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(54) **PLIERS WITH ADJUSTABLE SPRING**

ZANGE MIT EINSTELLBARER FEDER

PINCE A RESSORT REGLABLE

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Description

Pliers and similar hand tools, such as shears and secateurs, which in use are repeatedly opened and closed several times are often made with a return spring for automatic opening when the gripping force on the handles is reduced (see for instance GB-A-762740). The return spring is often linear, requiring an increasing force as the jaws are progressively closed. In order not to tire the hand and to provide the best control of the force used for holding, shearing or deforming the work-piece, it would be preferable that the return force would remain constant or decrease.

It is also desirable that the return force when the jaws are closed is adjustable to suit different tasks and the strength of different persons, and that the equilibrium opening when there is no more return force can be adjusted independent of the maximum opening allowed by the joint.

The present invention provides for a pliers type tool as defined in claim 1, dependant claims 2 and 3 defining preferred embodiments. The pliers type tool according to the invention is provided with a return spring which is adjustable to provide different return forces and different equilibrium openings to suit the user and the task.

The invention is described with reference to the figures, where figure 1 shows a tool with the spring located in a position with low return force and large equilibrium opening, figure 2 shows a tool with the spring located in a position with large return force and small equilibrium opening, and figure 3 is a graph of how the return force can depend on the opening with different spring locations.

The pliers type tool comprises two shanks held together by a joint (10). Between the handle parts (11,12) of the shanks is a leaf spring (13) which when unstressed is basically straight, but when mounted is S-shaped, with its ends inserted in slots or recesses in the handles (11,12). A first end (14) of the spring is located closer to the joint (10) and is inserted in one of a plurality of recesses in a first handle (11), where a recess (15) at greater distance from the joint (10) results in a greater return force and a recess (16) at a lesser distance from the joint (10) results in a lesser return force. The second end (17) of the spring is located farther from the joint (10) and is inserted in one of a plurality of recesses in the second handle (12), where a recess (18) at a greater distance from the joint (10) results in a lesser equilibrium opening and a recess (19) at a lesser distance from the joint (10) results in a greater equilibrium opening.

Since the recesses of the first handle (11) are located so close to the joint, the choice of recess (15,16) will have as its main effect a variation of the leverage of the spring force, directly affecting the return force. When the tool is open, however, the recesses (15,16) of the first handle are almost at the same distance from which-ever recess in the second handle has been utilized. The recesses (18,19) of the second handle (12) are so close

that they result in roughly the same return force, especially if there is some angular difference, but they have a strong influence on the equilibrium opening.

The recesses can be shaped and adapted to the ends of the spring in different ways. Slots with a narrow opening combined with thickened ends (14,17) of the spring allow insertion of the spring from the side and prevent accidental dislodging of the spring when the tool is maximally opened. The slots need not be parallel to each other. The spring can also be made from round spring wire, and in such case the recesses can be drilled holes.

Figure 3 shows how the return force F on the handles depends on the opening D between the jaws with two different locations of the spring. The first graph (21) shows the dependence for a tool with the spring placed as in figure 1, with a small return force (24) when the jaws are closed, since the spring force against the first handle (11) has little leverage, and with a great equilibrium opening (23) since the recess (19) in the second handle (12) is rather close to the joint (10). The second graph (22) shows the dependence for a tool where the spring is placed as in figure 2, where the return force (24) with closed jaws is larger due to larger leverage for the spring force against the first handle (11), and the equilibrium opening (23) is smaller since the recess (18) in the second handle is farther from the joint (10).

The choice of recess (15,16) for attaching the inner first end (14) of the spring will mainly influence the return force (24) for closed jaws, and the choice of recess (18,19) for attaching the outer second end (17) will mainly influence the equilibrium opening (23). Due to the S-shape of the spring the return force will be relatively constant except near the equilibrium opening, which is an advantage in itself. Unused recesses can be blocked or unfinished.

Claims

1. Pliers type hand tool comprising two shanks with handles (11,12) and jaws hingedly connected at a joint (10) which is in between of the handle and the jaw of each shank, and an S-shaped single leaf spring (13) for returning the tool to an open position, where a first end (14) of the spring is inserted in a recess (15,16) in a first one (11) of the handles at a lesser distance from the joint (10) and the second end (17) of the spring is inserted in a recess (18,19) in the second handle (12) at a greater distance from the joint (10), characterized by at least the first handle (11) having at least two recesses (15,16) at unequal distances from the joint (10), the recesses (15,16) and the first spring end (14) being adapted in such manner, that the first spring end (14) can be releasably secured to the first handle (11) by inserting it in either one of the recesses (15,16).
2. Hand tool according to claim 1, characterized by

both handles (11,12) of the tool having each at least two recesses (15,16,18,19), the recesses of each handle being at unequal distances from the joint (w), the spring ends (14,17) and the recesses (15,16,18,19) being adapted in such a manner, that the first spring end can be releasably secured to the first handle (11) by inserting it in one of the recesses (15,16) provided therein, and that the second spring end (17) can be releasably secured to the second handle (12) by inserting it in one of the recesses (18,19) provided therein.

3. Hand tool according to claim 1, characterized by the recesses having narrow openings and wider interiors, and by the spring ends (14,17) being thickened to avoid accidental dislodging from the recesses.

Patentansprüche

1. Handwerkzeug vom Zangentyp mit zwei Schäften mit Handgriffen (11, 12) und an einer Verbindungsstelle (10), die sich zwischen den Handgriffen und der Klemmbacke jedes Schaftes befindet, schwenkbar verbundenen Klemmbacken sowie einer S-förmigen einzelnen Blattfeder (13) zur Rückstellung des Werkzeugs zu einer offenen Stellung, wo ein erstes Ende (14) der Feder in eine Vertiefung (15, 16) in einem ersten (11) der Handgriffe in einem geringeren Abstand von der Verbindungsstelle (10) eingefügt ist und das zweite Ende (17) der Feder in eine Vertiefung (18, 19) in dem zweiten Handgriff (12) in einem größeren Abstand von der Verbindungsstelle (10) eingefügt ist, **dadurch gekennzeichnet**, daß wenigstens der erste Handgriff (11) wenigstens zwei Vertiefungen (15, 16) in ungleichen Abständen von der Verbindungsstelle (10) hat, die Vertiefungen (15, 16) und das erste Federende (14) in solcher Weise ausgebildet sind, daß das erste Federende (14) lösbar an dem ersten Handgriff (11) durch sein Einfügen in eine der Vertiefungen (15, 16) befestigt werden kann.

2. Handwerkzeug nach Anspruch 1, **dadurch gekennzeichnet**, daß beide Handgriffe (11, 12) des Werkzeuges jeweils zwei Vertiefungen (15, 16, 18, 19) haben, wobei die Vertiefung jedes Handgriffes sich in ungleichen Abständen von der Verbindungsstelle (10) befinden, die Federenden (14, 17) und die Vertiefungen (15, 16, 18, 19) in solcher Weise ausgebildet sind, daß das erste Federende lösbar an dem ersten Handgriff (11) durch sein Einfügen in eine der darin vorgesehenen Vertiefungen (15, 16) befestigt werden kann und daß das zweite Federende (17) lösbar an dem zweiten Handgriff (12) durch sein Einfügen in eine der darin vorgesehenen Vertiefungen (18, 19) befestigt werden kann.

3. Handwerkzeug nach Anspruch 1, **dadurch**

gekennzeichnet, daß die Vertiefungen schmale Öffnungen und breitere Innenbereiche haben und die Federenden (14, 17) verdickt sind, um ein unerwünschtes Entfernen aus den Vertiefungen zu vermeiden.

Revendications

1. Outil manuel du genre pinces comprenant deux tiges ayant des poignées (11, 12) et des mâchoires reliées, par l'entremise d'une charnière, à un joint (10) qui est situé entre la poignée et la mâchoire de chaque tige, et un ressort à lame (13) unique en forme de S servant à ramener l'outil en position ouverte, où une première extrémité (14) du ressort est insérée dans une encoche (15, 16) ménagée dans la première poignée (11) à une distance inférieure du joint (10), et l'autre extrémité (17) du ressort est insérée dans une encoche (18, 19) ménagée dans la seconde poignée (12) à une plus grande distance du joint (10), caractérisé en ce qu'au moins la première poignée (11) possède deux encoches (15, 16) situées à des distances inégales du joint (10), les encoches (15, 16) et la première extrémité (14) du ressort étant agencées de telle manière que la première extrémité (14) du ressort peut être assujettie de façon amovible à la première poignée (11) en l'insérant dans l'une ou l'autre des encoches (15, 16).
2. Outil manuel selon la revendication 1, caractérisé en ce que les deux poignées (11, 12) de l'outil présentent chacune au moins deux encoches (15, 16, 18, 19), les encoches ménagées dans chaque poignée étant à des distances inégales du joint (10), les extrémités du ressort (14, 17) et les encoches (15, 16, 18, 19) étant agencées de telle manière que la première extrémité du ressort peut être assujettie de façon amovible à la première poignée (11) en l'insérant dans l'une des encoches (15, 16) dont elle est munie, et que la seconde extrémité du ressort (17) peut être assujettie de façon amovible à la seconde poignée (12) en l'insérant dans l'une des encoches (18, 19) dont elle est munie.
3. Outil manuel selon la revendication 1, caractérisé en ce que les encoches possèdent des ouvertures étroites et des parties internes plus larges, et en ce que les extrémités du ressort (14, 17) sont épaissies de façon à éviter qu'elles ne sortent accidentellement de leur logement dans les encoches.

Fig. 1

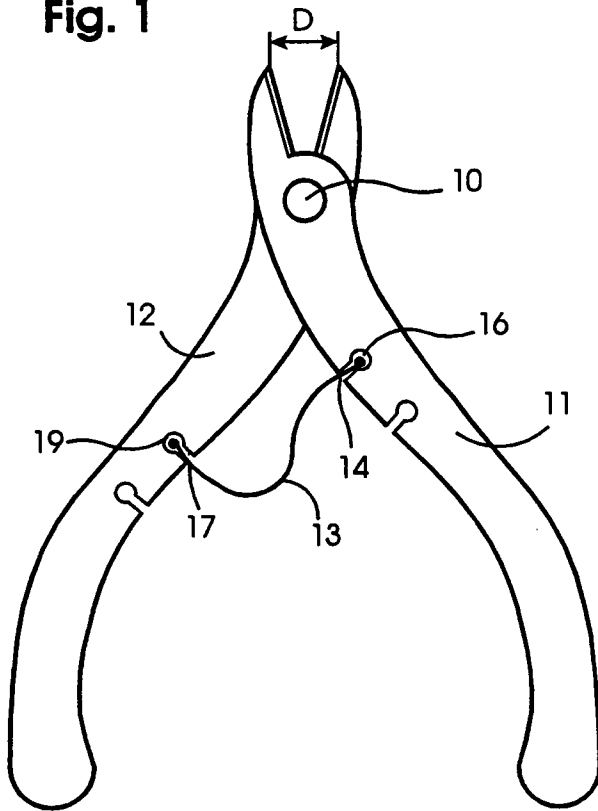


Fig. 2

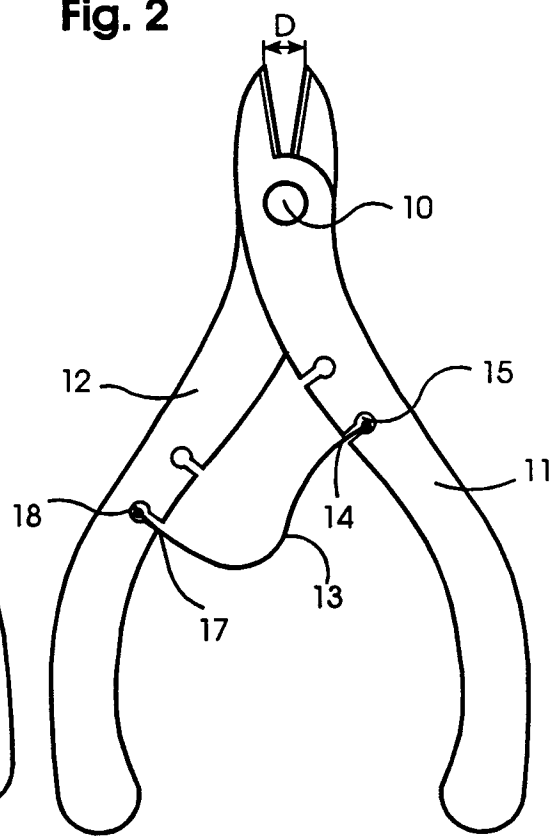


Fig. 3

