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(54) Lever mechanism for adjustable pliers

(57) The invention relates to a lever mechanism for adjustable pliers (1), of a kind which has a displaceable active arm (2) having a transverse recess with two flanks (2a) between which there is located a passive arm (3) which has a longitudinal slot (4) provided with at least one inclined tooth arrangement (4a), there being fixed to the displaceable active arm (2) a displaceable spindle (6) which slides along the longitudinal slot (4), characterised in that said displaceable spindle (6) has an engaging configuration of a shape corresponding to a non-circular engaged orifice (5a) of a rotatable catch (5) which has, on one side, a catching tooth arrangement (5b) facing the inclined tooth arrangement (4a) of the longitudinal slot (4), and the rotatable catch (5) has, on the opposite side, a resilient spring (8); the displaceable spindle (6) has, in its upper part, a radial lever (7) located in the proximity of the thumb of the user.

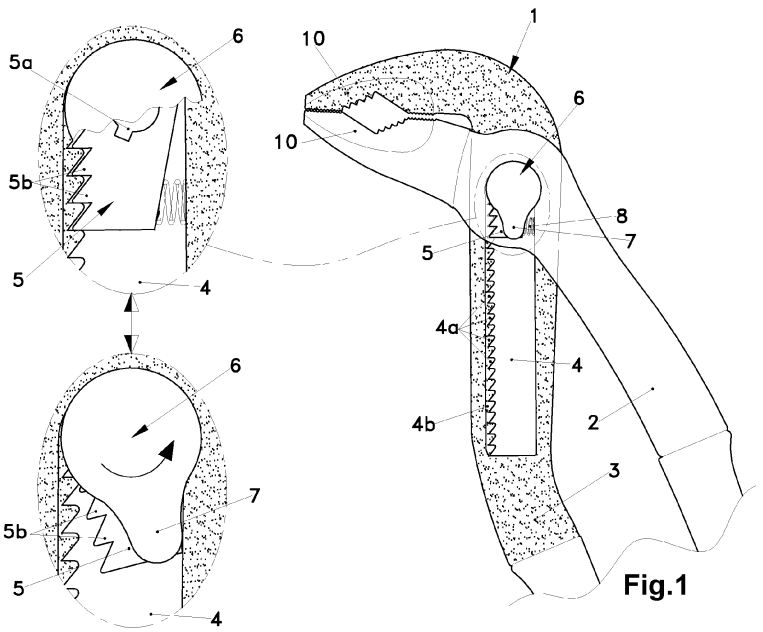

Fig.1

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a lever mechanism which allows modification of the spacing between the jaws of adjustable pliers which are commonly used in plumbing work or the like.

PRIOR ART

[0002] There exists on the market a great diversity of adjustable pliers, which are constructed from two arms that are joined together and that pivot relative to one another by virtue of a hinging spindle. This spindle is fixed to one of the two arms and is displaceable along a stepped slot provided in the other arm, by means of which it is possible to vary the opening between the jaws.

[0003] Starting from the requirement to be able to vary the opening between the jaws of pliers, various solutions have been put into practice for tools incorporating different systems for modification of the opening of the jaws and which allow the operator to vary the distance between the jaws in relation to the thickness or diameter of the part on which work is to be carried out.

[0004] Accordingly, for example, adjustable pliers are known which comprise two arms, pivoting relative to one another on a spindle that is displaceable in a slot and insertable, by means of a stepped arrangement, at a different height in one of the two arms. A problem of those conventional pliers lies in the security of firmly holding the arms in position relative to one another and in releasing them in a manner that is simple and secure for the operator.

[0005] Also known are adjustable pliers which comprise a displaceable active arm having a transverse recess with two flanks between which there is located a passive arm which has a longitudinal slot provided with successive drilled holes. Pliers of this kind incorporate a mechanism of push-button type in the active arm and, as a result of pressing said button in the axial direction, a displaceable spindle having a diameter corresponding to the holes drilled in the longitudinal slot of the passive arm is disengaged. Accordingly, internal sliding of one arm over the other is achieved, and consequently regulation of the distance between the jaws. That system has the disadvantage that it is necessary to keep the button depressed during both the jaw-closing and the jaw-opening action, which results in its not being very convenient for work to be carried out using said tool, as it takes a long time to prepare the pliers in order to adjust the jaws to the thickness or diameter of the part, the user being required to use both hands in order to adjust the distance between the jaws.

EXPLANATION OF THE INVENTION AND ADVANTAGES

[0006] Compared with that state of affairs, the present invention relates to a lever mechanism for adjustable pliers, of a kind which has a displaceable active arm having a transverse recess with two flanks between which there is located a passive arm which has a longitudinal slot provided with at least one inclined tooth arrangement, there being fixed to the displaceable active arm a displaceable spindle which slides along the longitudinal slot, and which consists of said displaceable spindle having an engaging configuration of a shape corresponding to a non-circular engaged orifice of a rotatable catch which has, on one side, a catching tooth arrangement facing the inclined tooth arrangement of the longitudinal slot, and the rotatable catch has, on the opposite side, a resilient spring; the displaceable spindle has, in its upper part, a radial lever located in the proximity of the thumb of the user.

[0007] The rotatable catch has two extreme positions which correspond to the two extreme positions of the radial lever, one being an activated position in which the radial lever is positioned parallel to the longitudinal slot and, therefore, the tooth arrangement of the rotatable catch is located in the corresponding inclined tooth arrangement of the longitudinal slot. The second position corresponds to the deactivated state, in which the radial lever is rotated in the anticlockwise direction and, therefore, the rotatable catch is disengaged from the corresponding inclined tooth arrangement of the longitudinal slot. Accordingly, the user can, by means of a movement in the longitudinal direction of the slot, slide the displaceable active arm over the passive arm, as there is in said longitudinal slot a slideway against which the sliding edge of the displaceable spindle rests. By means of this configuration, guidance in the sliding of one arm over the other is achieved and also the hinging pin function when the rotatable catch is activated.

[0008] The advantages of this configuration are that, by means of easy anticlockwise rotation of the radial lever, which is located and oriented for manipulation using the thumb, the operator deactivates the rotatable catch and thus can slide the displaceable active arm over the passive arm and determine the necessary spacing for the jaw opening. The jaw-closing action can be performed without having to rotate the radial lever as applying a force to one of the two arms in the longitudinal direction of the inclination of the tooth arrangement of the longitudinal slot overcomes the force of the resilient spring, because the tooth arrangement of the rotatable catch has a corresponding inclination. In this way, adjustable pliers are obtained which can be regulated by the worker quickly and simply.

[0009] In plumbing work and the like where pliers having these characteristics are used, work is customarily carried out wearing gloves, for which reason it is necessary to be provided with an easy-to-handle tool. To this

end, the fact that the element for activation or deactivation is by way of a lever facilitates said manipulation, even on those occasions when the operator is provided with less feel or accessibility.

[0010] In addition, the inclined tooth arrangement of the longitudinal slot results in pliers being obtained which can be adjusted to as many positions as there are teeth in the longitudinal slot, making it an ideal tool for plumbing work or the like, where pipes of different diameters are continually being manipulated.

[0011] Another advantage of the formation of the subject-matter of the invention is that it is formed from simple elements with a low manufacturing cost. Those elements which constitute the lever mechanism are located protected in the interior of the transverse recess with two flanks of the displaceable active arm and between the longitudinal slot of the passive arm, as a result of which damage to the tool is avoided in the event of its being dropped and also its entanglement with other tools in a confined space, for example a tool-box. Another characteristic to be noted is that there is obtained a dismantlable mechanism, which saves the tool from being thrown away in the event of one of the arms, jaws or lever mechanism elements breaking.

DRAWINGS AND REFERENCES

[0012] In order to better understand the nature of the invention, the accompanying drawings show an industrial embodiment by way of merely illustrative and non-limiting example.

[0013] In order to aid understanding of the accompanying drawings, the passive arm (3) of the adjustable pliers (1) has been shaded with dots.

Figure 1 is a general view of an elevation of adjustable pliers (1) together with two expanded details relating to the lever mechanism. In the upper detail there can be seen the rotatable catch (5) in its activated position, with the radial lever (7) having been cut away, helping to show how said parts are joined together, whilst the lower detail shows the rotatable catch (5) in its deactivated position.

Figure 2 is a view of an elevation of adjustable pliers (1), in which the rotatable catch (5) is in the activated position and the jaws (10) are completely closed.

Figure 3 is a rear profile of the adjustable pliers (1), in which there can be seen the transverse recess with two flanks (2a) in the displaceable active arm (2).

Figure 4 is a view of an elevation of adjustable pliers (1), in which the rotatable catch (5) is located in its deactivated position.

Figure 5 is a view of an elevation of adjustable pliers (1) gripping a pipe (11).

Figure 6 is an exploded perspective view showing the dismantled lever mechanism according to the invention, in which the displaceable spindle (6) is a non-cylindrical body having a corresponding shape to the non-circular engaged orifice (5a) of the rotatable catch (5), the displaceable spindle (6) having, in one possible arrangement, at least one lateral projection (6a).

Figure 7 is a similar view to Figure 6, but seen from a different angle and in which, in another possible arrangement, the displaceable spindle (6) has at least one transverse cut-away portion (6c).

Figure 8 is the partial section A-A indicated in Figure 2, to an enlarged scale.

[0014] In these Figures, the following reference numerals are indicated:

1. - Adjustable pliers
2. - Displaceable active arm
2a. - Transverse recess with two flanks in the active displaceable arm (2)
3. - Passive arm
4. - Longitudinal slot
4a. - Inclined tooth arrangement in longitudinal slot (4)
4b. - Slideway in longitudinal slot (4)
5. - Rotatable catch
5a. - Non-circular engaged orifice in catch (5)
5b. - Catching tooth arrangement on catch (5)
6. - Displaceable spindle
6a. - Transverse projection on displaceable spindle (6)
6b. - Sliding surface of displaceable spindle (6)
6c. - Transverse cut-away portion on displaceable spindle (6)
7. - Radial lever
8. - Resilient spring
9. - Recess
10. - Jaw
11. - Pipe or part

DESCRIPTION OF A PREFERRED EMBODIMENT

[0015] Referring to the drawings and the above-mentioned reference numerals, the accompanying drawings illustrate a preferred embodiment of the subject-matter of the invention relating to a lever mechanism for adjustable pliers (1), of a kind which has a displaceable active arm (2) having a transverse recess with two flanks (2a) between which there is located a passive arm (3) which has a longitudinal slot (4) provided with at least one inclined tooth arrangement (4a), there being fixed to the displaceable active arm (2) a displaceable spindle (6) which slides along the longitudinal slot (4).

[0016] Figures 1, 2 and 3 illustrate the subject-matter

of the invention, consisting of said displaceable spindle (6) having an engaging configuration of a shape corresponding to an engaged orifice (5a) of a rotatable catch (5) which has, on one side, a catching tooth arrangement (5b) facing the inclined tooth arrangement (4a) of the longitudinal slot (4), and the rotatable catch (5) has, on the opposite side, a resilient spring (8); the displaceable spindle (6) has, in its upper part, a radial lever (7) located in the proximity of the thumb of the user.

[0017] As Figure 4 shows, the operator, by easily rotating the radial lever (7) in the anticlockwise direction, which lever is located and oriented to be manipulated using the thumb, de-activates the rotatable catch (5) and thus can slide the displaceable active arm (2) over the passive arm (3), determining the necessary spacing for opening of the jaws (10). The action of closing between jaws (10) can be accomplished without having to rotate the radial lever (7) because applying a force to one of the two arms (2, 3) in the longitudinal direction of the inclination of the inclined tooth arrangement (4a) of the longitudinal slot (4) overcomes the force of the resilient spring (8) as the catching tooth arrangement (5b) of the rotatable catch (5) has a corresponding inclination. As a result, adjustable pliers (1) are obtained which can be regulated rapidly and simply by the worker.

[0018] The inclined tooth arrangement (4a) of the longitudinal slot (4) results in pliers being obtained which can be adjusted to as many positions as there are teeth in the longitudinal slot (4), making it an ideal tool for plumbing work or the like, in which pipes (11) of different diameters are continually being handled. Figure 5 shows adjustable pliers (1), the jaws (10) thereof having been adjusted to a pipe (11) of a predetermined diameter, and wherein it can be seen that the displaceable active arm (2) has been moved so that the rotatable catch (5) has been fixed in the corresponding inclined tooth arrangement (4a) of the longitudinal slot (4).

[0019] Another feature of the invention is that the displaceable spindle (6) is a non-cylindrical body having a shape corresponding to the engaged non-circular orifice (5a) of the rotatable catch (5). In non-limiting manner, different configurations exist for the non-cylindrical body of the displaceable spindle (6); for example, Figure 6 shows the displaceable spindle (6) incorporating at least one transverse projection (6a) and in Figure 7 it can be seen that said displaceable spindle (6) incorporates at least one transverse cut-away portion (6c).

[0020] Another optional embodiment consists of the engaging configuration of said displaceable spindle (6) being accomplished by means of a pin.

[0021] Also, in accordance with the invention (Figure 6), the resilient spring (8) is preferably lodged in part inside a recess (9) provided in the rotatable catch (5).

[0022] The essence of this invention is not altered by variations in materials, shape, size or disposition of the component elements, which are described in a non-limiting manner which is sufficient for a skilled person to carry out reproduction thereof.

Claims

1. Lever mechanism for adjustable pliers (1), of a kind which has a displaceable active arm (2) having a transverse recess with two flanks (2a) between which there is located a passive arm (3) which has a longitudinal slot (4) provided with at least one inclined tooth arrangement (4a), there being fixed to the displaceable active arm (2) a displaceable spindle (6) which slides along the longitudinal slot (4), **characterised in that** said displaceable spindle (6) has an engaging configuration of a shape corresponding to a non-circular engaged orifice (5a) of a rotatable catch (5) which has, on one side, a catching tooth arrangement (5b) facing the inclined tooth arrangement (4a) of the longitudinal slot (4), and the rotatable catch (5) has, on the opposite side, a resilient spring (8); the displaceable spindle (6) has, in its upper part, a radial lever (7) located in the proximity of the thumb of the user.

2. Lever mechanism for adjustable pliers (1), in accordance with claim 1, **characterised in that** the displaceable spindle (6) is a non-cylindrical body having a shape corresponding to the non-circular engaged orifice (5a) of the rotatable catch (5).

3. Lever mechanism for adjustable pliers (1), in accordance with claim 1, **characterised in that** the engaging configuration of the displaceable spindle (6) is arranged to be accomplished by means of a pin.

4. Lever mechanism for adjustable pliers (1), in accordance with claim 1, **characterised in that** preferably the resilient spring (8) is lodged in part inside a recess (9) provided in the rotatable catch (5).

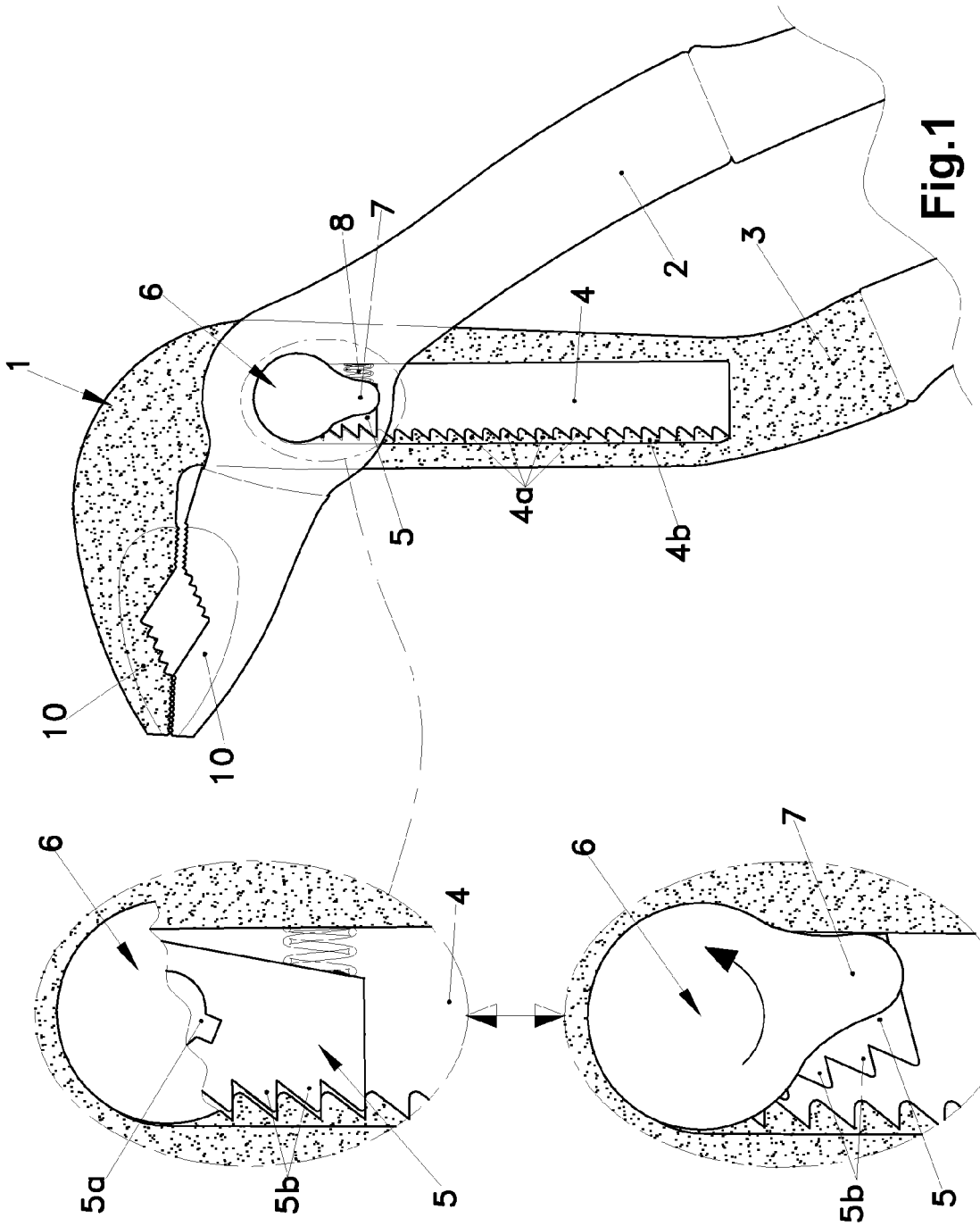

Fig.1

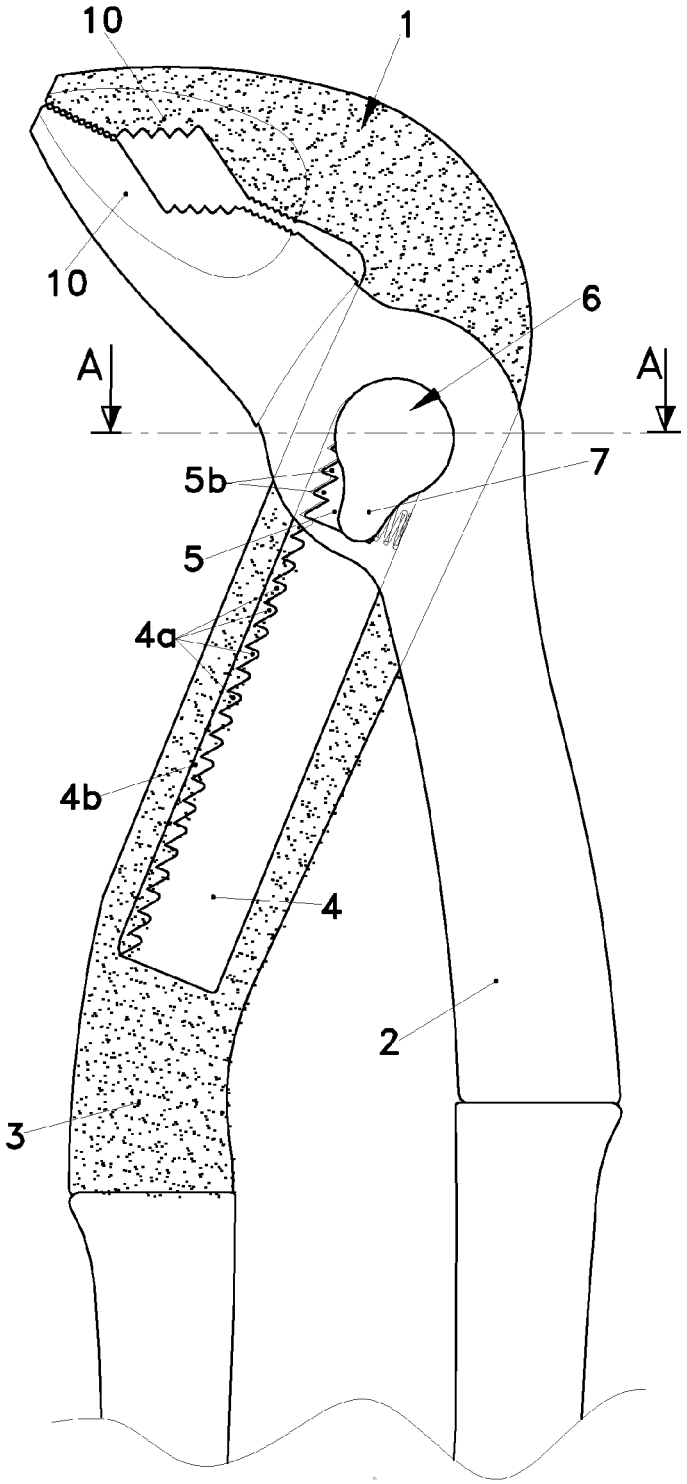

Fig.2

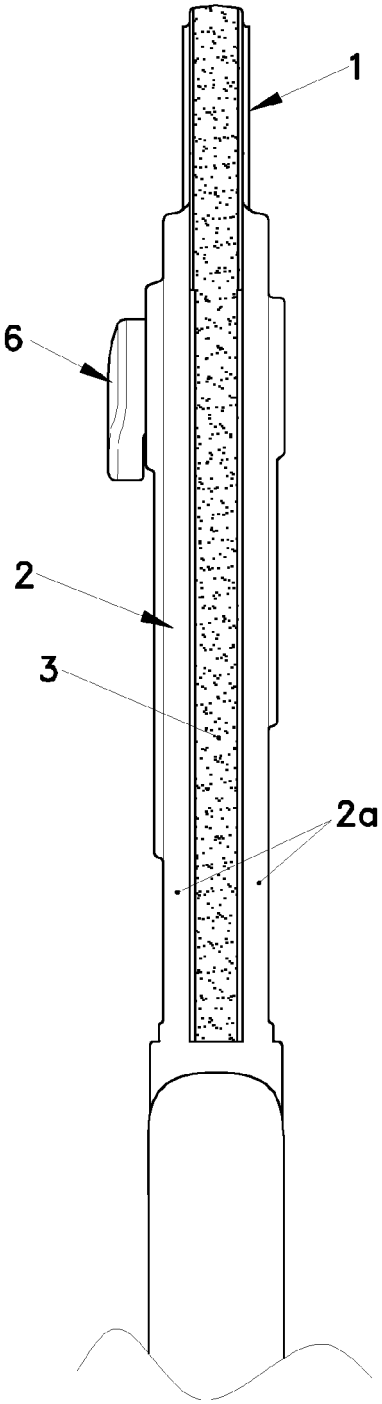

Fig.3

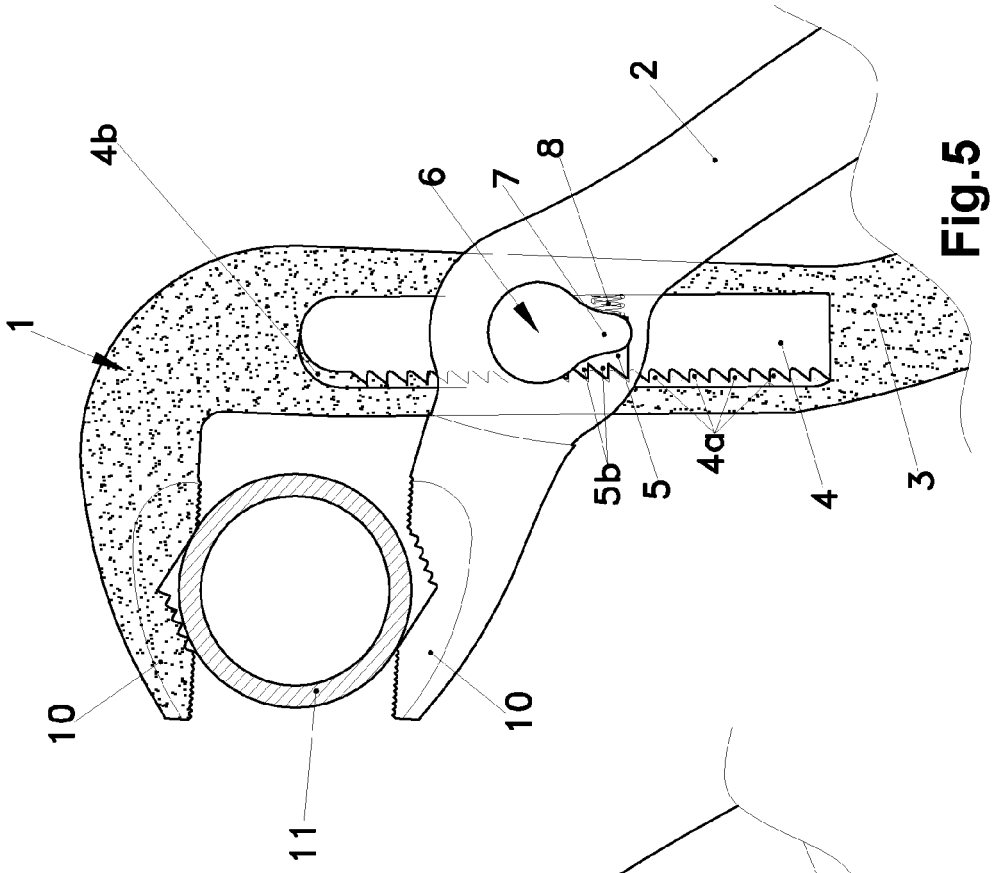

Fig.5

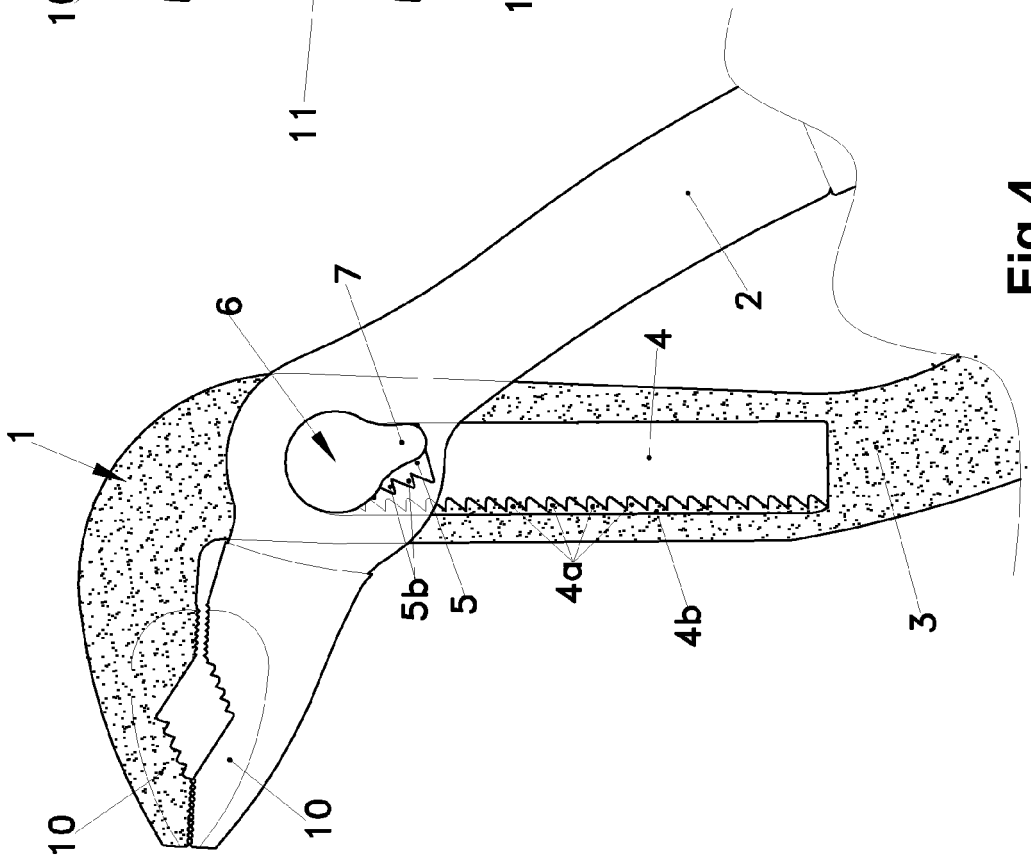

Fig.4

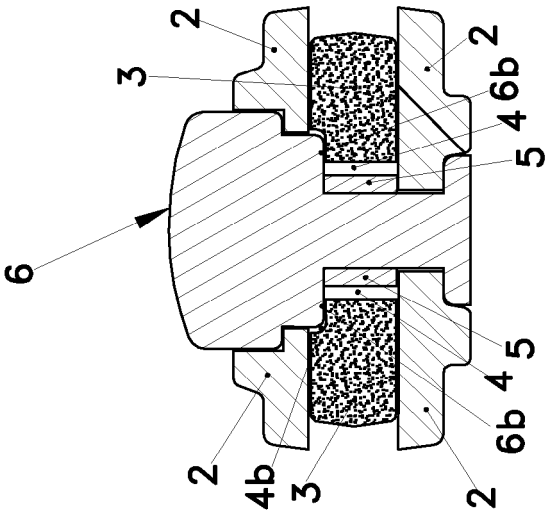

Fig.8

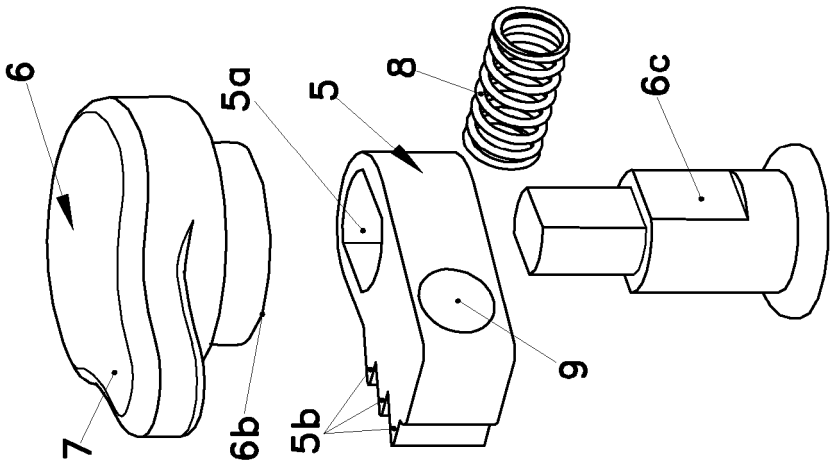

Fig.7

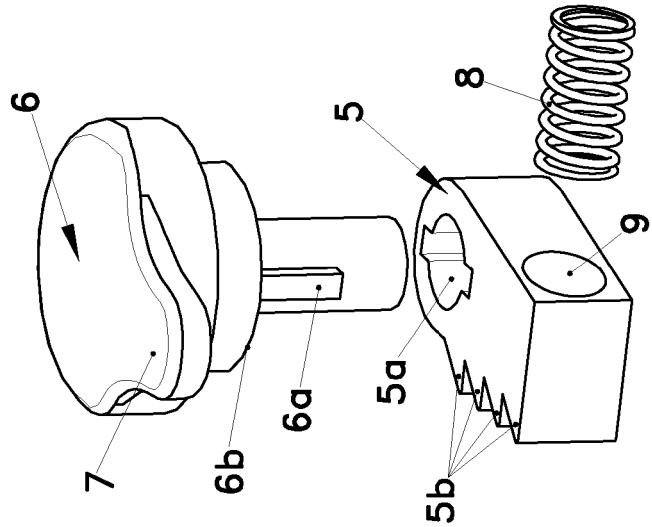

Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 11 38 5201

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 052 066 A2 (SUPER EGO TOOLS [ES]) 15 November 2000 (2000-11-15) * the whole document * -----	1-4	INV. B25B7/10
A	GB 2 453 331 A (WENDENG MAXPOWER TOOL GROUP CO LTD [CN]) 8 April 2009 (2009-04-08) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (IPC)

B25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 April 2012	Kühn, Thomas

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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24-04-2012

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