

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 701 883 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.03.1996 Bulletin 1996/12

(51) Int. Cl.⁶: **B25B 13/06**

(21) Application number: **93500112.3**

(22) Date of filing: **23.07.1993**

(84) Designated Contracting States:
ES

(72) Inventor: **Palacio, Joseba**
E-48980 Santurtzi (Bizkaia) (ES)

(71) Applicant: **BATZ, S. COOP. LTDA.**
E-48140 Igoerre (Bizkaia) (ES)

(74) Representative: **Urteaga Simarro, José Antonio**
Principe de Vergara, 31
E-28001 Madrid (ES)

(54) Tubular socket wrench body

(57) A socket wrench produced in a progressive die from a metal sheet, with a bent area and two straight sections, one longer (2) and one shorter (3). The sheet metal meets along an edge (11) provided with recesses and projections (8, 8a) which engage with each other, and the end of the shorter section (3) has a hexagonal cross-section. The shorter section (3) is occupied by an electrode welded section (10). A sturdy economical wrench is thus provided.

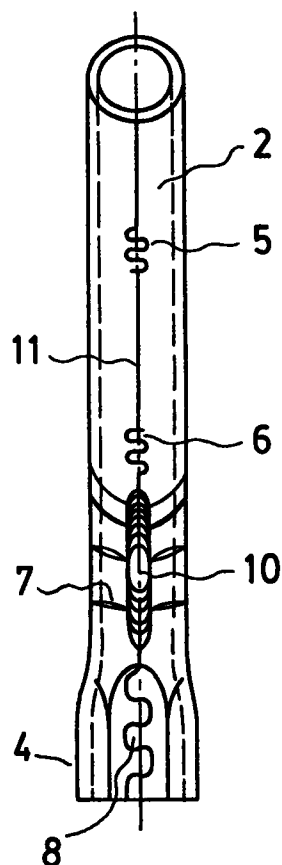


Fig.: 2

EP 0 701 883 A1

Description

This invention relates to socket wrenches, also known as box wrenches or box spanners, commonly used in industry and used in particular in the automobile sector, whose purpose is to loosen and/or tighten the wheel nuts of vehicles when wheels are being changed, removed or fitted.

Wrenches of this kind which are known are produced using different techniques. Thus, extrusion from a pipe, forging and drop forging are all used. However, the disadvantage of all these systems is that the manufacturing process is costly and the wrenches obtained are excessively heavy.

More recently, another process which is known is patent ES.P.8802510, which relates to a fixed wrench which is produced starting from a metal sheet, submitted to the action of progressive dies, thus achieving a tubular element, finishing at one of its ends in a polygonal shape, usually hexagonal, which is then bent as required.

Although this latter technique improves on the previous ones, it nevertheless has the disadvantages that it was produced with a final bending operation and needed transversal folds for its structural reinforcement. Moreover, the facing edges of the pipe were induction welded along the whole of their length, which was an inconvenience as regards keeping the interior section intact at the polygonal end of the wrench.

One object of this invention is to overcome the disadvantages associated with known wrenches and provide a socket wrench which is totally produced based on progressive dies and has completely flat internal and external surfaces.

A second object of the invention is to provide a wrench that uses the assistance of welding only at the bent or elbowed section of the polygonal end.

A third object of the invention is to provide a wrench which is, in general, more economical and stronger than conventional ones.

To put these objectives into practice, a wrench according to the invention is produced starting from a steel sheet, which is submitted to the action of different operations of the progressive dies of a stamping machine, finishing in a unit with a longer straight section with a circular cross-section and another shorter section, also straight, forming an angle with the longer section, whose free end is shaped into a polygonal cross-section, usually hexagonal, on the interior and exterior.

The facing edges of the tubular element so produced find themselves in frontal surface contact and in at least one portion of each straight end section of the wrench, dentations are made, approximately rectangular in shape, on both edges, in such a way that the two dentated portions engage or intermesh with each other. There are usually two pairs of dentated portions on the longer straight section and one pair on the shorter straight section.

In the bent elbow-shaped area, starting from the fronts of the edges, cuts are made in the sheet metal,

with removal of material, so that when the bending operation takes place in the stamping machine, these cuts absorb the formation of possible folds which are formed in carrying out the bending operation. The cuts in question allow a more convenient bending operation, so that once bending has been carried out, the opposite surfaces of the said cuts move towards each other, thus absorbing the surface reduction.

The cuts in question are made with a larger opening towards the area of the joining edge, in such a way that from this area, these openings gradually reduce in size until, approximately, the central area of the pipe, i.e. with each cut occupying an angular space of some 90° and each two cuts aligned some 180°.

As was mentioned earlier, in one of the stamping operations a set of teeth are formed on the sides of the edges, preferably two pairs in the longer straight section and one pair in the shorter straight section. These teeth are usually approximately rectangular in shape and have rounded corners and S-shaped sides, with an outwardly convex protruding portion and another outwardly concave recessed portion.

One line of teeth or dentations on one edge and the line of teeth on the opposite edge have their teeth displaced with respect to each other, with each projection on one edge corresponding to a recess in the other edge, so that when the progressive folding of the sheet steel takes place, each tooth on one edge becomes housed inside its corresponding recess in the other edge, thus carrying out a kind of engagement or intermeshing.

In this engaging action, the sides of the teeth become housed inside each other due to their S shapes, while at the same time the front edges of the teeth and the bases of the recesses, both of which are straight, come face to face with each other.

In general terms, each group has two recesses and two projections on each edge, which correspond to a typical wrench, although this number can be variable, as will be understood.

The pair of teeth made in the shorter straight section of the wrench are made in the portion of a hexagonal cross-section and more specifically in the middle of one of the faces of the polygonal shape performed in the progressive dieing press. This pair is made in identical conditions to those of the pairs in the longer straight section.

All the internal area of the bent or elbowed portion of the wrench with the facing edges, where the previously mentioned cuts are made, is electrode welded along the theoretical central line and, in the same way, this welding is carried out along the same central line where the engagement of the teeth is situated.

In the area where the bent portion finishes and the longer straight section begins, the welding is not necessary and along all this area the edges are simply face to face with each other due to the provision of the pairs of engaged areas mentioned above.

All these and other details of the invention can be seen more clearly in the attached sheets of drawings, in

which one, non-restrictive, solution of the invention is shown as follows:

- Figure 1 is an elevation and half cross-section view of the wrench according to the invention.
- Figure 2 is a view from the right of the previous figure.
- Figure 3 is a local view, from below, of Figure 1.
- Figure 4 is an enlarged detail corresponding to the teeth and recesses made at the edges.

Referring now to figure 1 of the drawings, we can appreciate the wrench (1) as a whole, with its two straight sections, one longer (2) and the other shorter (3) bent in a central area. The cross-sectional elevation of both straight sections is circular, except for the end (4) of the shorter straight section (3), which is polygonal, in this case hexagonal.

In the internal part of the bent area, it can be appreciated that the sides of the cuts (7), made before the bending operation, occupy an angle of 180° between each two in each section.

In the internal area of the wrench (1), it is possible to see the areas (5), (6) and (8) in which the dentated areas are made at the edges of the steel sheet of origin.

Both the general bent or elbowed shape obtained starting from the initial steel sheet, together with the cuts (7), the closed section, the recesses and projections of the areas (5), (6) and (8) and the hexagonal cross-section of the end portion (4) are achieved entirely by progressive die stamping on one single machine.

In accordance with Figure 2, we can appreciate the lower side of the wrench, which shows the positions of the engaged areas (5), (6) and (8) made at the edges (11) of the two straight sections of the wrench (1). The position (10) represents the area which is electrode welded and occupies, at least, the bent area where the cuts (7) have been made.

The welding (10), as was mentioned previously, will occupy at least the bent area, as shown in Fig. 2. This welding will provide the wrench with a certain strength or robustness which will be sufficient for some applications.

However, when it is necessary to raise this strength in order to cover other applications with higher requirements, the welding will be extended to the engagement area (8), but it will not be necessary, in any case, to apply welding in the area (11) of the longer straight section (2).

Figure 3 shows the lower part of the wrench (1) in greater detail, making it possible to appreciate the cuts (7), the welding (10) and one of the engagement areas (6) of the facing edges (11), as well as the internal cavity (9) in the hexagonal portion (8) to house the nut which the wrench has to turn.

In Figure 4 we can see the shape of the recesses (8a) and projections (8) in the shorter straight section, which are identical to those arranged in the longer straight section (2). It is possible to observe the generally rectangular shape of the recesses (8a) and the projec-

tions (8), as well as the S-shape of the sides of both. These specific shapes allow the sides of one recess to be combined with the sides of the projection on the opposite edge, so that once both parts are engaged with each other, this correspondence ensures the immobility of the straight sections (2) and (3) while the wrench is being used.

Obviously, the shape of the recesses and projections (8, 8a) can be as described herein or of another shape. However, the use of those shown here is preferable, as it is considered to be the most advantageous for the purposes proposed.

Claims

1. A socket wrench, of the type which have a bent hollow body (1) with one longer arm (2) and another shorter arm (3), with the end of the latter finishing in a polygonal cross-section, preferably hexagonal, made from a metal sheet shaped in a progressive dieing press and finally bent in a separate operation, with the edges (11) of the steel sheet facing each other and induction welded later, which is characterized in that the whole of the wrench (1) is made in a progressive die, with the edges (11) having portions in which recesses (8a) and projections (8) are made, with these being facing so that they engage inside each other, both in the longer straight section (2) and in the shorter straight section (3), in that a series of double cuts (7) are made in the internal bent area, starting from the edges, with these cuts being made by the removal of material and occupying an area of 90° from each edge (11) in perpendicular planes to the axis of the wrench, in that the edges in the bent area, as a minimum, are occupied and joined by electrode welding (10), leaving the longer straight section (2) of the wrench (1) connected together only due to the engagement of the recesses and projections on the longitudinal edges.
2. A socket wrench, according to claim 1, characterized in that the longer straight section (2) is provided with two groups (5, 6) of recesses and projections engaged with each other, while the shorter straight section (3) has one such group (8) of recesses and projections.
3. A socket wrench, according to claim 1, characterized in that the engagement area (8) of the shorter straight section (3) is made in the central area of one of the hexagonal faces of this section, which essentially corresponds with its facing edges (11).
4. A socket wrench, according to claim 1, characterized in that the electrode welding (10) occupies the facing edges in the bent portion and the shorter straight section (3).

5. A socket wrench, according to claim 1, characterized in that the recesses and projections (8, 8a) made on the facing edges (11) are rectangular in shape and the sides of both are in an S-shape, with the recessed area towards the interior and the projection towards the exterior. 5

10

15

20

25

30

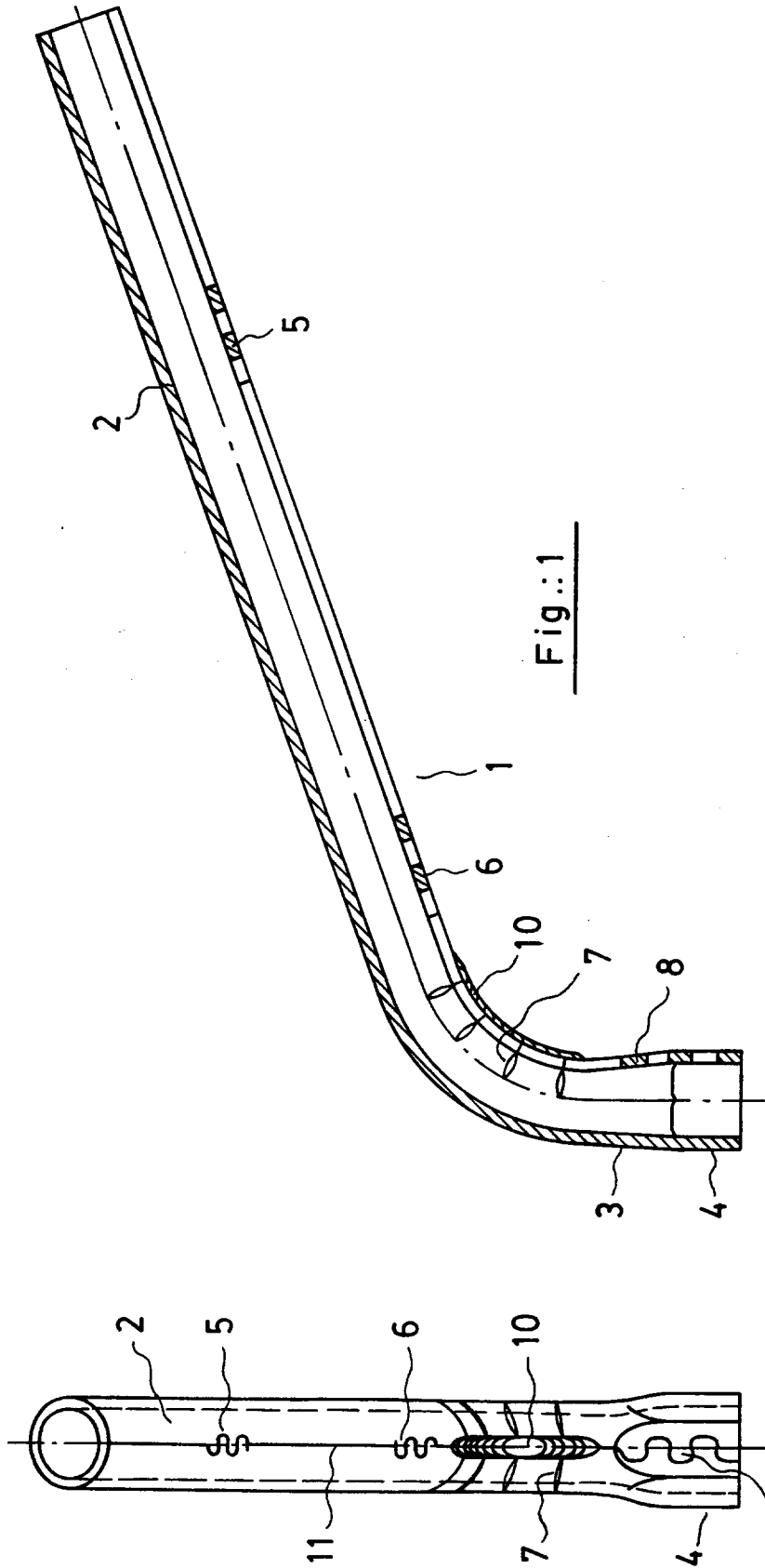
35

40

45

50

55



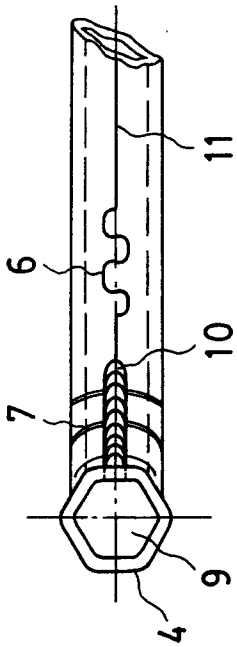


Fig.: 3

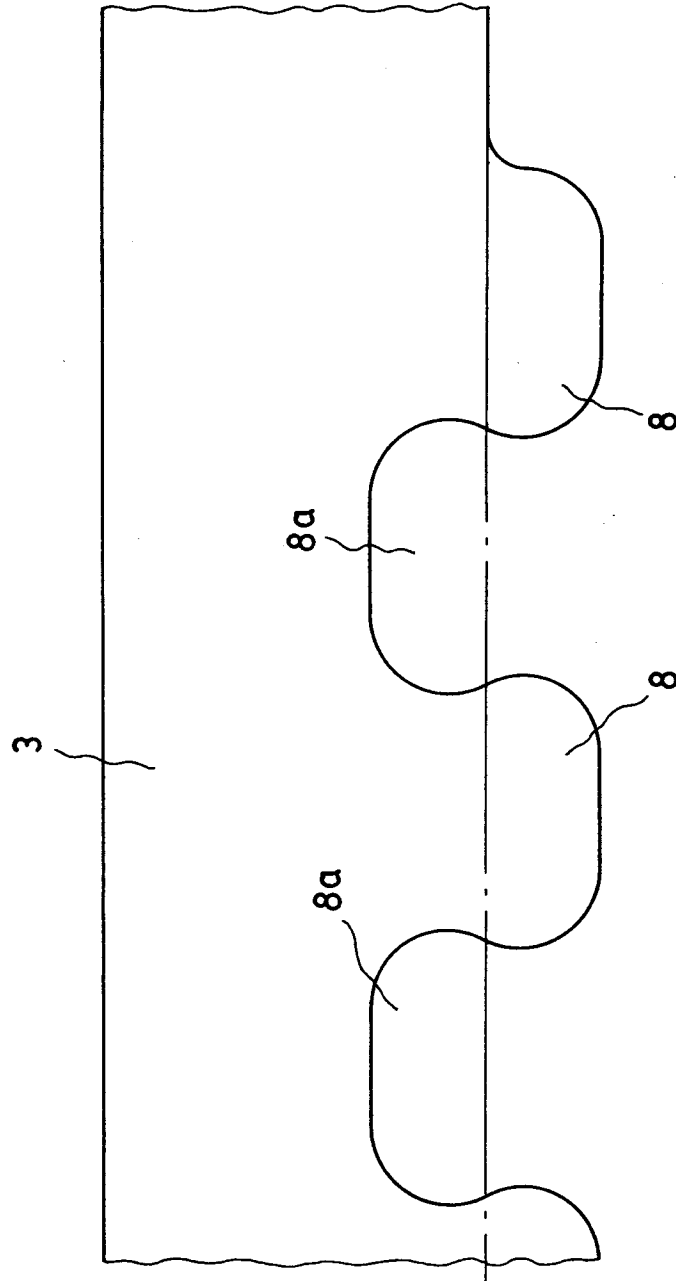


Fig.: 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 50 0112

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE-C-598 181 (SOCIÉTÉ LAITER & CO.) * figures 1,2 *	1	B25B13/06
A	FR-A-997 496 (R.-M.ROUX) * page 1, left column, line 13 - line 22; figure 3 *	1	
A	US-A-1 641 307 (R.J.VELEPEC) * page 1, line 59 - line 64; figures 1,3 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B25B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 December 1993	Examiner Majerus, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)