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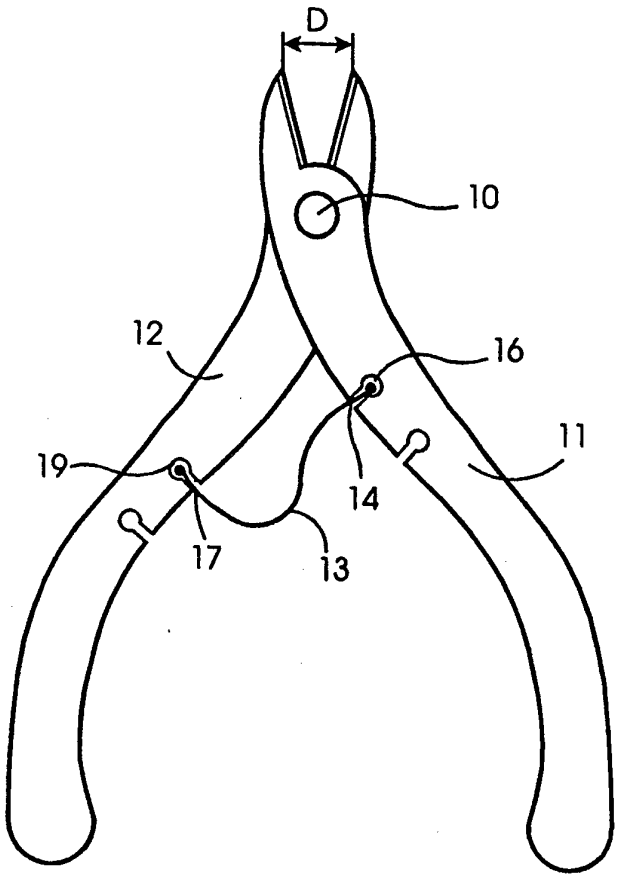
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(54) Title: PLIERS WITH ADJUSTABLE SPRING

(57) Abstract

Pliers or pliers type hand tool comprising two shanks with handles (11, 12) connected at a joint (10) and an S-shaped spring for returning the tool to an open position, where the spring ends (14, 17) are inserted in recesses in the handles, a first end at a lesser distance from the joint and a second end at a greater distance from the joint, and where the handles have a plurality of recesses to make it possible to choose the return force (24) and the equilibrium opening to fit the user and the task.



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PLIERS WITH ADJUSTABLE SPRING

Background

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. 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 workpiece, it would br 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 concerns a pliers type tool with a return spring which is adjustable to provide different return forces and different equilibrium openings to suit the user and the task.

Description

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 with the spring located in a position with large return force and small euilibrium 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

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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 equilibium 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 whichever 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 euilibrium 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) hingedly connected at a joint (10) 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 handle (11) at a lesser distance from the joint (10) and the second end (17) of the spring is inserted in a recess (18,19) in a second handle (12) at a greater distance from the joint (10), characterized by at least a first handle (11) having at least two recesses (15,16) where the first spring end (14) can be inserted.

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) where both ends (14,17) of the spring can be inserted.

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

Fig. 1

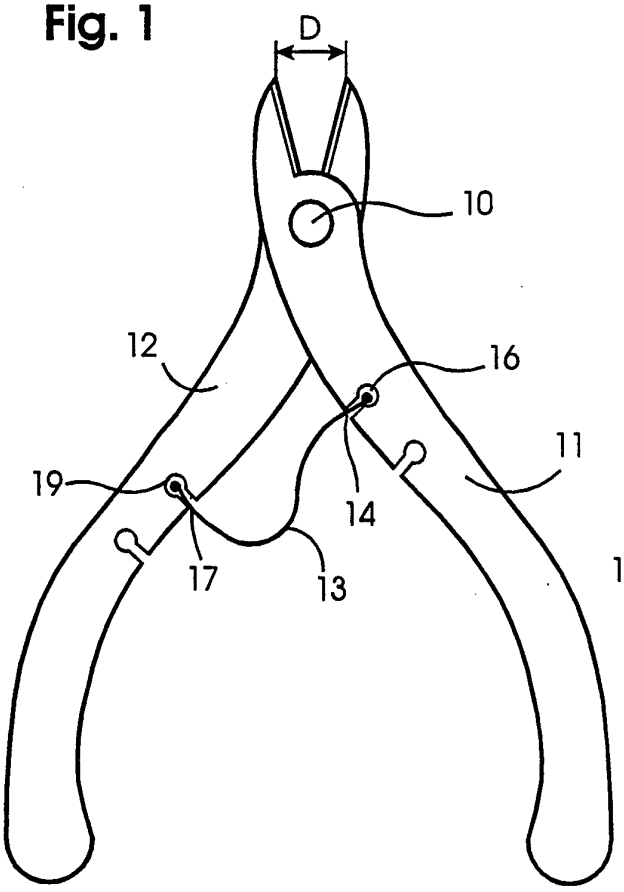


Fig. 2

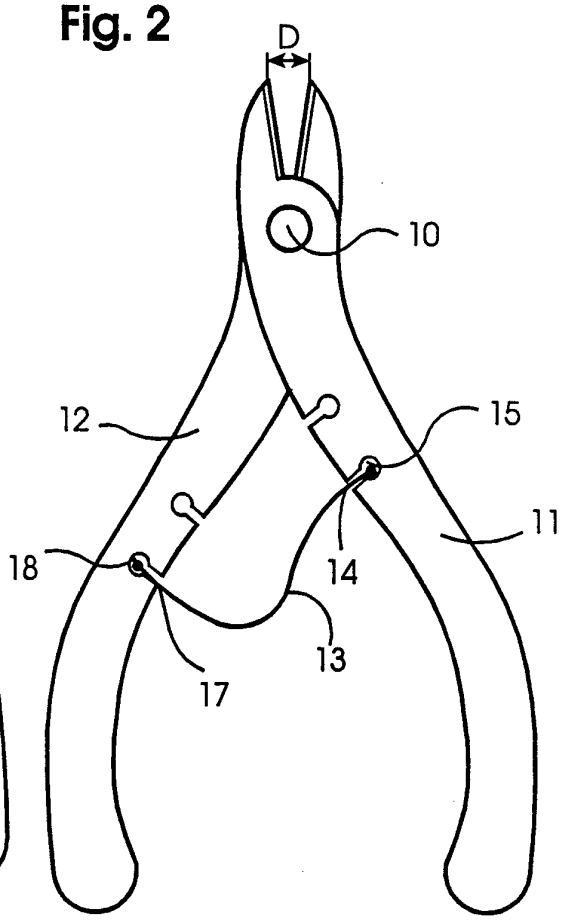
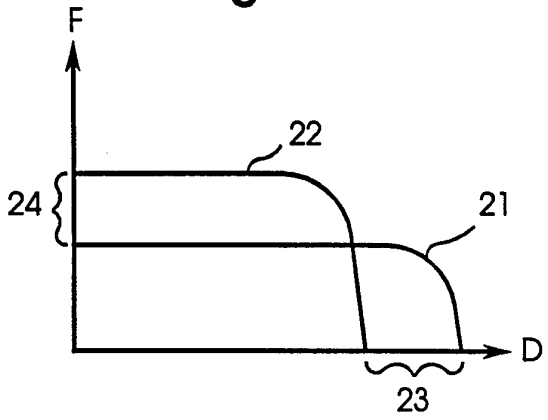


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 94/00977

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B25B 7/00, B25B 7/18
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB, A, 762740 (MARTIN JONSSON), 5 December 1956 (05.12.56), the spring 3, its connection and S-form ---	1
A	US, A, 1802904 (C.A. BRYANT), 28 April 1931 (28.04.31), the spring 6 and the connection points 7, 10 and 11 --- --------	1

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 762740	05/12/56	NONE	
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