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(19)

(54) A SPANNER

(71) We, EDUARD WILLE GMBH & o., of Lindenallee 27, D-5600 Wuppertal 12, Germany, a German Body Corporate, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a spanner, and particularly, but not exclusively, to a torque spanner.

It is known to provide spanners, more particularly torque spanners, with a set of plug-in tool heads so that different screwing operations can be performed with the same spanner by optional plugging-in of the plug-in tool heads or to enable the same spanner to be used for tightening or releasing screws of different dimensions. Generally, torque spanners are provided with an endpiece having a socket and the plug-in tool heads are provided with a spigot which in turn is equipped with a locking pin to retain the head in the socket. In a known embodiment of such a plug-in connection the spigot of the tool head has a square cross-sectional profile with rounded corners and a locking pin which projects from one side surface. The square cross-sectional profile of the spigot has a low resistance to bending loads, unless it is constructed with a large cross-sectional area. This in turn involves the disadvantage of a construction with large dimensions.

In another known embodiment, the plug-in tool heads have a rearwardly extended tubular arm with an approximately square cross-sectional opening into which can be inserted a square pin disposed on the torque spanner. Since each of the tool heads must have a tubular arm, it follows that the manufacture of the heads is difficult and costly. Moreover, the tool heads of this known torque spanner can be stressed in bending only to a limited extent. In a similar known embodiment of a torque spanner with interchangeable plug-in tool heads, the latter also have a rearwardly oriented tubular extension arm. The latter is offset so that force is not transmitted in a straight line. Furthermore, the tubular extension arms have a circular cross-sectional opening, thus calling for means to prevent twisting.

Another known embodiment of a torque spanner has an endpiece constructed as a flat tube with plug-in tool heads which can be inserted into the end of said endpiece. A torque spanner of this kind has large tolerances between the socket opening and the external diameter of the spigot associated with the plug-in tool head and has a long length.

The endpiece of another known torque spanner has an extension of trapezoidal cross-section, supported by a web, which projects axially beyond the endpiece. The plug-in tool heads in this case have a continuous groove, profiled to fit the above-mentioned extension, so that the plug-in tool heads must be mounted from the side on the said extension. This torque spanner suffers from the disadvanage of its manufacture being exceptionally difficult and therefore costly combined with the disadvantage of unfavourable force transmission.

According to the present invention, there is provided a spanner comprising an elongate handle and a removable tool head, the spigot of rectangular cross-section which forms part of the tool head, the spanner being arranged so that the handle is swung, in use, in a plane about an axis located within the tool head, the handle and the head thus having lateral sides which, respectively, lead and trail in said plane, the socket being formed in an end face of the handle, and having no opening in the lateral sides, the major axis of the

rectangular spigot cross-section lying in or parallel to said plane, and the spigot and socket having a snap-in connection engaging between a wider face of the spigot and a corresponding surface in the socket in either one of two positions.

It is possible, with a spanner according to the invention, to produce a tool of small thickness but with a substantial resistance to bending loads in the plane of use. The thinness of the resulting tool can be advantageous in locations where access is limted, and can in fact make the difference between being able to use a tool or not.

The tool head may have outwardly extending shoulders on either side at one end of the spigot. The shoulders can abut against the end face of the handle, so that the axial depth of the socket in the handle is not critical.

If the adjoining surfaces of the handle and of the tool head are aligned flush with each other, there are no projecting portions which can catch on projections.

If the spigot is off set from the centre of the tool, so that a step is formed between one wider surface of the spigot and the adjacent external surface of the head, the head can be reversed in the handle and still present the desirable flush alignment feature.

If the wider surface of the spigot opposite the stepped wider surface is flush with the adjacent external surface of the head, forging and polishing of the head is facilitated.

The snap-in connection between the head and the handle can be formed by a spring biassed locking pin disposed in a blind hole in the spigot and projecting perpendicularly therefrom. The pin can engage in one of two bores situated in wider sides of the socket in the handle. When the spanner is in use, the locking pin remains unstressed because it is aligned perpendicular to the plane of movement of the handle.

If the opening of the socket in the end face of the handle is chamfered, insertion of the spigot is facilitated, and the chamfer can cause the locking pin to be pushed back into the spigot during insertion.

The shape of the head is very suitable for production by forging.

Embodiments of the subject of the invention will be explained hereinbelow by way of example, with reference to the accompanying drawing, in which:

Fig. 1 is a plan view of the end region of a torque spanner with a plug-in tool head,

Fig. 2 is a side view according to Fig. 1, the end of the handle being shown as a vertical section,

Fig. 3 shows the end of the handle of Figure 2 on a larger scale,

Fig. 4 is an end view of the handle of Fig. 3,

Fig. 5 is a plan view of an alternative plug-in tool head,

Fig. 6 is a section along the line VI-VI of Fig. 5, and

Fig. 7 is an end view in the direction of the arrow VII in Fig. 5.

Figs. 1 and 2 show an end region of a torque spanner handle 1 with an end 2. A spigot 4 of a plug-in tool head 5 is inserted into a socket 3 in the end 2. The plug-in tool head 5 shown in Figs. 1 and 2 is a square drive shank tool head, and the head shown in Figs. 5 to 7 is a ring tool head. Other possible heads are an open-ended spanner, an open-ring spanner, a ratchet spanner, or a ratchet spanner. Each plug-in tool head 5 of the comprehensive range has the same shaped spigot 4. As can be seen more particularly by reference to Fig. 7, the spigot 4 has a rectangular cross-sectional profile whose major cross-sectional axis 6 lies in the plane in which the handle 1 will be turned, in use. The bending moment which occurs in use of the spanner thus encounters the maximum resistance of the spigot 4, thus producing a relatively high load-bearing capacity.

On its bottom broad side 14 (Fig. 6), the spigot 4 is provided with a blind hole 7 in which a locking pin 8 is supported. The locking pin 8 is outwardly based by a compression spring, not shown, so that the said pin projects perpendicularly from the plane of the side 14.

All edge corners of the drive pin 4 have a chamfer 9, for example of 1 mm x 45°. The plug-in tool head has abutment shoulders 10 which bear against the free endface 15 of the end 2. The top broad side 16 of the spigot 4 (see more particularly Fig. 2) is in flush alignment with the top broad side 17 of the remainder of the tool head 5. This flush alignment is important for manufacturing purposes, since it simplifies manufacture. The bottom broad side 14 of the spigot 4, into which the locking pin 8 is advantageously recessed, is offset by a step 11 (Fig. 6) from the bottom broad side 18 of the remainder of the tool head. The height of the step 11 corresponds to the dimension between the broad sides 19 of the end 2 and the inner walls of the socket 3 adjacent thereto. This dimension is referenced with the numeral 11 in Fig. 4.

Flush alignment between one of the broad sides 19 of the end 2 and one broad side 17 of the plug-in tool head 5 is thus obtained at all times. Furthermore, the length of the abutment shoulders 10 corresponds to the wall thickness of the end 2 at the height of the socket 3, the wall thickness being advantageously uniform all round. This also provides flush alignment between the end-

piece 2 and the plug-in tool head 5 on the narrow sides 20.

Advantageously, spanners are produced with two spigot sizes. In the first size, the spigot 4 has a width of 12 mm, a height of 9 mm and a length of 16 mm. In the second size, the spigot 4 has a width of 18 mm, a height of 14 mm and a length of 25 mm. The ratio of spigot width 21 to spigot height 22 should be advantageously between 1.2:1 and 1.3:1. A particularly narrow and attractively styled embodiment can thus be achieved for the spanners, with a large resistance to bending loads.

The socket 3 of the end 2 is adapted to the dimensions of the spigot 4. To allow the locking pin 8 to engage, the end 2 is provided with an open bore 12 which intersects perpendicularly with the longitudinal axis. The open bore which extends transversely through the socket provides two recesses for the locking pin 8, so that the plug-in tool head can be inserted in either one of two positions which are spaced 180° apart, for example for reasons of space or for anti-clockwise tightening. To facilitate the inserton of the plug-in tool head, the socket 3 of the end 2 is provided with frontal insertion chamfers 13. The front edges of the insertion chamfers 13 are arcuate (see Fig. 4) and converge towards the inside of the socket, (see also Fig. 3). Adavntageously, the acceptance anxle α of the insertion chamfer 13 is 80°.

WHAT WE CLAIM IS:—

1. A spanner comprising an elongate handle and a removable tool head, the handle having a socket for receiving a spigot of rectangular cross-section which forms part of the tool head, the spanner being arranged so that the handle is swung, in use, in a plane about an axis located within the tool head, the handle and the head thus having lateral sides which, respectively, lead and trail in said plane, the socket being formed in an end face of the handle and having no opening in the lateral sides, the major axis of the rectangular spigot cross-section lying in or parallel to said plane, and the spigot and socket having a snap-in connection engaging between a wider face of the spigot and a corresponding surface in the socket in either one of two positions.

2. A spanner as claimed in claim 1, wherein the tool head has outwardly extending shoulders on either side at one end of the spigot.

3. A spanner as claimed in claim 1 or claim 2, wherein the lateral sides of the tool head are flush with the lateral sides of the handle ,and a face joining the two lateral sides of the head is also flush with the adjacent face of the handle.

4. A spanner as claimed in any preceding claim, wherein the spigot is offset from the centre of the tool head so that a step is formed between one wider surface of the spigot and the adjacent external surface of the head, the depth of which is equal to the distance between the corresponding inner surface of the socket in the handle and the outer surface of the handle.

5. A spanner as claimed in claim 4, wherein the wider surface of the spigot opposite said stepped wider surface is flush with the adjacent external surface of the head.

6. A spanner as claimed in any preceding claim, wherein the snap-in connection is formed by a spring-biassed locking pin disposed in a blind hole in the spigot and projecting therefrom, and two bores situated in wider sides of the socket in the handle.

7. A spanner as claimed in any preceding claim, wherein the opening of the socket in the end face of the handle is chamfered to facilitate insertion of the spigot.

8. A spanner as claimed in claim 7, wherein the chamfered opening is of arcuate configuration.

9. A spanner as claimed in claim 7 or claim 8, wherein the angle between the chamfers on opposite edges of the spanner is 80°.

10. A spanner as claimed in any preceding claim, wherein the ratio of the length of major and minor axes to the spigot cross-section is between 1.2:1 and 1.3:1.

11. A spanner as claimed in any preceding claim, wherein the tool head is produced by forging.

12. A spanner substantially as herein described with reference to the accompanying drawing.

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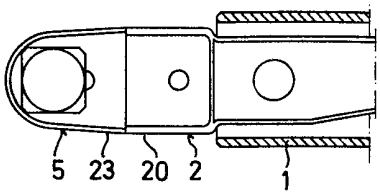
1566596 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 1



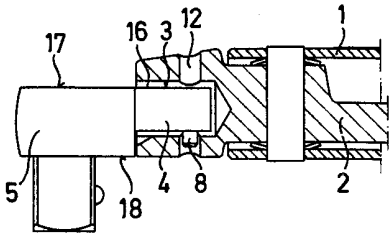


FIG. 2

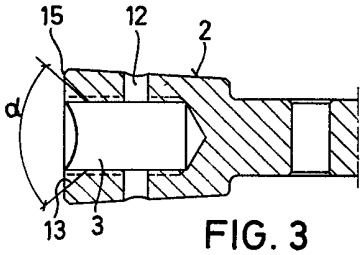


FIG. 3

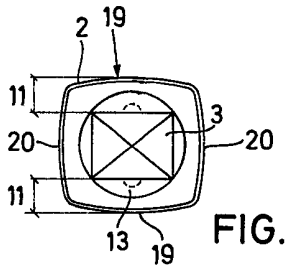


FIG. 4

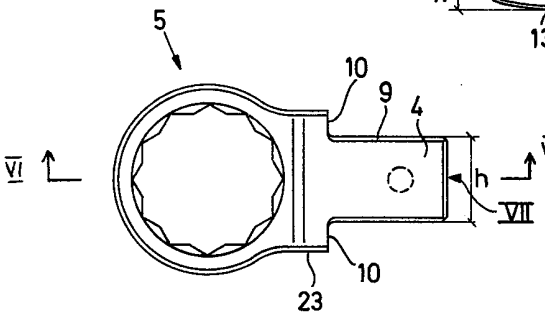


FIG. 5

FIG. 7

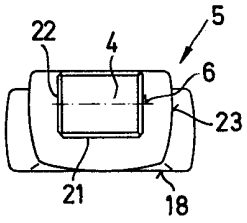


FIG. 6