(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 214 107**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: 86830206.8

(22) Date of filing: 17.07.86

(51) Int. Cl.⁴: B 25 B 7/06
B 26 B 13/28

(30) Priority: 23.07.85 IT 2167985

(43) Date of publication of application:
11.03.87 Bulletin 87/11

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(71) Applicant: DE MOLLI ROMEO & C. S.n.c.
Via Campo di Maggio 16/B
I-21022 Brunello Varese(IT)

(72) Inventor: De Molli, Romeo
Via Campo di Maggio, 16/B
I-21022 Brunello Varese(IT)

(74) Representative: Cicogna, Franco
Ufficio Internazionale Brevetti Dott.Prof. Franco Cicogna
Via Visconti di Modrone, 14/A
I-20122 Milano(IT)

(54) A movable jaw tool with an adjustable tightenable pivot.

(57) A movable jaw tool such as pliers or scissors has a pivot assembly which can be adjusted to tighten it; the tool comprises a first jaw member (2) and a second jaw member (3) which are pivoted together via a pivot assembly engaged with predetermined play in a hole (8) provided in one of the jaw members (2, 3) of the tool. The pivot assembly (4) comprises a pivot body (7) having at one end an abutment head (5) and at the other end a radially expandable portion (10, 11) provided with an outer thread (12) for engagement with a threaded collet (14, 14a) connectable to the other jaw (3, 2) and an inner thread (22) which is engageable by a screw (20), tightening of which causes radial expansion of the expandable portion (10, 11) consequently clamping the pivot body (7) to one of the jaw members (2, 3) and retaining it in its state of adjustment.

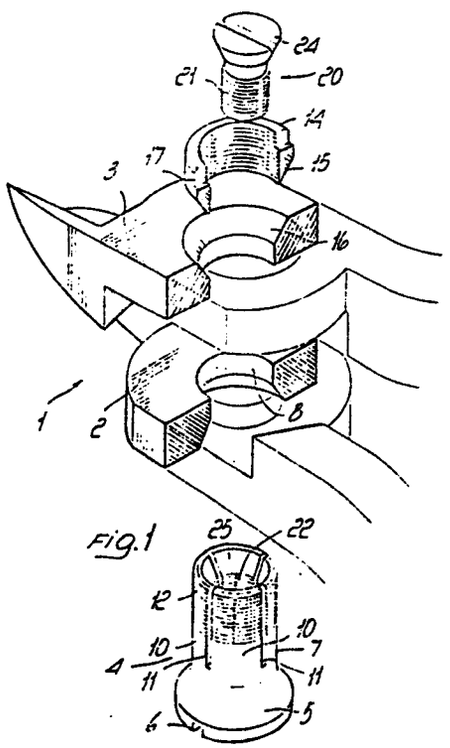


Fig.1

EP 0 214 107 A1

A MOVABLE JAW TOOL WITH AN ADJUSTABLY TIGHTENABLE PIVOT

The present invention relates to a movable jaw tool with an adjustably tightenable pivot.

Various movable jaw tools are commercially available such as, for example, pincers, scissors, wire cutters, pliers and the like. Many such tools are required to be of high precision, for example, for medical, electronic or dental work, and for such fields of activity it is known that a very high degree of precision is required in order to be able to obtain perfect closure of the jaws, that is not only avoiding unwanted play but, at the same time, having just the right amount of freedom of movement so that a given sensitivity upon actuation of the tool can be obtained.

In the majority of precision-made movable jaw tools the jaws are pivoted together by means of a pin which is introduced as an interference or force fit into one jaw and a sliding fit in the other jaw so that the coupling of the two jaws has a slight play in such a way as to allow smooth pivoting relative movement between the two jaws without any slackness. With such a structure, however, the user cannot modify or adjust the play between the two jaws so that, after a certain period of use, when wear has created an increased play and the tool has lost its original precision and accuracy, there is no convenient way in which the original play can be renewed. Even when new there is no way in which the original resistance to mutual movement between the jaws can be modified if it is found by the user to be unsatisfactory for his particular requirements.

Moreover, in the manufacture of such known tools there are encountered significant problems in that it is necessary to perform a long series of production steps which are not only expensive but which require a high expenditure of time. In fact, the conventional production process for making movable jaw tools such as pliers involves first hot stamping or forging of the two elements constituting the jaws, then further steps to effect piercing, grinding, assembly, hand grinding, heat treatment, and cleaning or polishing, all with intermediate testing and bench fitting steps as well. This lengthy process, involving such a considerable number of steps, results in tools which are rather expensive largely because of the time and trouble necessary for their production. Moreover, it is a disadvantage having to perform heat treatment steps in order to be able to effect the force fit assembly, that is to say, in order to introduce the pivot pin into the jaw with which it is an interference fit, since this is a prime cause of the high production costs.

The present invention seeks to eliminate the above mentioned disadvantages by providing a movable jaw tool having two jaw members joined by an adjustably tightenable pivot in which the steps required for assembly are very much simplified, and in particular, the need for heat treatment steps for force fitting the pivot is avoided and, further, which has the possibility of adjustment, even subsequently, of the force resisting turning movement acting between the two jaw members as they are opened and closed in use.

The present invention also seeks to provide a tool which

can be mass produced without requiring complex bench work upon assembly, and in which adjustment of the resistance to turning movement between the two jaw members can be effected in a simple and rapid manner. In fact, in embodiments of this invention such tightening operation is always directly available to the user both when the tool is new and after a certain period of time during which the tool may have been in use.

According to the present invention, there is provided a movable jaw tool with an adjustably tightenable pivot, comprising a first jaw and a second jaw pivotally connected together by means of a pivot, characterised by the fact that the pivot is formed as a pivot assembly comprising a generally cylindrical pivot body freely engaged in a hole in one of the jaw members of the tool, the pivot body having an enlarged abutment head at one end thereof, and a radially expandable portion at the other, the said radially expandable portion having an outer thread for threaded engagement with a collet engageable in a recess in the other of the jaw members and an inner thread engageable by a screw element for effecting radial expansion of the said expandable portion whereby to lock the pivot body against turning with respect to the collet.

A particular advantage of the present invention is that it provides a tool which can be produced with drastically reduced manufacturing and assembly costs due to the shorter time needed for the various operations, leading to a product with significantly improved

characteristics being obtained.

Another advantage of the present invention is that it provides a tool the individual component elements of which can for the most part be made using automatic machines and, consequently, at a particularly advantageous cost.

A further advantage of the present invention is that it provides a tool which, by its particular constructional characteristics, is able to offer the widest guarantees of reliability and safety in use.

Various embodiments of the present invention will now be more particularly described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a partially sectioned exploded perspective view of a tool constituting a first embodiment of the present invention;

Figure 2 is a partially sectioned perspective view, on an enlarged scale, of a part of the embodiment of Figure 1, showing the components in their assembled positions;

Figure 3 is a fully sectioned perspective view, similar to Figure 2, showing the internal components of the assembly;

Figure 4 is a perspective view illustrating the manner of adjustment of the play between two jaws; and,

Figure 5 is an exploded perspective view, similar to

Figure 1, showing an alternative embodiment of the invention.

Referring now to the drawings, the tool illustrated is generally indicated with the reference numeral 1 and comprises a first movable jaw member 2 and a second movable jaw member 3, these jaw members being pivoted together by means of the pivot assembly generally indicated with the reference numeral 4. In the attached drawing, purely by way of indicative, but non-limitative example, the tool shown is a precision side cutter. Obviously, the invention is equally applicable to all other jaw-type tools such as scissors, pliers, pincers, forceps or the like, the relevant criteria which must be taken into account being the available movement between two pivoted jaw-like members, and for this purpose the blades of a pair of scissors, shears or wire cutters will be considered as jaw members for the purpose of the present specification.

The pivot assembly 4 includes a pivot body 7 having at one end an abutment head 5 with a frusto-conical surface, provided with a slot 6 for engagement of a screwdriver or like tool. The head is formed at one end of a cylindrical pivot body 7 which can be introduced into a preformed hole 8 in one of the two jaw members; in the example illustrated this being the jaw 2. The cylindrical pivot body 7 has at its free end a radially expandable portion constituted by four sectors 10 separated by radial slots 11. Although four such sectors and slots are shown in the embodiment, disposed diametrically opposite one another in orthogonal pairs, there could readily be provided a different number

(either more or less) without altering the way in which the tool performs.

The radially expandable portion of the pivot body constituted by the sectors 10, has on its outer surface a thread 12 which can be engaged by an internal thread 13 of a threaded ring 14 or collet having a conical end surface 15 for engagement in a correspondingly conically shaped seat 16 formed on the other of the two jaw members, namely the jaw member 3. The threaded ring or collet 14 is provided with two diametrically opposite radial slots 17 which can be engaged by a specially shaped screwdriver or like tool for the purpose of turning it with respect to the outer threading 12 on the pivot body, whereby effectively to press the two jaw members 2 and 3 together until the required force between them has been achieved, thereby setting the desired resistance to rotation between the two jaw members 2 and 3.

In the alternative embodiment shown in Figure 5 a threaded collet 14a is provided around its periphery with splines 15a or other surface working for engagement with a correspondingly splined recess 16a provided in the jaw member 3 so as to obtain a forced locking of the ring nut 14a in the jaw 3 enabling tightening of the pivot assembly 4 in an entirely similar manner to that described above be obtained by turning the pivot body 7 by the head 5 to screw it into the collet 14a by engagement of a screw driver or other tool into the slot 6 in the said head 5 of the pivot body 7.

For locking the pivot assembly 4 with respect to the

collet 14 or the collet 14a there is provided a screw element 20 provided with a threaded shank 21 and a conical head 24, which can be engaged with an internal thread 22 formed in the radially expandable portion 10 of the pivot body 7. The conical head 24 of the screw 20 can be engaged into a conically flared end portion 25 formed in the expandable portion of the pivot body 7 in such a way that upon clamping of the screw element 20 radial expansion of the sectors 10 is obtained with consequent clamping of the pivot assembly 4 with respect to the collet nut 14 or 14a. With this arrangement the pivot body 4, because of its engagement with the collet 14 or 14a, determines the force between the jaw members 2 and 3, whilst the locking of the pivot assembly in the desired adjustment is effected by means of the screw 20 which, by causing radial expansion of the sectors 10, causes them to clamp the pivot body 7 tightly to the collet 14 or 14a.

The locking of the pivot assembly with respect to the jaw members is effected by the radial expansion caused by screwing the screw 20 tightly into the interior of the pivot body 7 which is clearly different from the known prior art construction in which the pin is a force fit in one of the jaws. Moreover, the actions of drawing the jaws together and of locking of the pivot assembly are separated from one another which, again, is exactly contrary to what takes place in those tools known in the art in which there is provided a single screw pivotable with respect to one of the jaw members and screwed into a threaded hole in the other jaw member. In this known construction, in fact, both the locking of the screw constituting the pivot pin and the

tightening of the jaw members take place simultaneously by screwing of the pin itself to tighten it. This, therefore, does not allow an adjustment of the mutual friction force between the jaws themselves. Further, in addition to what has been discussed above, according to the present invention it is at any time possible to slacken the screw 20 and effect rotation of the pivot body 7 with respect to the collet 14 or 14a to modify or adjust the play between the jaws 2 and 3.

The present invention thus provides a tool of high precision which can be obtained using only simple working techniques in that the pivot assembly is fitted by screwing, and locked in a stable manner with respect to one of the jaws by acting on a screw element. Moreover, the many working stages currently utilised in the production of tools of this type known in the art are entirely eliminated and the expensive coupling and interference fit obtained by heat treatment are likewise unnecessary.

Claims:

1. A movable jaw tool with an adjustably tightenable pivot, comprising a first jaw (2) and a second jaw (3) pivotally connected together by means of a pivot (4), characterised by the fact that the pivot (4) is formed as a pivot assembly comprising a generally cylindrical pivot body (7) freely engaged in a hole (8) in one of the jaw members (2,3) of the tool, the pivot body (7) having an enlarged abutment head (5) at one end thereof, and a radially expandable portion (10,11) at the other, the said radially expandable portion having an outer thread (12) for threaded engagement with a collet (14,14a) engageable in a recess (16, 16a)in the other of the jaw members (3,2) and an inner thread (22) engageable by a screw element (20) for effecting radial expansion of the said expandable portion (10,11) whereby to lock the pivot body (7) against turning with respect to the collet (14,14a).

2. A movable jaw tool according to Claim 1 characterised by the fact that the said radially expandable portion has a plurality of circumferential sectors (10) separated from one another by axial slots (11).

3. A movable jaw tool according to Claim 1 or Claim 2, characterised by the fact that the collet (14) has a conical end portion (15) and the said recess formed (16) in the said other jaw (3) is shaped as a corresponding conical seat.

4. A movable jaw tool according to any preceding Claim, characterised by the fact that the said collet (14a) has

a peripheral splining or other surface working (15a) and the said recess (16a) in the said other jaw member (3) is provided with a corresponding splined seat.

5. A movable jaw tool according to any preceding Claim, characterised by the fact that the said screw (20) has a conical head (24) engeagable in a conically flared end space (25) formed on the inner surface of the sectors (10) constituting the radially expandable portion.

6. A movable jaw tool according to any preceding Claim, characterised by the fact that the coupling between the pivot body (7) and the collet (14,14a) determines the force exerted between the jaw members (2,3) against mutual rotation.

0214107

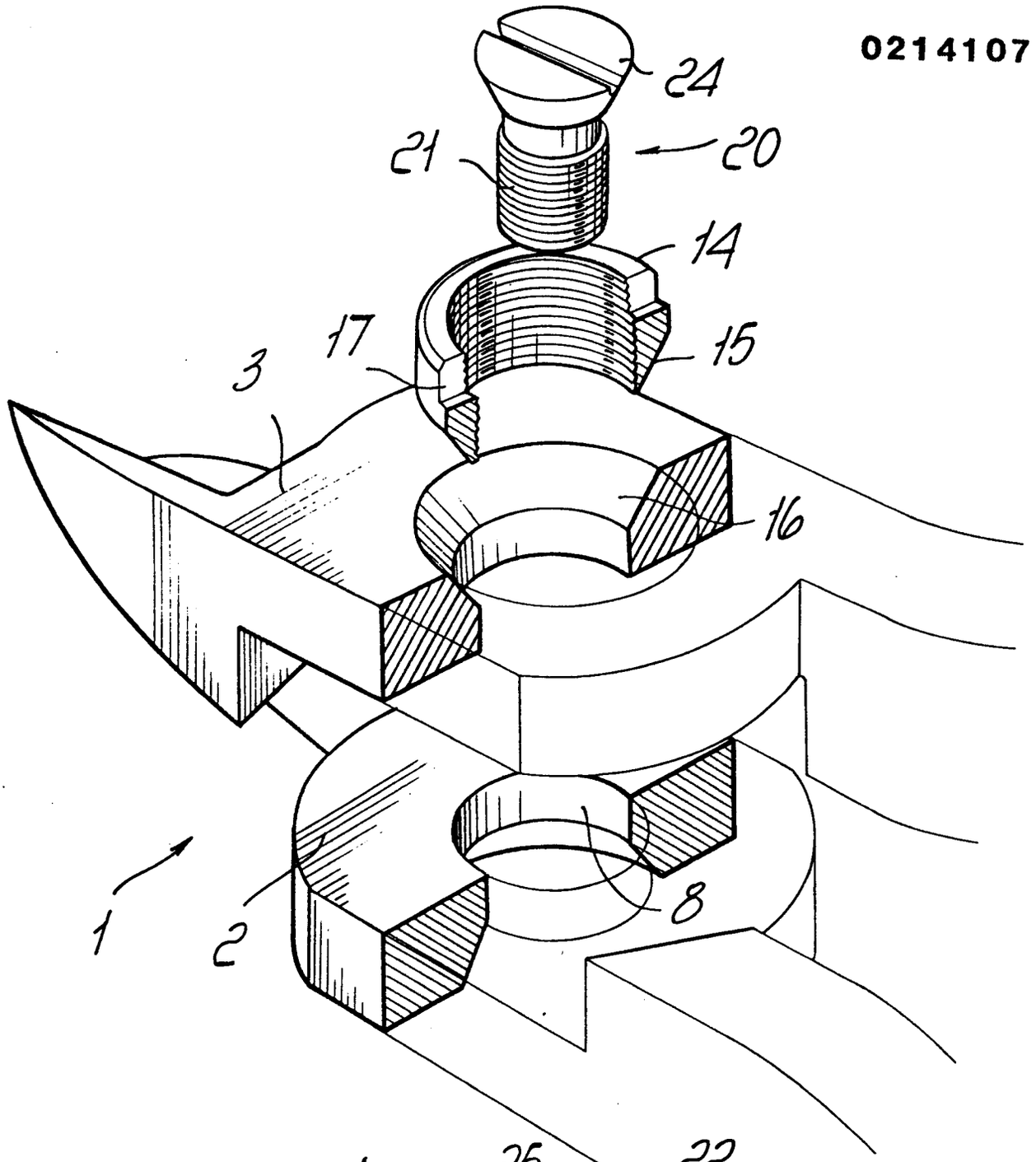
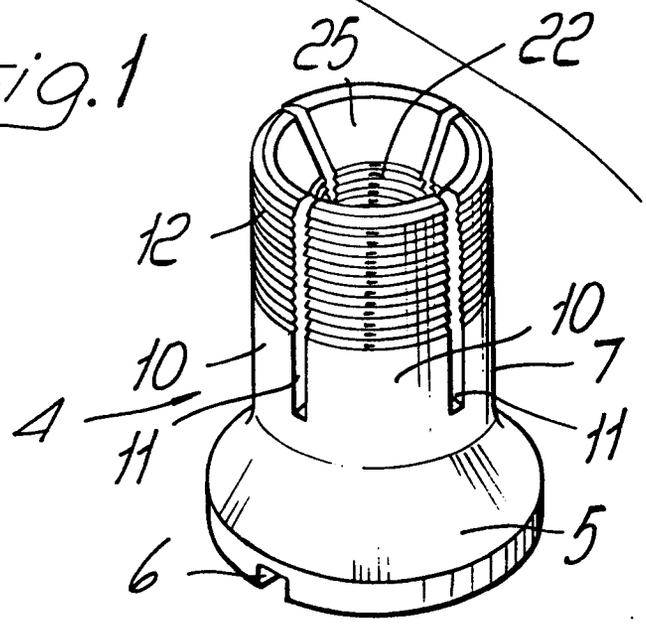


Fig. 1



0214107

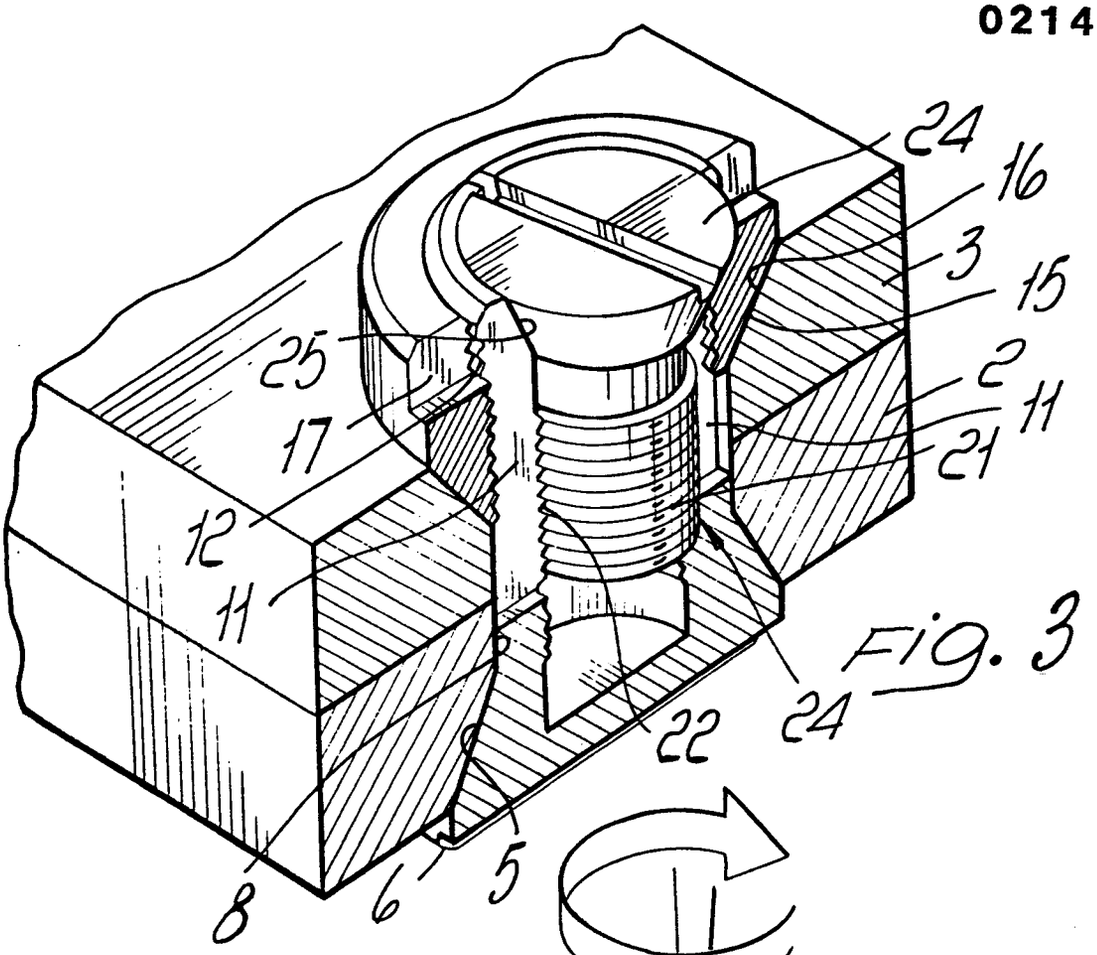


FIG. 3

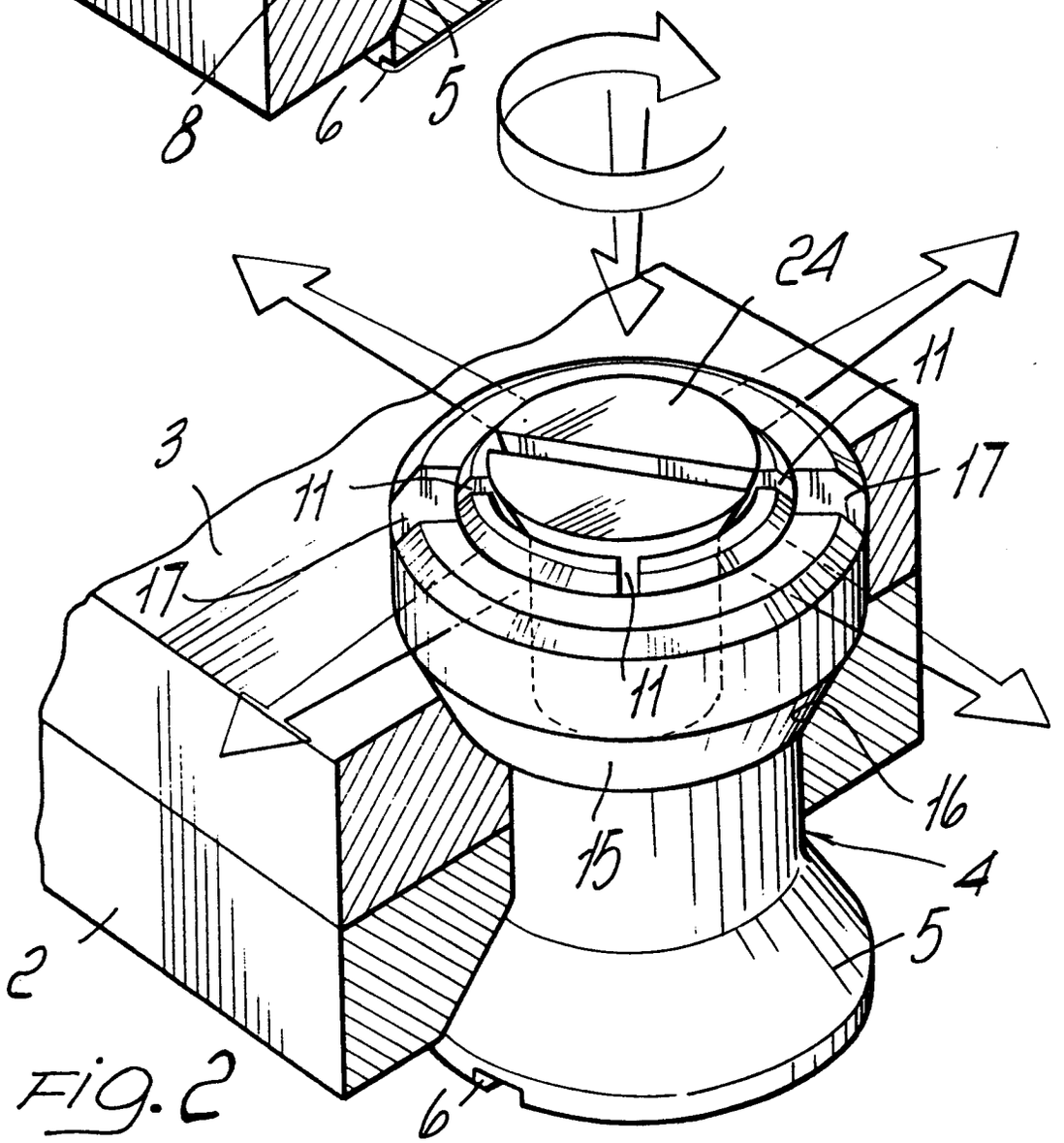


FIG. 2

0214107

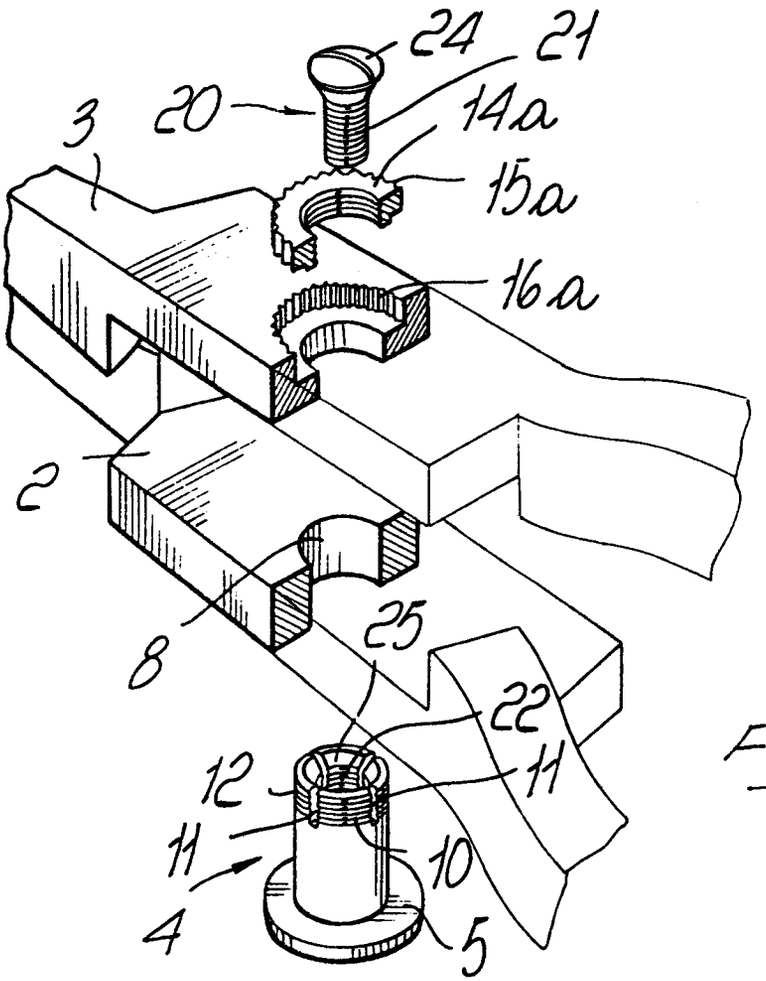


FIG. 5

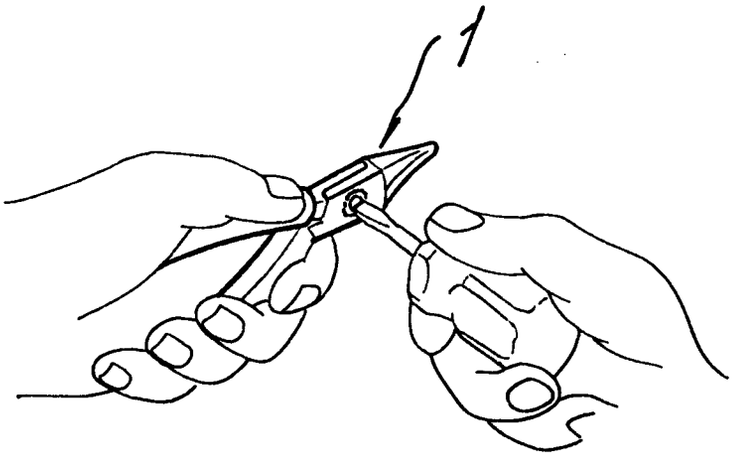


FIG. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application number
0214107

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 86830206.8

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 624 175 (J.W. CHAPMAN) * Fig. 7 * --	1-3,5, 6	B 25 B 7/06 B 26 B 13/28
X	US - A5 - 793 402 (J. STORSBERG) * Fig. 2 * --	1	
A	CH - A - 573 288 (EREM) * Fig. 3 * ----	1,4	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 25 B 7/00
B 26 B 13/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	04-11-1986	BENCZE

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO Form 1503 03 82