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GB - A - 1 863
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US - A - 600 494**(73) Proprietor: **LARSEN, Egon Salting**
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Description

It has long been known to provide a pipe wrench for gripping a pipe at three points spaced around its circumference, the pipe wrench comprising a pivotable jaw having two inclined gripping faces to grip the pipe at two spaced joints and which is pivoted to a handle having a curved jaw part in the form of an involute adapted to grip the pipe at the third point. An example is to be found in United Kingdom patent specification 2524 of 1863 (GB—A—AD 1863—No. 2524).

However, the design of prior art wrenches has not been such that the three points or zones of contact are always substantially equi-spaced at 120° intervals.

It has now been found that if the curvature of the curved jaw part is that of the involute of circle centered on the pivot axis between the jaws, of the gripping jaws inclined at 60° to each other, then it is possible for the locus of the point of contact between the curved jaw and pipes of different sizes resting between the gripping jaws to be a straight line bisecting the angle between the gripping faces.

Accordingly the present invention consists in a pipe wrench for gripping a pipe at three circumferentially spaced points which wrench consists of a pivotable jaw including two inclined gripping faces to grip the pipe at two points and which is pivoted to a handle having a jaw part with an involute contact surface intended to grip the pipe at the third point, characterized in that

- a) the involute contact surface of the jaw part is formed as an involute of a circle centered on the pivot axis
- b) the angle between the gripping faces of the pivotable jaw is 60 degrees, and
- c) the contact surface of the jaw part, the pivot axis and the gripping faces are positioned in relation to each other in such a way that the locus of the contacting point of the contact surface of the jaw part as the diameters of the pipes vary is a straight line bisecting the angle between the gripping faces.

The invention will be further described with reference to the accompanying drawings, in which:—

Figure 1 shows a wrench seen from one side and gripping a heavy pipe,

Figure 2 shows the wrench seen from one side and gripping a thin pipe,

Figure 3 shows the wrench of Figures 1 and 2 in perspective; and

Figure 4 is a view similar to Figure 1 showing an alternative form of wrench.

The wrench consists of a shank with an involute, possibly toothed, jaw a and a loose jaw b pivotally connected hereto.

The curved contact surface of the jaw a is an involute generated from a circle c centred on the pivot axis between the jaws a and b, and the

toothed gripping surfaces on the jaw b are inclined to each other at 60° so that the points of contact with pipes shown in Figure 1 and Figure 2 are at 120° spacing. The line 1 represents a plane bisecting the angle between the gripping surfaces of the jaw b. The positions of the gripping surfaces on the jaw b in relation to the pivot axis of the jaw a, and the involute curve of the contact surface on a jaw a are so chosen that the point of contact between the contact surface and the pipe always lies on the line 1, thus establishing the third point of contact at 120° spacing from each of the other points.

A study of line 1 shows that because of the involute all the pipes of the diameters accommodated by the wrench contact the involute exactly where it is intersected by line 1 when the centre of rotation of the movable jaw part a is at a distance from 1 which is radius of the circle from which the involute is generated.

In order to allow for hexagonal parts, the point of contact can be moved a small distance Δr tangentially in the direction of rotation by the centre of rotation of the loose jaw part being moved the small distance Δr closer to 1.

The wrench works in the way that pipes or parts inserted between its jaws are firmly fixed between these when the handle is pulled, and they are at the same time actuated by a turning movement. The normal force K between pipe and jaw is determined by the moment of the shank and the moment arm r which is the same for all pipe diameters as a result of the involute design.

The effect is that whatever the diameter of the pipe actuated there will always be a proportionality between the moment acting on the pipe and the normal force.

Since the pipe will receive the normal force K at three points at 120° intervals, there is a reduced risk of flattening and the transmission of a moment which is 50% higher as compared to a design where the normal force K acts at two points on the pipe at intervals of 180° is possible.

Because of this 60° V-shaped loose jaw the wrench will also be suitable for hexagonal parts, and as mentioned in the foregoing the point of contact and hence the line of application of the force K can be moved a distance Δr tangentially in the direction of rotation which, when Δr is small, does not change the fact to any considerable degree that parts are actuated at three points at 120° intervals since, in actual practice, these "points" are faces of a size of a few millimetres.

According to known principles, the wrench can be provided with adjustment facilities since a possible shifting in the direction on line 1 on the loose jaw of its axis of rotation will extend the diameter range covered by the wrench.

Claims

1. A pipe wrench for gripping a pipe at three

circumferentially spaced points which wrench consists of a pivotable jaw including two inclined gripping faces to grip the pipe at two points and which is pivoted to a handle having a jaw part with an involute contact surface intended to grip the pipe at the third point, characterized in that

- a) the involute contact surface of the jaw part is formed as an involute of a circle centered on the pivot axis,
- b) the angle between the gripping faces of the pivotable jaw is 60 degrees, and
- c) the contact surface of the jaw part, the pivot axis and the gripping faces are positioned in relation to each other in such a way that the locus of the said third contacting point as the diameter of the pipe varies is a straight line bisecting the angle between the gripping faces.

2. A pipe wrench according to claim 1, characterised in that the convex surface of the involute is utilized as the contact surface.

3. A pipe wrench according to claim 1 or 2, characterised in that the gripping faces and/or the contact surface are toothed.

Patentansprüche

1. Rohrzange zum Halten eines Rohres, in drei, in Umfangsrichtung des Rohres gegeneinander versetzten Punkten, mit einem schwenkbaren Klemmbacken, der zwei schraeg zueinander verlaufende Aufnahmefflaechen zum Aufnehmen des Rohres in zwei Punkten aufweist und an einem Griffteil angelenkt ist, das einen Klemmbackenabschnitt mit einer als Evolvente ausgebildeten Anlagefflaeche zum Abstuetzen des Rohres im dritten Punkt aufweist, dadurch gekennzeichnet, dass

- a) die als Evolvente ausgebildete Anlagefflaeche des Klemmbackenabschnittes des Griffteiles als Evolventes eines Kreises ausgebildet ist, dessen Mittelpunkt auf der Schwenkachse des Gelenkes zwischen Klemmbacken und Griffteil liegt,
- b) die Aufnahmefflaechen des schwenkbaren Klemmbackens einen Winkel von 60° einschliessen und
- c) die Anlagefflaeche des Klemmbackenabschnittes des Griffteiles, die Schwenk-

achse des Gelenkes zwischen Klemmbacken und Griffteil und die Aufnahmefflaechen des Klemmbackens derart einander zugeordnet sind, dass unabhaengig vom Rohrdurchmesser der dritte Abstuetzpunkt fuer das Rohr auf der Winkelhalbierenden des Winkels zwischen den Aufnahmefflaechen des Klemmbackens liegt.

2. Rohrzange nach Anspruch 1, dadurch gekennzeichnet, dass die konvexe Flaeche der Evolventen als Anlagefflaeche ausgebildet ist.

3. Rohrzange nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass Aufnahmefflaechen und/oder die Anlagefflaeche gezahnt sind bzw. ist.

Revendications

1. Une clé pour tubes pour agripper un tube en trois points espacés de sa circonférence, cette clé étant constituée par une mâchoire pivotante présentant deux faces d'agrippage inclinées pour agripper le tube en deux points, laquelle est pivotée sur un manche comportant une partie formant mâchoire avec une surface de contact en développante pour agripper le tube en un troisième point caractérisée en ce que

- a) la surface de contact en développante de la partie formant mâchoire est constituée par une développante d'un cercle centré sur l'axe de pivotement
- b) l'angle entre les faces d'agrippage de la mâchoire pivotante est de 60° et
- c) la surface de contact de la partie formant mâchoire, l'axe de pivotement et les faces d'agrippage sont positionnés les uns par rapport aux autres de manière que le lieu dudit troisième point de contact lorsque le diamètre du tube varie est la ligne droite bissectrice de l'angle entre les faces d'agrippage.

2. Une clé pour tubes selon la revendication 1, caractérisée en ce que la surface convexe de la développante est utilisée comme surface de contact.

3. Une clé pour tubes selon la revendication 1 ou 2, caractérisée en ce que les faces d'agrippage et/ou la surface de contact sont dentées.

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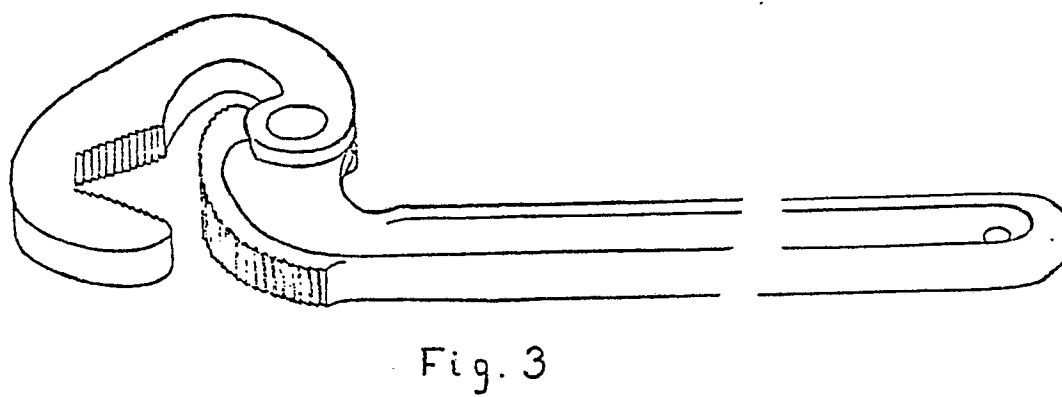
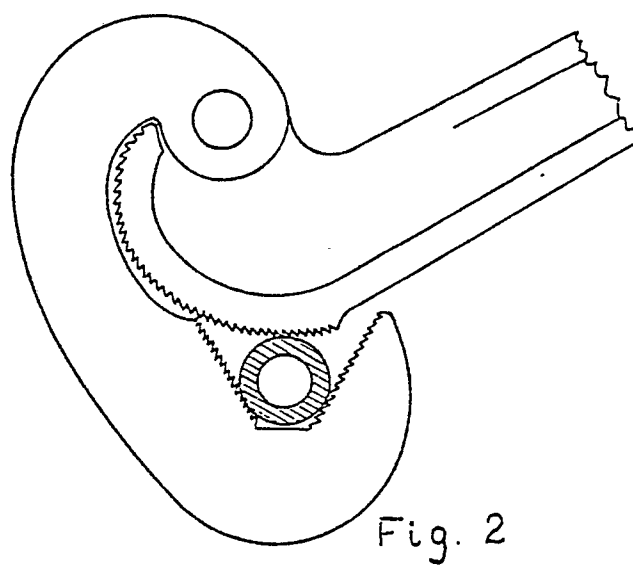
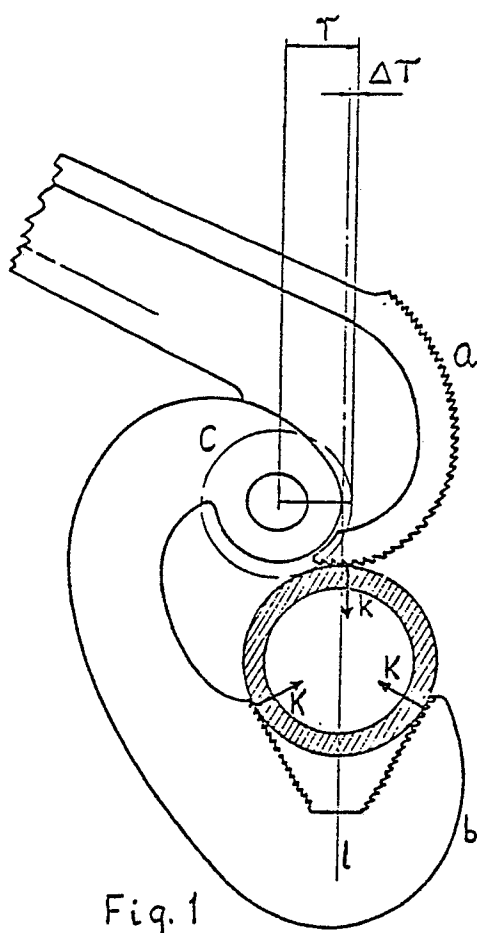
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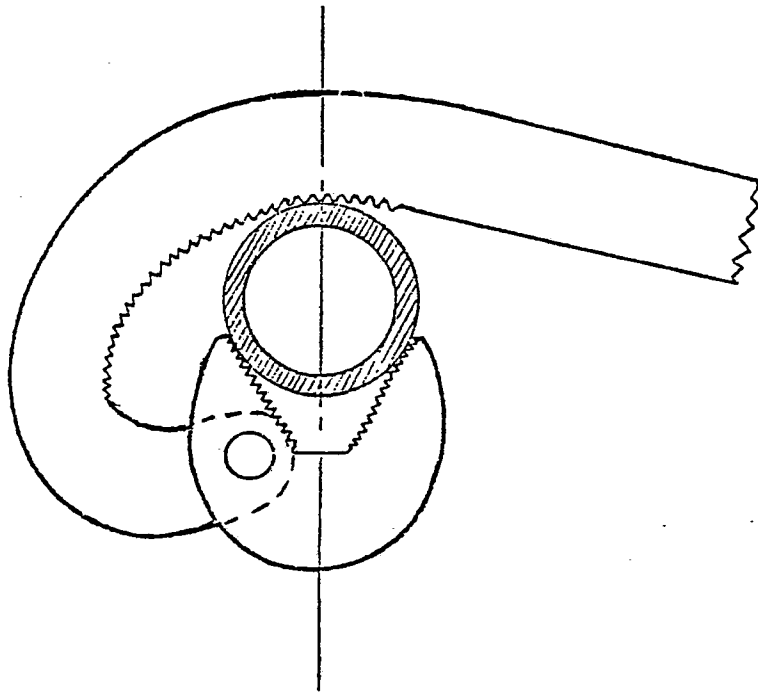


Fig. 4