

[54] **WATER-PUMP PLIERS**

[76] Inventor: **Karl Putsch**, Rennbaumer Strasse
70, 56 Wuppertal-Cronenberg,
Germany

[22] Filed: **Feb. 6, 1974**

[21] Appl. No.: **440,241**

2,558,440	6/1951	Johnson	81/426
2,571,819	10/1951	Boel et al.....	81/426
2,593,164	4/1952	McAdoo	81/426

Primary Examiner—James L. Jones, Jr.

Attorney, Agent, or Firm—Ernest G. Montague; Karl
F. Ross; Herbert Dubno

[30] **Foreign Application Priority Data**

Feb. 23, 1973 Germany..... 7306900

[52] **U.S. Cl.**..... **81/425 R; 81/426**

[51] **Int. Cl.**..... **B25b 7/02**

[58] **Field of Search**..... **81/425 R, 426, 418**

[56] **References Cited**

UNITED STATES PATENTS

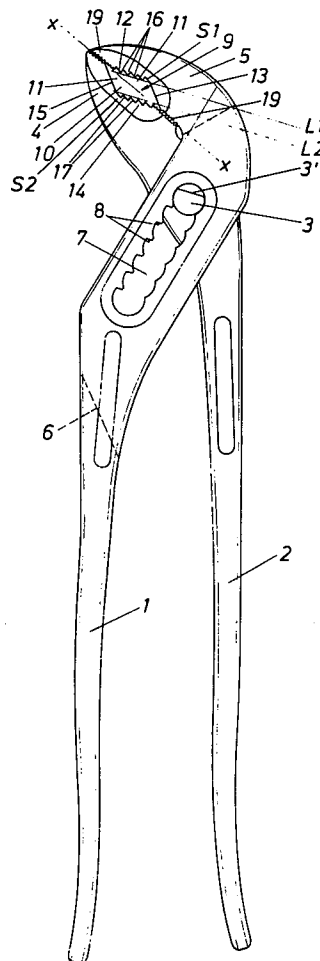
371,476 10/1887 Reese..... 81/425 A

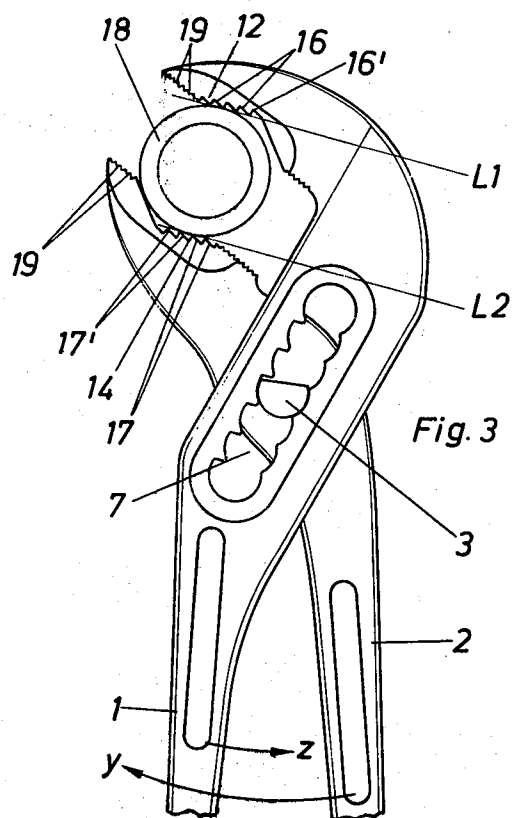
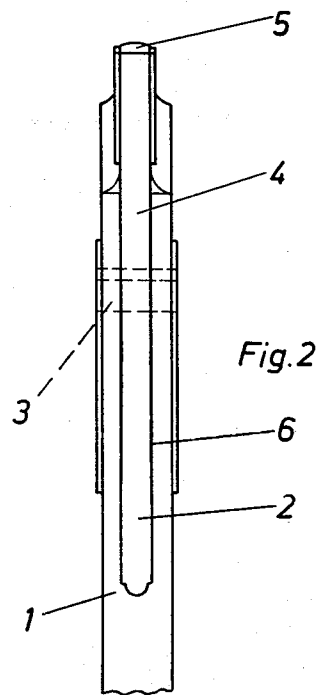
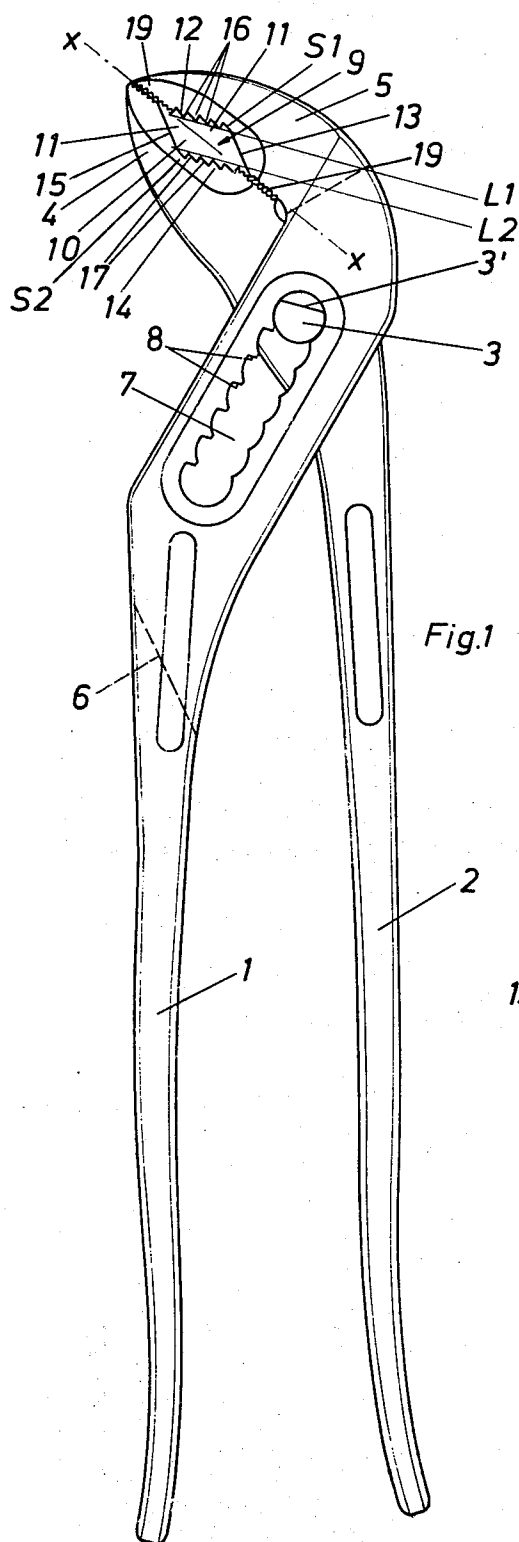
[57]

ABSTRACT

Water-pump pliers which comprise relatively displaceable plier handles carry jaws which continue from the handles, these jaws having recesses forming the plier opening and lying on both sides of a jaw-junction plane. These jaw recesses define two deepest points thereof as seen in a longitudinal direction of the jaws and the two deepest points are staggered with respect to each other.

1 Claim, 3 Drawing Figures





1

WATER-PUMP PLIERS

The present invention relates to water-pump pliers. The present invention relates to water-pump pliers having plier handles which are displaceable with respect to each other in order to change the size of the opening or mouth of the pliers defined by the plier jaws which have recesses forming the plier opening lying on opposite sides of the junction plane of the jaws.

It is known to provide such recesses in trough shape so as to form an approximately oval opening of the pliers. In this way a relatively favorable attack is obtained upon objects of circular cross section corresponding to the opening of the pliers. The attack, however, becomes worse when the circular material entering into the opening of the pliers has a curvature which differs from that of the trough-shaped recesses. This is true also of multi-edged objects such as, hexagon nuts.

There are also known water-pump pliers having angular recesses in such manner that the vertices and therefore the deepest points of the recesses are opposite one another. By such an orientation of the recesses, a favorable attack in the case of objects of circular cross section can be obtained only in a few cases. To be sure, a good attack is obtained on the less common square-nuts. On the other hand, an extremely ineffective attack is made upon hexagon nuts which are much more commonly used than square nuts.

It is an object of the present invention to provide water-pump pliers such that by advantageous shaping of the mouth of the pliers it is always possible to obtain a good purchase on the material gripped, particularly in the case of nuts and preferably hexagon nuts, as well as in the case of pipes, so that a self-clamping association between the pliers and the workpiece can be provided.

I thus provide a water pump pliers in which the two deepest points of the jaw recesses, as seen in the longitudinal direction of the jaws, are staggered with respect to each other.

According to a feature of the present invention each recess is developed as an angle with sides of unequal length.

It has been found advantageous in accordance with the present invention for the two recesses together to constitute a parallelogram whose diagonal lies along the junction plane of the jaws in the closed-mouth position of the pliers.

Furthermore, it is favorable in accordance with the present invention for the opposite longer sides of the parallelogram to be provided with teeth which are directed towards each other, the tips of the teeth of the upper jaw pointing in approximately the direction of the pivot of the plier handles.

In accordance with the present invention the lines of extension of the longer sides of the parallelogram extend spaced from and on the other side of the pivot point of the plier handles.

Still another advantageous development in accordance with the present invention resides in the fact that the teeth of the longer side of the parallelogram of the lower jaw are developed as forward directed sawteeth.

The water-pump pliers in accordance with the invention are of increased value in use. After grasping the material which is to be turned, whether it be a length of pipe, a socket or a nut, there is always a three-point attack of the opening of the pliers on the corresponding part. In particular a better holding of the opening of the

2

pliers is also obtained in the case of hexagon nuts. If the conditions permit only a partial turning of the hexagon nut by means of the pliers, the water-pump pliers can, after each partial turn, come into an equally good position of attack with respect to the hexagon nut. The three-point attack of the plier opening is preferably so selected that the lower jaw is in two-point contact with the part grasped and the upper jaw in one-point contact. In this way the lever forces acting on the water-pump pliers can be transmitted better. The plier opening which permits the advantageous three-point attack is favorably formed by two triangles of sides of unequal length with a common base extending in the junction plane of the jaws. This permits a simplified manufacture of the jaw recesses and prevents the lowest point of the recesses being opposite each other. The triangles are preferably so shaped that they supplement each other to form a parallelogram with its diagonal (or the base of the triangular recesses) lying in the junction plane of the jaws. The two longer sides of the parallelogram-shaped opening of the pliers serve essentially to transmit force, the longer side of the parallelogram on the lower jaw exerting a compressive force and the longer side of the parallelogram on the upper jaw exerting a tension force on the part grasped. In accordance with the invention, the longer sides of the parallelogram are equipped with teeth aligned in such a manner that maximum forces can be transmitted with respect to the water-pump pliers. The lines of extension of the longer sides of the parallelogram which in each position of use of the water-pump pliers extend on the other side of the pivot point of the plier handles then also lead to the advantage that after the part which is to be turned has been grasped by the jaws of the plier force can be transmitted merely by load applied to the handle of the pliers bearing the lower jaw. Therefore it is not necessary to press the handle of the pliers forming the upper jaw at all or to press this handle only slightly in the direction towards the other handle of the pliers, which greatly facilitates the use of the pliers in accordance with the invention.

These and other objects, which will become apparent in the following detailed description, will be clearly understood in connection with the accompanying drawing, in which:

FIG. 1 is a plan view of the water-pump pliers in a basic position;

FIG. 2 is a side view of the pliers, shown in the upper region thereof; and

FIG. 3 is a view of the water-pump pliers in an active position.

Referring now to the drawings, the water-pump pliers of the present invention have two plier handles 1 and 2 which continue on the other side of the pivot point 3 of the plier handles to form the jaws 4 and 5.

The pivot 3 of the plier handles comprises a pin permanently inserted in the plier handle 2 and the protruding sections of which are provided with flattened portions 3'. The plier handle 2 which passes through the plier handle 1 in an opening 6 has the flattened sections extending into corresponding longitudinal slot 7 of the plier handle 1. The long edges of the slots 7 are of undulated shape in such a manner that the undulated course is adapted to the curvature of the pin 3. The distance between the vertices of the undulations is somewhat larger than the height resulting over the flattened portion 3' of the pin 3.

The undulated course on the one side of the guide slot 7 is provided with steps 8 which cooperate with the flattened portions 3' and limit the closing movement with the plier handles 1, 2 moved together.

The lower jaw 4 seated on the plier handle 1 and the upper jaw 5 extending from the plier handle 1 have the recesses 10, 11 which form the plier opening 9 and lie on opposite sides of the junction plane $x-x$ of the jaws. Each recess 10, 11 has the form of an angle with sides 12, 13 and 14, 15 respectively of unequal length. The triangular recesses 10, 11, which have a common base along this plane $x-x$, and therefore the deepest points S1 and S2, seen in the longitudinal direction of the jaws 4, 5, staggered with respect to each other.

Preferably the triangular recesses supplement one another to collectively form a parallelogram, see Fig. 1. The diagonal extends in the junction plane $x-x$ of the jaws. The extension lines L1 and L2 of the longer sides 12, 14 of the parallelogram extend in every active position spaced from and on the other side from the pivot 3 of the plier handles.

With the jaws 4, 5 in the active position, the longer handle 14 of the lower jaw 4 exerts a compressive load and the opposite handle 12 of the upper jaw 5 a tensile load on the part to be turned. For this purpose the opposite longer parallelogram sides 12, 14 are provided with teeth 16, 17 directed against each other in such a manner that the tips of the teeth 16' of the upper jaw point approximately in the direction of the pivot 3 of the plier handles, while the tips 17' of the lower-jaw teeth 17 are directed in the opposite direction. The shorter sides 13, 15 have no teeth.

The plier opening 9 after gripping a part which is to be turned, developed as pipe 18 in Fig. 3, comes into a three-point contact with same. The advantageous alignment of the toothed longer parallelogram sides makes it possible, starting from this position and by exclusively acting on the plier handle 2, in the direction indicated by the arrow y , to effect a turning of the part 18 without the plier handle 1 having to be acted on in this connection in the direction of the arrow z . This means in a figurative sense that upon use of the pliers,

only a slight force need be applied in the direction indicated by the arrow z on the plier handle 1, which facilitates the use thereof.

In order to broaden the scope of use of the water-pump pliers of the present invention, the plier jaws 4, 5 are provided with a fine toothing 19 outside of the plier opening 9 along the plane $x-x$.

I claim:

1. A water-pump pliers comprising:

a pair of elongated handles having hand-grip portions;

pivot means pivotally interconnecting said handles at a fulcrum shiftable along one of said handles, said pivot means including an elongated slot with undulating flanks formed in said one of said handles and a pin receivable in said slot and fixed to the other of said handles for selective positioning along said slot;

respective jaws formed on said handles at ends thereof opposite said portions across said fulcrum and projecting transversely from said handles, said jaws having confronting recesses of triangular configuration with each recess having a vertex, a long side and a short side, the vertices and said recesses being staggered longitudinally along said jaws with respect to one another, the triangles of said recesses defining a parallelogram and having a common base along a diagonal of said parallelogram corresponding to a junction plane of said jaws in a closed position thereof, said jaws having confronting faces lying along said plane on opposite sides of said parallelogram;

a set of sawtooth-shaped teeth formed on the long side of the recess of an upper one of said jaws and turned in the direction of said fulcrum;

a set of sawtooth-shaped teeth formed on the long side of the recess of the other jaw and oriented in the opposite direction; and

respective rows of teeth along each of said faces on opposite sides of said parallelogram.

* * * * *

45

50

55

60

65