread apart to fit over the trunnions during the assembly operation.

Still another object is to provide a wrench making method in which the wrench handle is forged to shape including a yoke for the wrench head, then slotted and the yoke spread beyond the elastic limit thereof to assume a shape that has to be sprung further to go over the trunnions of the wrench head, then tempered to give it the desired strength, after which the yoke may be sprung apart to a position to fit over the wrench head trunnions and then sprung together to substantially close the slot and bolted, riveted or otherwise secured in this position with the two portions of the wrench handle on opposite sides of the slot rigidly connected together for maximum strength of the handle during subsequent manipulations thereof for rotating the wrench head.

A further object is to provide a frictional connection between the wrench head and the wrench handle comprising flat spring washers which are sprung to cup shape by the yoke as it is closed by my method on the wrench head due to a globular surface thereof and a complementary concave spherical surface within the yoke of the handle as the two are clamped together by the bolt or rivet.

With these and other objects in view, my invention consists in the forming of a wrench handle and the assembly thereof to a wrench head by my wrench making method, 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 plan view of a forged wrench handle used in my wrench making method, the forging thereof being the first step in the method;

Fig. 2 is a plan view of the left end portion thereof showing the yoke spread to a desired shape and then tempered;

Fig. 3 is a similar view showing the yoke sprung apart after tempering for placing it over the trunnions of the wrench head;

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Fig. 4 shows the yoke released onto the trunnions; Fig. 5 is a plan view partially in section showing the yoke sprung together and held by a cap screw;

Fig. 6 is a fragmentary portion of Fig. 5 showing the head of the cap screw plugged and the head and lower end of the screw trimmed;

Fig. 7 is a partial sectional view on the line 7—7 of Fig. 5;

Fig. 8 is a sectional view on the line 8—8 of Fig. 6; and

Fig. 9 shows a modification similar to a portion of Fig. 6 in which a rivet is used instead of a cap screw for holding the arms of the yoke together.

On the accompanying drawing I have used the reference numeral 10 to indicate in general a wrench handle characterized by a shank 12, a yoke 14 and a hand grip 16. The wrench handle 10 may be forged to the shape shown in Fig. 1 including a concave spherical surface 14<sup>b</sup> and then slotted as indicated at 18 which forging and slotting constitute the first two steps of my method. The slotting produces a pair of yoke arms 14<sup>a</sup>.

The third step consists in spreading the two yoke arms 14<sup>a</sup> beyond their elastic limit, and the degree of spread is such that when the yoke arms are released they take up a position to about half way clear the trunnions 22 of a wrench head indicated generally at 20. Half-way marks on the trunnions are indicated at 22<sup>a</sup>.

The fourth step in my method is to temper the handle 10 to impart to it the desired strength for use as a lever in turning the wrench head 20, and to give the yoke arms 14<sup>a</sup> the characteristics of a spring.

Fifth, the yoke arms 14<sup>a</sup> are sprung apart as indicated by the arrow 26 in Fig. 3 so that they can pass over the trunnions 22 as indicated by the arrows 28 and trunnion openings 15 assume a position of alignment with the trunnions 22. Sixth, the arms are released and they spring back to the position shown in Fig. 4 which is the same as depicted in Fig. 2. Seventh, the yoke arms are sprung together as indicated by the arrows 30 in Fig. 5 and eighth, are secured together with a suitable spacer washer 34 therebetween by a cap screw or the like 32. The wrench handle now bears a pivotal relationship to the wrench head such that it may be swung upright relative thereto, or to an angular position as space permits for rotating or oscillating the wrench head.

It is desirable, between steps four and five, to place on the trunnions 22 flat spring friction washers 24 to be deformed to spherical shape as shown in Figs. 5, 6 and 7. The thickness of the washer 34 is such that the yoke arms 14<sup>a</sup> deform the initially flat washers 24 to the spherical shape as just mentioned, the periphery of the wrench head 20 being likewise spherical as indicated at 20<sup>a</sup>. The spherical surface 20<sup>a</sup> and the concave surface 14<sup>b</sup> of the yoke arms 14<sup>a</sup> provide close following of the surface 14<sup>a</sup> over the surface 20<sup>a</sup> during the adjustment of the wrench handle 10 from one position to another. The close approach of the two surfaces also provides maximum strength in the handle 10.

Another contributing factor to maximum strength is the clamping tightly together of the two arms 14<sup>a</sup> and the intervening spacer washer 34 by the screw 32, the thickness of the washer 34 being selected for proper tensioning of the spring washer 24 as desired.

After the parts are assembled as in Fig. 5, the hexagon opening in the screw 32 is filled in by welding or the like indicated at 36, the head of the screw 32 is trimmed off to the surface 32<sup>a</sup> and the lower end of the screw is trimmed off to the surface 32<sup>b</sup> illustrated in Figs. 6 and 8 for neat appearance and to provide smooth surfaces that do not catch on clothing and the like.

A modified arrangement is shown in Fig. 8 wherein a rivet 38 having a head 40 and riveted at 42 is used in

place of the screw 32, or other suitable means may be provided for connecting the two parts of the forked handle 10 together rigidly at this point so as to provide an effective integral connection between the yoke arms 14<sup>a</sup>.

In Fig. 6 I illustrate a ratchet wrench mechanism such as shown in my Patent No. 2,232,477 which may be assembled to the wrench head 20, or other mechanisms such as shown in my Patent Nos. 2,657,604 or 2,744,432 may be used to complete the wrench assembly. Summarizing the steps of my method:

- (1) The handle 10 is forged to the desired shape (Fig. 1).
- (2) The handle 10 is slotted at 18 (Fig. 1 dotted).
- (3) The arms of the handle 10 are spread beyond their elastic limit to the indicated dimension 22<sup>a</sup>.
- (4) The handle 10 of the shape shown in Fig. 2 is tempered.
- (4a) The spring washers 24 are placed on the trunnions 22 (Fig. 3).
- (5) The yoke arms 14<sup>a</sup> are sprung apart (Fig. 3) to pass over the wrench head trunnions.
- (6) The arms 14<sup>a</sup> are released to spring back to the Fig. 2 position (Fig. 4).
- (7) The yoke arms 14<sup>a</sup> are sprung together (Fig. 5).
- (8) The yoke arms are secured solidly together (Fig. 5).
- (8a) The securing means is plugged if necessary and trimmed to the contour of the wrench handle as shown in Figs. 6 and 8.

Certain changes may be made in the steps of my wrench making method without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any equivalent steps which may reasonably be included within their scope.

I claim as my invention:

1. The method of making and permanently connecting

together a two-part wrench having a head provided with opposite projections and a handle provided with a pair of perforated arms to receive said projections, comprising the steps of; forging said handle, slotting the same to provide said arms, spreading said arms beyond their elastic limit and permitting them to return to a set position substantially one-half the requirement for going over said projections, tempering said wrench handle, springing said arms apart to go over said projections and releasing them, springing said arms together at a point closely adjacent said wrench head for a working fit on said projections, and permanently and rigidly connecting said arms together at said point in their sprung-together position.

2. The method of making and connecting together a two-part wrench having a head provided with opposite projections and a handle provided with a pair of arms having perforations to receive said projections and second perforations, comprising the steps of; forging said handle, slotting the same to provide said arms, spreading said arms beyond their elastic limit and permitting them to return to a set position substantially one-half the requirement for going over said projections, tempering said wrench handle, springing said arms apart to go over said projections and releasing them, springing said arms together at said second perforations for a working fit on said projections, entering a fastening element through said second perforations to solidly, rigidly and permanently connect said arms together, and trimming said fastening element flush with the surface of said wrench handle.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

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