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(54) Multiple-cutter insert fixing structure, particularly for wood-working tools and the like.

(57) The multiple-cutter insert fixing structure (20) particularly for wood-working tools comprises a tool defining a seat (21) accommodating an element (22) for locking the multiple-cutter insert (23). The locking element (22) has a cavity (40) formed therein which accommodates a pin (41) for fixing the locking element (22). The outer ends (42) of the fixing pin (41) and the locking element (22) define a portion of a groove (60) for permitting the escape and removal of shavings produced by the multiple-cutter insert.

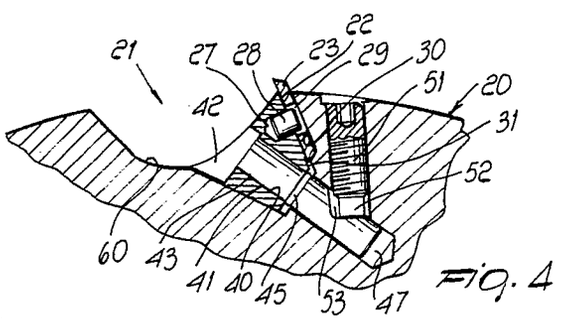

Fig. 4

EP 0 455 196 A2

The present invention relates to a multiple-cutter insert fixing structure, particularly for wood-working tools and the like.

As is known, currently commercially available wood-working tools have various types of fixing structure for multiple-cutter inserts, which are subject to disadvantages to varying extents.

For example, in a known structure which is schematically illustrated in figure 1, there is a tool body 1 in which a seat 2 is defined and accommodates a locking element 3.

Said element 3 has a pin 4 for locking a multiple-cutter insert 5.

The element 3 is fixed in the seat 2 by means of a fixing screw 6 which is arranged ahead of the multiple-cutter insert with respect to the tool cutting direction. The element 3 and the surface of the tool which is adjacent to the seat 2 are shaped so as to define a groove 7 for the escape and removal of the shaving produced by the insert 5.

The front placement of the fixing screw 6 compromises the escape of the shavings from the groove 7, since said shavings linger in said groove 7.

In order to try to obviate this type of disadvantage, another type of fixing structure, illustrated in figure 2, has been proposed; said structure has a tool 10 provided with an accommodation seat 11 for the locking element 12.

The element 12 is fixed to the tool 10 by means of a screw 16.

A blind hole 13 is defined in the tool 10, inside the seat 11, for accommodating a pin 14 for locking the multiple-cutter insert 15.

A groove 17 for collecting and eliminating the shavings is provided directly in front of the multiple-cutter insert 15 with respect to the cutting direction of the tool 10.

Although this solution is acceptable, it is subject to various disadvantages, since the placement of the insert 15 is not very precise due to the considerable size of the element 12.

This type of structure is furthermore difficult to assemble on low-thickness tools, and the use of said structure in the working of highly abrasive materials causes cavitation phenomena in the groove 17, proximate to the insert 15.

In case of breakage or unwanted impacts on the insert 15, the contact surfaces between the insert 15 and the element 12 are permanently deteriorated, with the need to replace said element as well as, of course, the insert.

The aim of the invention is indeed to solve the above problems by providing a multiple-cutter insert fixing structure particularly for wood-working tools and the like, which achieves excellent elimination of the shavings from the surface of the tool.

Within the scope of the above aim, a particular object of the invention is to provide a fixing structure which significantly reduces the possibility of damage to the fixing structure in case of breakage of a multiple-cutter insert.

Another object of the present invention is to provide a fixing structure which allows to replace the multiple-cutter insert very easily and rapidly.

Not least object of the present invention is to provide a fixing structure which can be easily obtained starting from commonly commercially available elements and materials and which furthermore has a competitive cost.

This aim, these objects and others which will become apparent hereinafter are achieved by a multiple-cutter insert fixing structure particularly for wood-working tools and the like, according to the invention, which comprises a tool which defines a seat for the accommodation of an element for locking a multiple-cutter insert, said locking element defining a cavity for the insertion of a pin for fixing said element, characterized in that the outer ends of said fixing pin and of said locking element define at least one portion of the groove for the escape and removal of the shaving produced by said multiple-cutter insert.

Further characteristics and advantages will become apparent from the detailed description of a multiple-cutter insert fixing structure particularly for wood-working tools and the like, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figures 1 and 2 are sectional views of two different solutions of the known art for the execution of the multiple-cutter insert fixing structure;

figure 3 is an exploded sectional view of the fixing structure according to the invention;

figure 4 is a schematic sectional view of the fixing structure according to the invention;

figure 5 is a schematic view of the composition of forces in the fixing structure according to the invention.

With reference to the above figures, the multiple-cutter insert fixing structure particularly for wood-working tools and the like comprises a tool or mill body, indicated by 20, which defines a seat 21 for accommodating an element 22 for locking a multiple-cutter insert 23.

Said locking element is shaped complementarily with respect to the seat 21, and it is substantially shaped like a truncated cone, with a surface 25 which acts against the multiple-cutter insert 23 and is inclined substantially at 30° with respect to the axis of said element, whereas the opposite surface 26 for abutment with the seat advantageously has an inclination of 10° with respect to the axis of said element.

The locking element 22 has, on its surface 25, a blind hole 27 in which a dowel 28 can be in-

serted; said dowel engages a hole 29 which is defined in the insert 23 to lock it against the retention wall 30 of the seat 21.

A recess 31 is furthermore provided on the surface 25 at the inner end thereof and prevents the possible breakage of the other cutter of the insert 23 during its fixing.

An axial through cavity 40 is defined inside the locking element 22, and a fixing pin 41 is insertable therein; said fixing pin has a shaped head 42 which ensures a single possibility of placement of said pin with respect to the element and which furthermore, at its outer surface, has a configuration which is shaped complementarily with respect to the configuration of the outer surface of the locking element 22.

The fixing pin 41 has a stem 43 with an annular groove 44 in which a locking snap-ring 45 can be inserted; said ring allows to define a monolithic unit between the element and the pin when said pin is inserted in the element.

The stem 43 of the pin 41 is accommodated in a blind hole 47 which is defined on the axial extension of the seat 21.

A threaded hole 50 is defined on the body 20, leads into the blind hole 47 and is suitable for accommodating a locking dowel 51 which, by means of its inner end 52, engages a fixing notch 53 which is defined on the stem of the pin 41 so as to perform locking.

In practice, by acting on the locking dowel 51, the inner end 52 of said dowel presses on the surface 53 of the notch, causing the sliding of the pin in the blind hole which generates traction on the locking element 21, which is thus moved so as to tightly lock the multiple-cutter insert 23.

An important peculiarity of the invention is constituted by the fact that the locking element 22 and the head 42 of the fixing pin 41 define a portion of the groove 60 which is arranged ahead of the multiple-cutter tool with respect to the working direction and has the function of allowing the escape and removal of the shaving.

According to what is illustrated in figure 5, the force F which is applied to the fixing dowel 51 is decomposed into the components F1 and F2, which generate a traction force on the pin 41 and accordingly on the locking element 22.

The conical element 22 develops a pair of forces F3 and F4 in which the force F3 is produced by the conical surface which is inclined at 30° with respect to the traction axis and acts on the insert 23.

The force F4 derives from the surface which is inclined at 10° with respect to the traction axis and acts on the body of the tool in the seat 21.

From the polygon of figure 5 it is evident that the forces F3 and F4 are greater than the forces F1 and F2, thus ensuring maximum safety in locking the multiple-cutter inserts.

From what has been described above, it can thus be seen that the invention achieves the intended aim and objects, and in particular the fact is stressed that a fixing structure is provided in which the outer surface of the locking element and its fixing pin have such a configuration as to be themselves a part of the groove for the escape and removal of the shaving, without creating possible lingerings and blending with the remaining part of the groove, which is defined directly by the tool.

Another important aspect of the invention is constituted by the fact that the particular configuration of the element, which has opposite faces with an asymmetrical inclination with respect to the axis, allows to define a safe and stable locking.

Another important aspect is furthermore constituted by the fact that the locking screw or dowel is arranged after the insert with respect to the working direction, so that the screw is always completely clean, with great ease of access.

In practice, the materials employed, so long as compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Multiple-cutter insert fixing structure particularly for wood-working tools and the like, comprising a tool which defines a seat for the accommodation of an element for locking the multiple-cutter insert, said locking element defining a cavity for the insertion of a pin for fixing said element, characterized in that the outer ends of said fixing pin and of said locking element define at least one portion of the groove for the escape and removal of the shaving produced by said multiple-cutter insert.

2. Insert fixing structure according to claim 1, characterized in that said locking element has opposite faces which are inclined asymmetrically with respect to the axis of said element.

3. Insert fixing structure, according to one or more of the preceding claims, characterized in that said locking element is shaped comple-

mentarily with respect to said accommodation seat.

4. Insert fixing structure, according to one or more of the preceding claims, characterized in that the surface of said locking element which engages against said insert is inclined at substantially 30° with respect to the axis of said element, the opposite surface being inclined substantially at 10° with respect to the axis of said element.

5. Insert fixing structure, according to one or more of the preceding claims, characterized in that said fixing pin has a stem which can be inserted in said cavity, a shaped head being connected to said stem, said head being eccentric with respect to said stem for the univocal positioning of said pin with respect to said locking element.

6. Insert fixing structure, according to one or more of the preceding claims, characterized in that said stem has an annular groove in which a retention ring can be engaged for the mutual coupling of said fixing pin with respect to said locking element.

7. Insert fixing structure, according to one or more of the preceding claims, characterized in that it comprises a fixing screw or dowel which can be engaged in a threaded hole which leads into a blind hole arranged on the axial extension of said seat, said threaded hole being defined on said tool rearward after said multiple-cutter insert with respect to the working direction.

8. Insert fixing structure, according to one or more of the preceding claims, characterized in that the axis of said threaded hole is inclined substantially at 50° with respect to the axis of said fixing pin.

9. Insert fixing structure, according to one or more of the preceding claims, characterized in that the stem of said fixing pin has a notch on which the end of said fixing dowel acts by pushing.

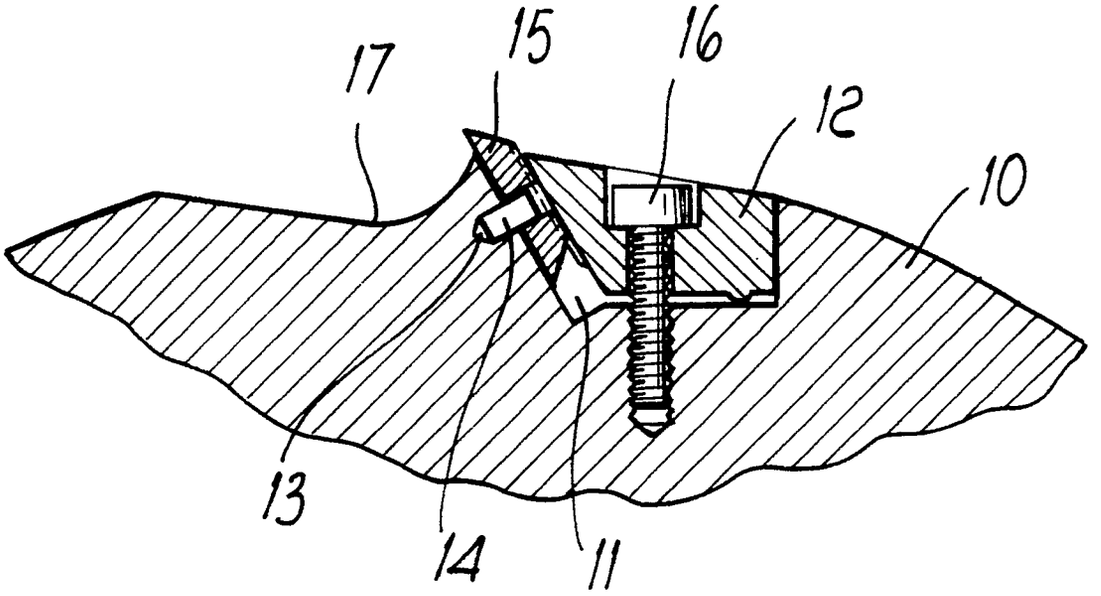

FIG. 2

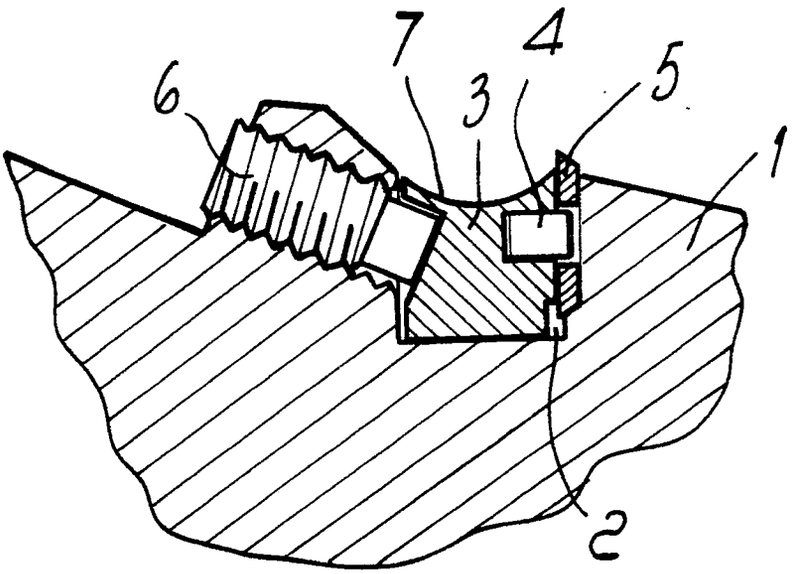

FIG. 1

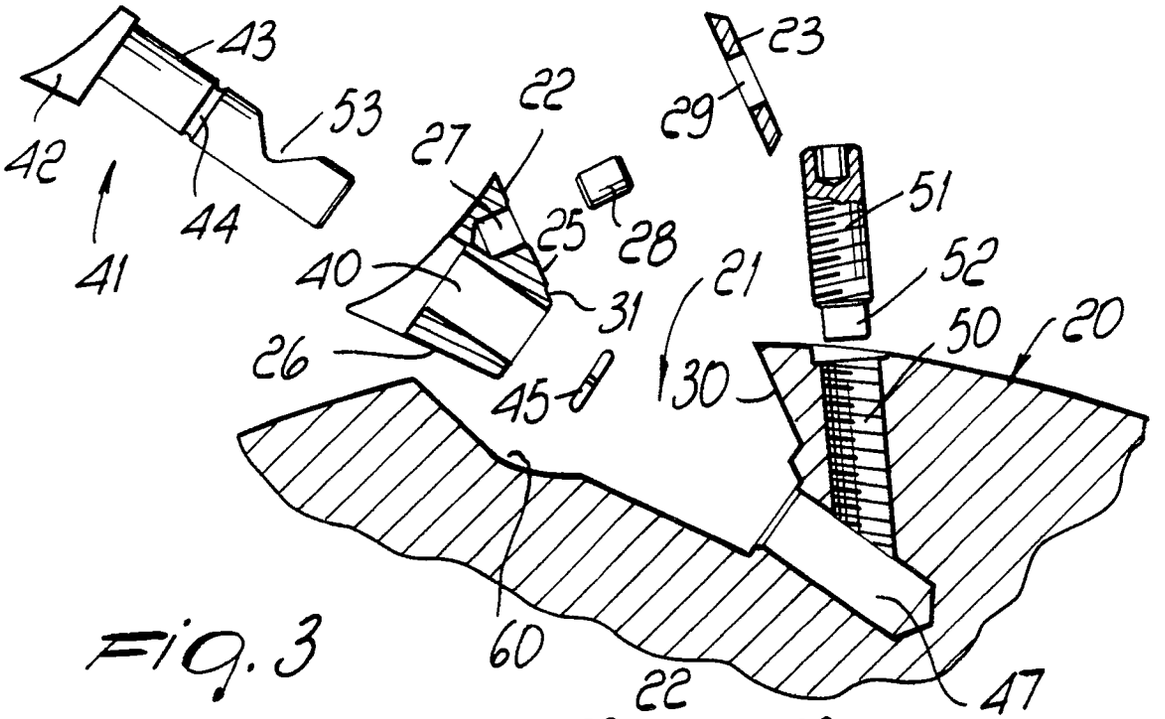

Fig. 3

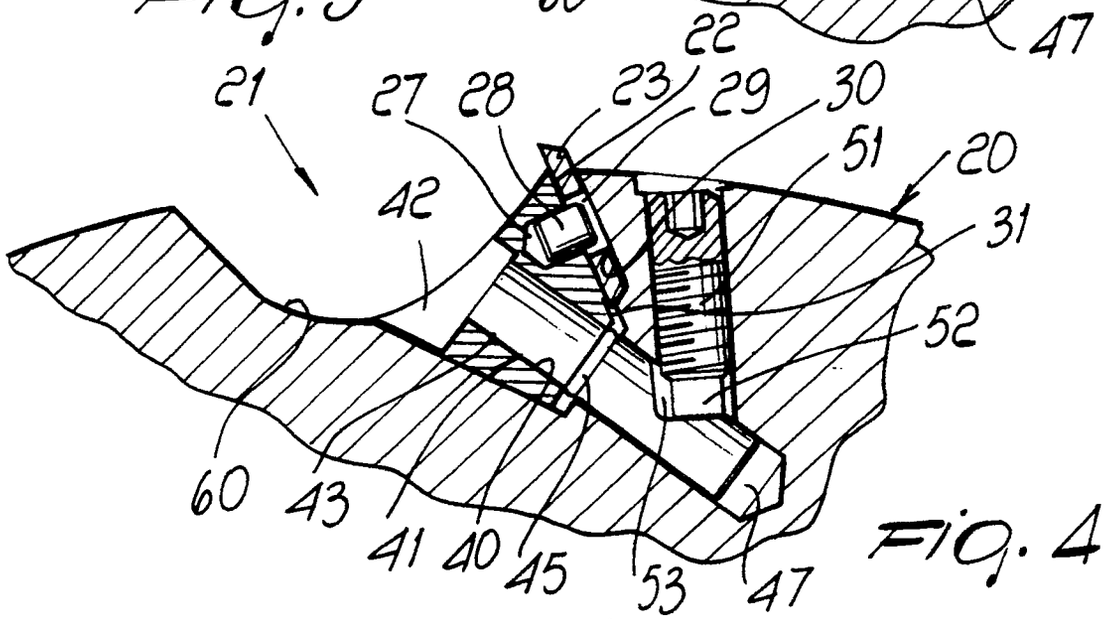

Fig. 4

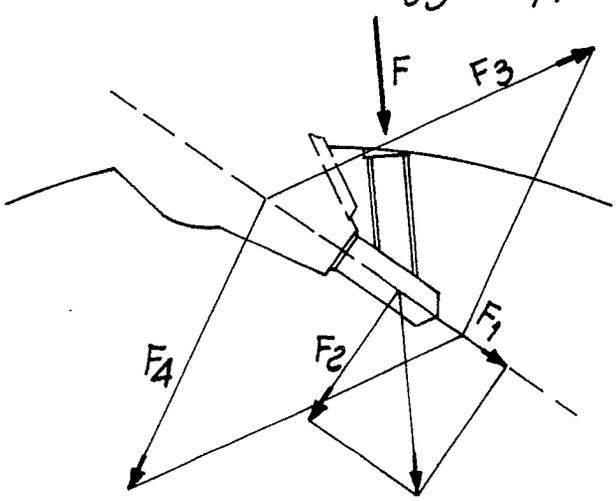

Fig. 5