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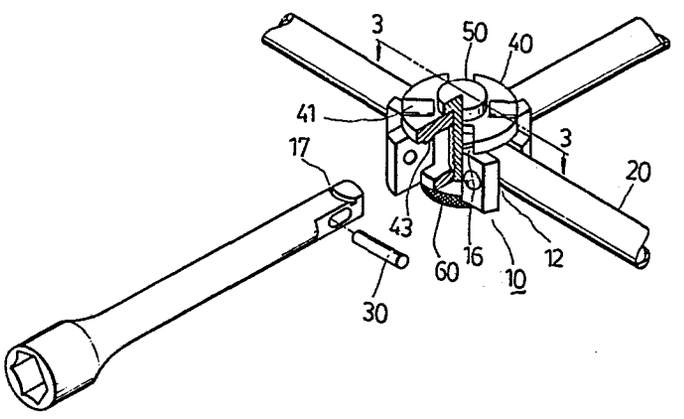
## (54) Foldable cross wrench.

(57) The foldable cross wrench having four wrench members (20) pivoted to a coupling member (10) can be stretched into a cross shape, and secured on its stretched position by a cap member (40) which is provided with keys (43) to engage with key ways (17) on the wrench member (20). When the wrench is not used, the cap member is rotated to a position where the keys (43) are not engaged with the key ways (17) on wrench members (20) so that the wrench members (20) can be pivoted to a folded position.

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TITLE: FOLDABLE CROSS WRENCH

This invention relates to cross wrench and more particularly to foldable cross wrench wherein a coupling means is included to enable the folding of the wrench body when not used.

Wrenches are those of the most important and most-used tools in a machanic's kit for loosening or tightening bolts and nuts. Among them a cross wrench specifically designed for some special occasions is disadvantaged by its large dimension, which will occupy a large space when stored and not convenient to be carried. Although some improvements has been made before the invention, for example, a cross wrench including two levers each with work head at two ends thereof, which are pivoted at the intersection part and can be pivoted to aligned one above the other. But it still occupies relative large spece when stored away.

Accordingly, it is a primary object of this invention to provide a foldable cross wrench which only needs small space for storing it away.

With this and other objects in view, the present invention contemplates a foldable cross wrench which comprises a coupling member incouding a rigid plate which

is quartered into four sections in connection, each two adjacent sections spaced apart with a slot, the top surface of each section being provided a first key way, and the first key ways positioned on a circle which having a radius corresponding to the distance between the central axis of the coupling member and the key ways; four wrench members each having a working head at a first end, and a second end pivoted to the coupling member between two adjacent sections and received in the slot, the second end being provided with a second key way which constituting a circular key way with the first key ways when the wrench members in stretched position thereof; a cap member releasably attached to the coupling member, being provided with four key elements on the bottom surface thereof for locking the wrench members in stretched position by engaging with the second key ways and releasing the wrench members as the cap member being rotated through a predetermined angle to a position where the key elements engaged with the first key ways other than the second key ways; and a headed bolt having a threaded end, which inserting through the cap member and the coupling member having its threaded end screwed with a nut to fasten both together.

A further feature of the invention resides in that an extended bore is provided at the pivoting end of each wrench member for receiving a pin to pivot on the coupling member and permitting a limited longitudinal movement with respect to the coupling member.

To prevent the headed bolt from rotating with the nut, a third key way on the upper surface of the cap member and a corresponding third key are separately provided on the bottom surface of the head of the bolt for securing the headed bolt with the cap member.

Other objects, advantages and features of the invention may be apparent upon consideration of the following detailed description when read in conjunction with the accompanying drawings wherein:

Fig.1 is a schematic fragmentary perspective view of the foldable cross wrench according to the present invention;

Fig.2 is a perspective view of the foldable cross wrench in a folded position;

Fig.3 is a section view taken on line 3-3 of Fig.1 with the wrench members in a stretched position;

Fig.4 is a section view taken on line 4-4 of Fig.2 with the wrench member in a folded position.

Attention firstly directed to Fig.1, the coupling member 10 is constituted by a rigid block which being quartered into four identical sections connected intergrally by a bottom plate thereunder. Between each two adjacent sections, there is a channel 12 provided for receiving one end of a wrench member 20 which is pivoted to walls of the adjacent section.

As best seen in Fig.3, an extended bore 22 is provided at one end of the wrench member 20 for inserting

a pin 30 to pivot the wrench member 20 to the coupling member 10 while permitting a limited movement of the wrench member 20 in the pivoted position, the benefit will described detailedly hereinafter.

A cap member 40, as shown in Fig.1 and Fig.3, is formed as a notched circular plate having keys 43 provided on the bottom surface thereof. The notches 41 are distributed corresponding to the channels between each two adjacent sections of the coupling member 10 such that the notches 41 can be aligned with the channels to allow the pivoting end of the wrench member 20 longitudinally extended therein when a folded position is to be taken, as shown in Fig.4.

The top surface of the coupling member 10 and the pivoting end of each wrench member 20 are respectively provided with key ways 16, 17 which are positioned on a circle, the bottom surface of the cap member 40 is integrally formed with key 43 to engage with the key ways 16, 17.

Furthermore, a headed bolt 50 having a threaded end is inserted into the hole 42 on the cap member 40 through an opening 29 formed at the center of the coupling member 10 and the lower end thereof being screwed with a nut 60. The tightness of attachment of the cap member 40 against the coupling member 10 can be adjusted by rotating the nut 60. In order to prevent the bolt 50 from rotating with the nut 60, an additional key 52 is provided on the

key way 45 is correspondingly provided on the cap member 40.

When the wrench is to be used, the wrench members 20 are pivoted to become straight, and then each being pushed forward to align the key ways 17 thereon with the key ways 16 on the coupling member 10. Following loosening the nut 60, the cap member 40 is then rotated to a position where the keys 43 engages with the key ways 17 and meanwhile rotating the nut 60 to tighten the coupling member 10 again thereby secureing the wrench member 20 in its stretched position to be ready for use.

After using, the wrench members 20 can be folded to parallel with each other, as shown in Fig.2, by firstly loosening the nut 60, then rotating the cap member 40 through a right angle to a position where the keys 43 engages with the key ways 16 and the notches 41 aligns with the channels 12, the wrench member 20 now can be pivoted down to a folded position.

The edges of walls of the coupling member 10 which holding the wrench member 20 are preferably rounded to decrease the degree of stress concentrated, therefore, the strength of the coupling member 10 is improved.

CLAIMS:

1. a foldable cross socket wrench comprising:

a coupling member (10) including a rigid plate which is quartered into four sections in connection, each two sections spaced apart with a slot, the top surface of each said section being provided with a first key way (16) and said first key ways (16) positioned on a circle which having a radius corresponding to the distance between the central axis of the coupling member (10) and said key ways (16);

four wrench members (20) each having a working head at a first end, and a second end pivoted to said coupling member (10) between two adjecent sections and received in said slot, said second end being provided with a second key way (17) which constituting a circular key way with said first key ways (16) when said wrench members in stretched position thereof;

a cap member (40) releasably attached to said coupling member (20), being provided with four key elements (43) on the bottom surface thereof for locking said wrench members (20) in stretched position by engaging with said second key ways (17), and releasing said wrench members (20) as said cap member (40) being rotated through a predetermined angle to a position where said key elements (43) engaged with said first key ways (16) other than said second key ways (17); and means for adjustably fastening said cap member (40) therby the

tightness of engagement of said cap member (40) with said coupling member (10) can be adjusted.

2. A foldable cross socket wrench as claimed in claim 1, wherein said wrench member (20) is provided with an extended bore (22) at said pivoting end for receiving a pin (30) to pivot on said coupling member (10) and permit limited longitudinal movement with respect to said coupling member (10).

3. a foldable cross socket wrench as claimed in claim 1, wherein said means for adjustably fastening said cap member (40) including a headed bolt (50) having a threaded end, said headed bolt (50) inserts through said cap member (40) and said coupling member (10) and having the threaded end thereof screwed with a nut (60).

4. A foldable cross socket wrench as claimed in claim 1 or 3, wherein said cap member (40) provided with a third key way on the upper surface thereof and said headed bolt (50) correspondingly provided with a third key on the bottom surface of the head for securing said headed bolt (50) with said cap member (40) to prevent said headed bolt (50) from rotating together with said nut (60) being rotated.

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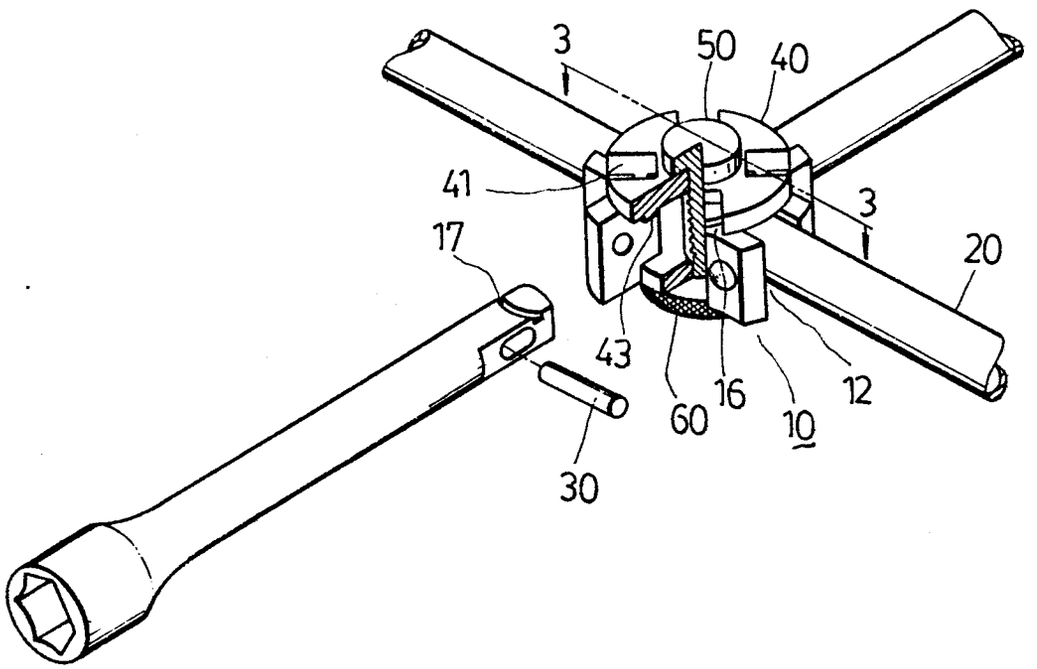


FIG. 1

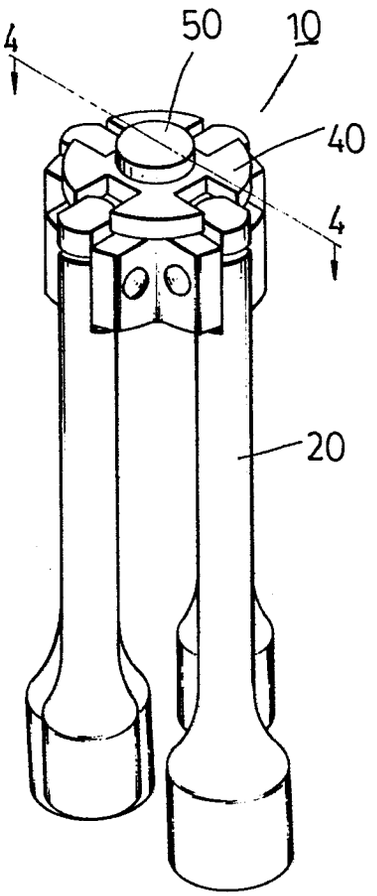


FIG. 2

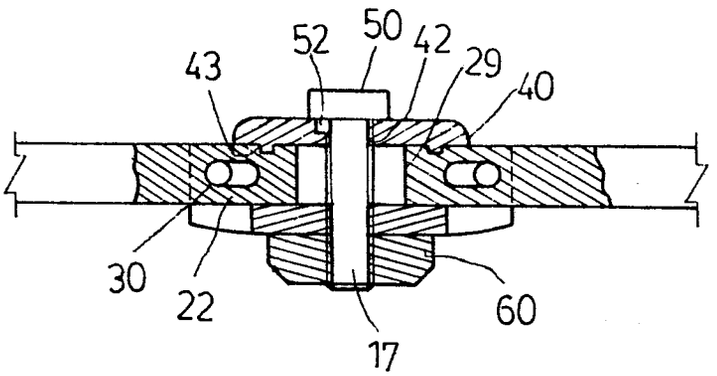


FIG. 3

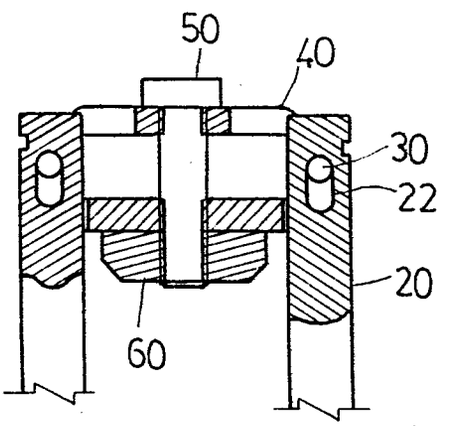


FIG. 4