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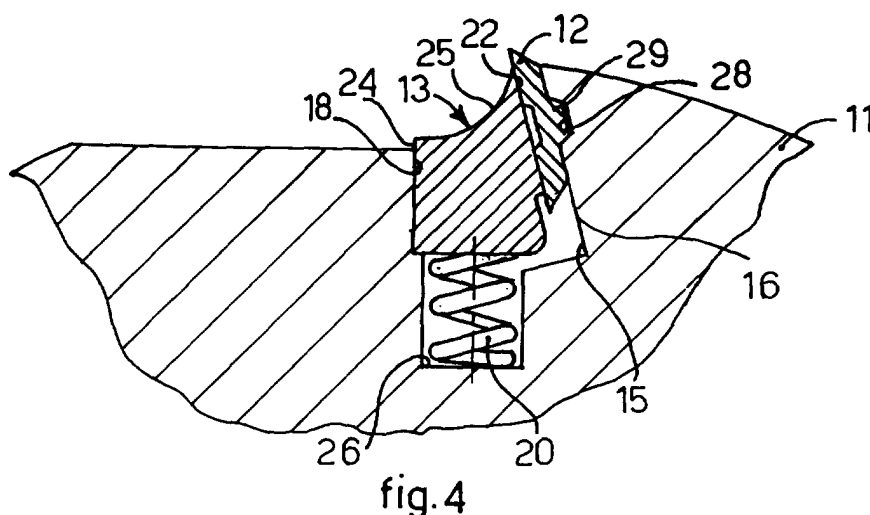
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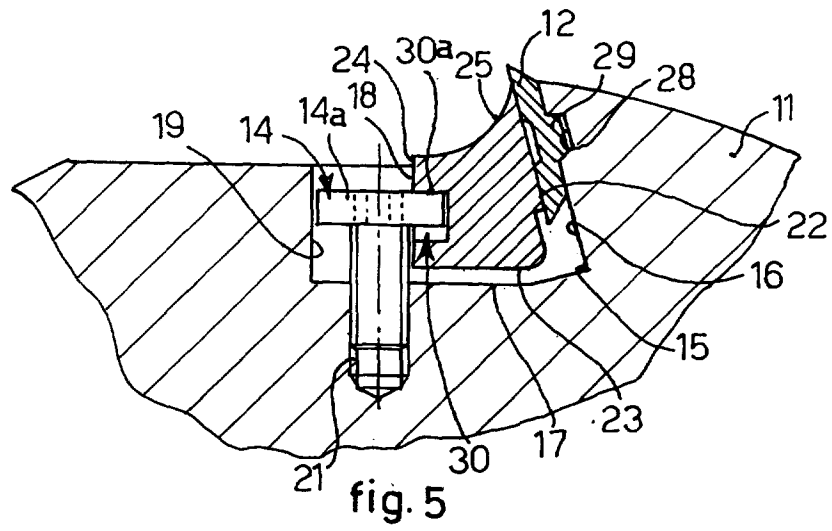
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(54) **Planing tool**

(57) Planing tool (10) comprising a main body (11), at least a blade (12) and at least a clamping element (13) housed in a hollow (15) made on the periphery of the main body (11), and able to clamp the blade (12) under pressure against a wall (16) of the hollow (15), the planing tool (10) also comprises elastic means (20), able to keep the clamping element (13) normally thrust against the blade (12), and means (14) to adjust the

pressure exerted by the clamping element (13) able to selectively take the latter from a first position, wherein it is thrust by the elastic means (20) in order to clamp the blade (12) under pressure against the wall (16), to a second position wherein, contrasting the thrust of the elastic means (20), it slackens the pressure on the blade (12) in order to allow it to be removed from the hollow (15).





Description

FIELD OF THE INVENTION

[0001] The present invention concerns a planing tool, used mainly for working wood and comprising a main body, able to be made to rotate, on the periphery of which one or more blades are mounted.

BACKGROUND OF THE INVENTION

[0002] Planing tools are known, comprising a main body on the periphery of which one or more blades are mounted radially.

[0003] Each blade is removably associated with the main body in correspondence with a hollow, by means of a clamping element or block, and by screws that clamp it under pressure against a wall of said hollow. This type of clamping makes the operations to assemble and dis-assemble the blades, which are necessary for their periodic sharpening and replacement, long and laborious, particularly due to the need to correctly reposition the blades after their height has been changed by the sharpening operation, so as not to compromise the cutting efficiency and precision of the tool.

[0004] In order to do this, it is known to use positioning calipers, the use of which requires on the one hand long downtimes of the machine and on the other hand the presence of qualified personnel, with a considerable increase in the costs of management and tool maintenance.

[0005] In order to reduce these disadvantages, blades have been proposed which are equipped with a longitudinal groove which couples with a mating protrusion present on the wall of the hollow; this coupling guarantees a univocal assembly position of the blade inside the hollow, and hence considerably speeds up the operations to restore the tool to operations.

[0006] Other embodiments are also known wherein the hollow has a dove-tail conformation which narrows towards the outside of the main body, so that when the block, of mating shape, is subjected to centrifugal force during the use of the tool, it is clamped with great interference in the outer part of the hollow. This causes the blade to be clamped under pressure. The blade is removed by hitting forcefully on the block so as to thrust it towards the bottom of the hollow, thus freeing the blade from the pressure exerted on it by the block.

[0007] The disadvantages of these solutions are mainly due to the need to dismantle the entire tool, and the risk of damaging the blocks in order to remove the blades.

[0008] Moreover, making the shaped protrusions and grooves on the hollow and the blade entails high production costs, also considering the need to use mills of limited size, which quickly get worn, therefore, and require long working times in order to operate inside the hollow.

[0009] Furthermore, in certain types of tool, only blades of a limited size can be used, with a consequent limited removal of material and low productivity of the tool.

[0010] The importance of achieving reliable, efficacious and safe planing tools, which allow quick and easy operations to assemble/dis-assemble the blades, has become more and more urgent considering the extremely high working speeds of modern planing machines which cause rapid wear of the blades.

[0011] One purpose of the present invention is to achieve a planing tool that allows rapid replacement, precise positioning even after removal and sharpening, and a stable clamping of the blades with respect to the main body, at the same time allowing rapid and easy operations to assemble/dis-assemble said blades, so as to limit to a minimum the inactive times of the machine.

[0012] Another purpose of the invention is to provide a planing tool that is easy, quick and economical to make, and that has characteristics of great reliability and working efficiency.

[0013] The present Applicant has devised and embodied this invention to overcome the shortcomings of the state of the art in order to achieve these purposes and obtain other advantages.

SUMMARY OF THE INVENTION

[0014] The present invention is set forth and characterized essentially in the main claim, while the dependent claims describe other innovative characteristics of the invention.

[0015] The planing tool according to the invention comprises a main body, at least a blade and at least a clamping element or block, housed in a hollow made on the periphery of the main body and able to clamp the blade under pressure against a wall of the hollow; the hollow has a section profile that narrows from the inside to the outside of the main body.

[0016] According to a characteristic feature of the present invention, the tool also comprises elastic means, able to keep the clamping element normally thrust against the blade, and means to adjust the pressure exerted by the clamping element on the relative blade.

[0017] To be more exact, the pressure adjustment means are able to selectively take the clamping element from a first active position, wherein it is thrust by said elastic means in order to block the blade under pressure against the wall, to a second at least partly passive position wherein, contrasting the thrust of the elastic means, it slackens the pressure on the blade in order to allow it to be removed from the relative hollow.

[0018] The hollow has at least a first wall, against which the blade is able to be clamped, a bottom and a second wall opposite the first.

[0019] The pressure adjustment means of the clamping element are able to move the latter in a direction

towards/away from the center of the main body, and substantially parallel to the second wall. Thanks to the dove-tailed conformation of the hollow, this movement respectively takes the clamping block towards the first wall, increasing the clamping pressure on the blade, or distances it from the first wall, reducing the clamping pressure until the blade is freed and can be removed.

[0020] The pressure adjustment means of the clamping element comprise at least a screw that can be selectively screwed into a threaded hole made radially on the main body, in a position adjacent to the hollow, in order to take the clamping element from the first to the second position or vice versa.

[0021] In a preferential embodiment, the screw has a widened head able to engage in a mating hollow made in the wall of the clamping element opposite that in contact with the blade. The selective screwing of the screw determines a mating displacement of the clamping element towards the inside or towards the outside of the hollow, thanks to the drawing action exerted thereon by the head of the screw.

[0022] In one embodiment, the clamping element is associated with guide means that prevent it from coming out of the hollow.

[0023] According to a variant, the clamping element and the blade comprise respective coupling means able to cooperate with each other in order to determine the correct reciprocal positioning thereof.

[0024] In a preferential form of embodiment, the blade and the hollow also have respective coupling means, consisting of a groove made in the wall of the hollow and a mating longitudinal protrusion made in a mating position on the wall of the blade.

[0025] In one embodiment of the invention, when the clamping element moves to the pressure release position, it moves only slightly away from the blade, so that the longitudinal protrusion of the latter remains partly inserted in the groove of the hollow and the blade can be removed only laterally from the hollow,

[0026] According to a variant, when the clamping element is taken to the pressure release position, it allows the blade to be completely free from interference with the groove so as to allow the blade to be removed radially from the hollow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a lateral view of a planing tool according to the present invention;
- fig. 2 is a front view of the planing tool in fig. 1;
- fig. 3 shows a blade of the planing tool in fig. 1;
- fig. 4 shows a section from A to A of fig. 2;

- fig. 5 shows the section from B to B of fig. 2 in the condition with the blade clamped;
- fig. 6 shows the section from B to B of fig. 2 in the condition with the blade unclamped;
- fig. 7 shows the section from C to C of fig. 2;
- fig. 8 shows a variant of fig. 2;
- fig. 9 shows a blade of the planing tool in fig. 8.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0028] With reference to the attached drawings, the number 10 denotes generally the planing tool according to the present invention, which comprises a main body 11 and a plurality of blades 12 assembled removably on its periphery.

[0029] The main body 11 has on its periphery a plurality of hollows 15 arranged radially, in correspondence with each of which a block 13 is inserted to clamp a mating blade 12. Each block 13 is associated with an adjustment screw 14 and two preloading springs 20, the function of which will be explained hereafter.

[0030] In the case of fig. 1, the tool 10 has four hollows 15 for four corresponding blades 12 and blocks 13, but it comes within the field of the invention to provide a different number of hollows 15, and hence of blades 12 and blocks 13.

[0031] The blades 12 are provided at the ends with two specular cutters and, in a substantially central position, have a longitudinal protrusion 29, in this case with a trapezoid section.

[0032] The hollows 15 have a dove-tailed conformation, narrowing towards the outside, and each of them has a first wall 16, a bottom 17 and a second wall 18, opposite the first, which in this case is arranged on a plane passing through the longitudinal axis "x" of the main body 11.

[0033] Along the first wall 16 a longitudinal groove 28 is made, in which the protrusion 29 of the blade 12 is inserted, in order to guarantee a univocal assembly positioning of the blade 12 on the main body 11 and prevent the accidental detachment of the blade 12 itself.

[0034] Each hollow 15 also has, at a substantially central point, accessible from the outside, a wider portion 19 in which the adjustment screw 14 is housed; on the bottom of the wider portion 19 a threaded hole 21 is made, advantageously facing towards the center of the main body 11, inside which the screw 14 can be selectively screwed.

[0035] The screw 14 has a widened head 14a advantageously having a "Torx" type impression.

[0036] In correspondence with the bottom 17 of the hollow 15, in a specular position with respect to the wider portion 19, two housing seatings 26 are made for corresponding springs 20, and two blind holes 27.

[0037] Each block 13 has a conformation mating with that of the relative hollow 15 and defines a front surface 22 arranged, during use, substantially parallel to the first

wall 16 of the hollow, a lower supporting surface 23, and a sliding surface 24 which is arranged, during use, in contact with the second wall 18.

[0038] The blade 12 is arranged between the front surface 22 and the first wall 16.

[0039] The front surface 22 and the sliding surface 24 are connected by an outer discharge surface 25, advantageously curved so as to promote the discharge of the chip that is generated when the tool 10 is in use.

[0040] On the sliding surface 24 a hollow 30 is made, open towards the wider portion 19, wherein part of the head 14a of the screw 14 is inserted; this hollow 30 defines an outer abutment surface 30a and an inner abutment surface 30b for the head 14a of the screw 14.

[0041] In correspondence with the supporting surface 23, the block 13 also has two pins 31 able to be inserted into the blind holes 27 which, apart from facilitating the correct positioning of the block 13 during the assembly step of the tool 10, also have the function of guiding the block 13 radially and of preventing the lateral displacement thereof when the tool 10 is functioning, as will be explained hereafter.

[0042] In the assembled condition of the tool 10, the block 13 has the pins 31 inserted into the blind holes 27 (fig. 7) and is kept thrust towards the outside of the main body 11, and hence towards the first wall 16 of the hollow 15, by the preloading springs 20 (fig. 4). The screw 14 is only partly screwed into the threaded hole 21, so that the head 14a is arranged against the outer abutment surface 30a of the hollow 30 (fig. 5).

[0043] The blade 12 has the protrusion 29 inserted into the longitudinal groove 28.

[0044] In this position, the block 13 is kept in a first position wherein it clamps the blade 12 under pressure against the first wall 16, due to the effect of the thrust imparted thereto both by the preloading springs 20 and also by the head 14a of the screw 14.

[0045] When the tool 10 is in use, the centrifugal force to which the block 13 is subjected causes the latter, thrust towards the outside and thanks to the conformation of the hollow 15, to further increase the pressure exerted on the blade 12, guaranteeing a great clamping force. The presence of the pins 31 on the contrary prevents the lateral displacement of the block 13.

[0046] The higher the running speed of the tool 10, the more efficacious the clamping of the blade 12 will be.

[0047] Each blade 12 can be removed, for example in order to be sharpened or replaced, without needing to dismantle the tool 10 from the machine on which it is installed.

[0048] In fact, it is enough to progressively screw the screw 14 until its head 14a is taken to thrust against the inner abutment surface 30b of the hollow 30, in this way determining the progressive displacement of the block 13 towards the bottom 17 of the hollow 15, away from the first wall 16.

[0049] The block 13, guided by the pins 27, overcomes the resistance of the preloading springs 20 and,

sliding with its sliding surface 24 on the second wall 18, moves to a second position wherein it abuts against the bottom 17. Moving towards the center of the main body 11, the block 13 is progressively distanced from the wall 16 of the hollow 15, thus progressively slackening the pressure on the blade 12 until it can be removed. In this way the blade 12 can be removed easily from the hollow 15 by means of lateral extraction.

[0050] According to the depth of the hole 27 and the size of the protrusion 29 and the groove 28, the displacement of the block 13 can be such as to allow the complete withdrawal of the protrusion 29 from the groove 28 in order to then allow the radial extraction of the blade 12 with respect to the main body 11.

[0051] The subsequent re-assembly of the tool 10 can be performed by keeping the latter on board the machine. In fact, it is enough to re-insert the blade 12 with the protrusion 29 in the groove 28, so that it is positioned parallel to the bottom 17 of the hollow 15 automatically and with a univocal positioning, and then progressively unscrew the screw 14 until the block 13 is returned towards the outside of the hollow 15, thus clamping the blade 12.

[0052] According to a variant, the block 13 has one or more ridges or impressions, able to cooperate with mating impressions or ridges made on the blade 12, in order to facilitate the correct longitudinal positioning thereof.

[0053] The conformation of the hollow 15 allows to house both blades 12 with cutters parallel to the longitudinal axis "x" of the main body 11 (figs. 2 and 3), and also blades 12 with arched cutters for so-called "helical" planing tools 10, arranged inclined with respect to said longitudinal axis "x" (figs. 8 and 9), which allow a progressive planing action on the piece to be worked.

[0054] Moreover, the very conformation of the hollow 15 and the position of the groove 28, in proximity with the outer profile of the main body 11, allow to use mills, or other equipment, of greater size which allow more simple and repeatable operations in order to make the groove 28 itself, with advantages in terms of costs and production times for the tool 10.

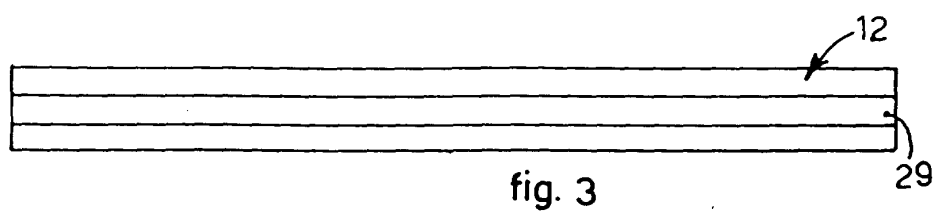
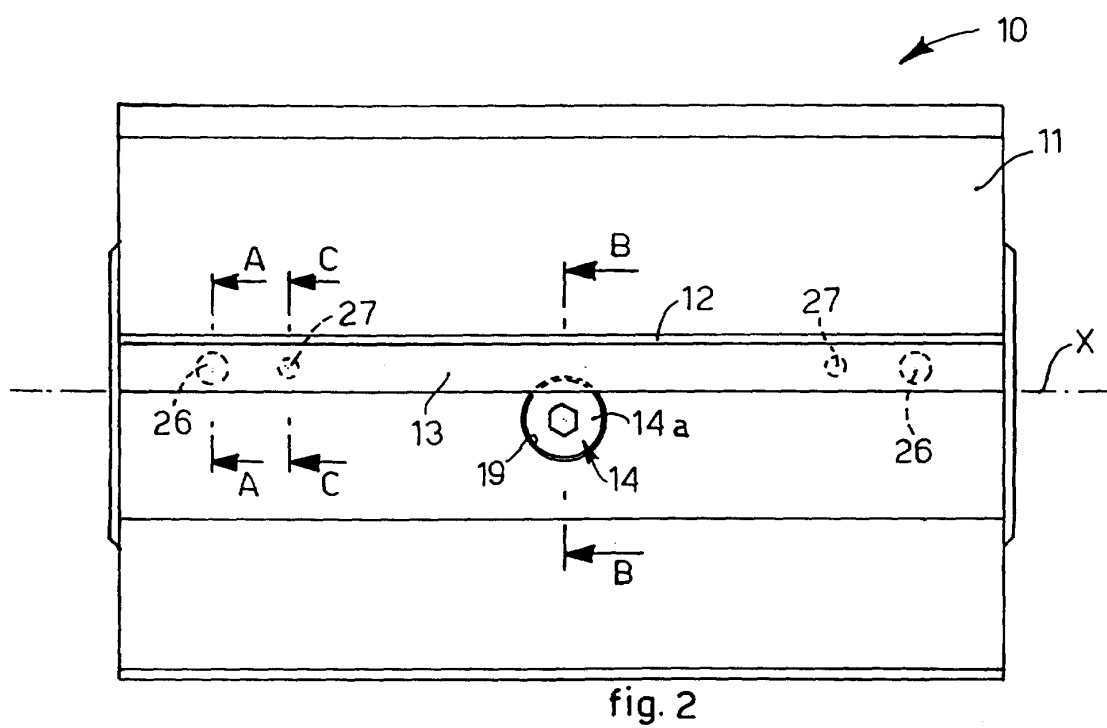
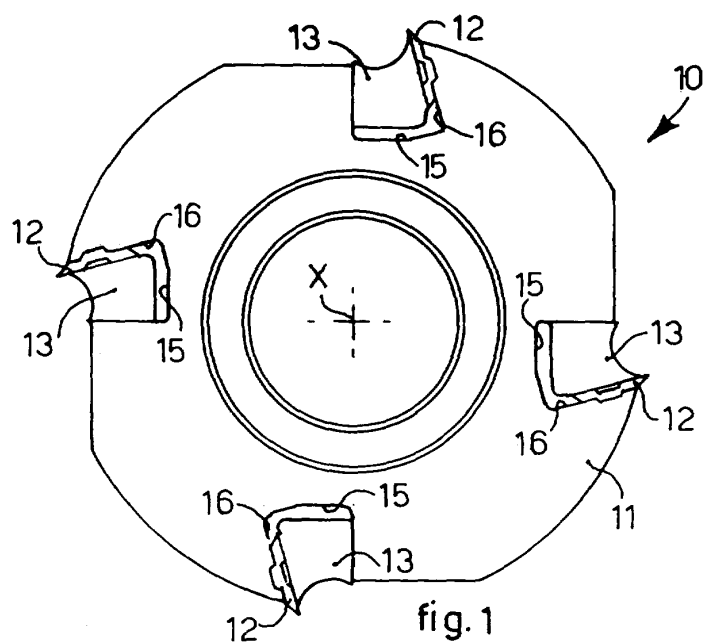
[0055] It is clear that modifications and/or additions of parts may be made to the planing tool 10 as described heretofore, without departing from the field and scope of the present invention.

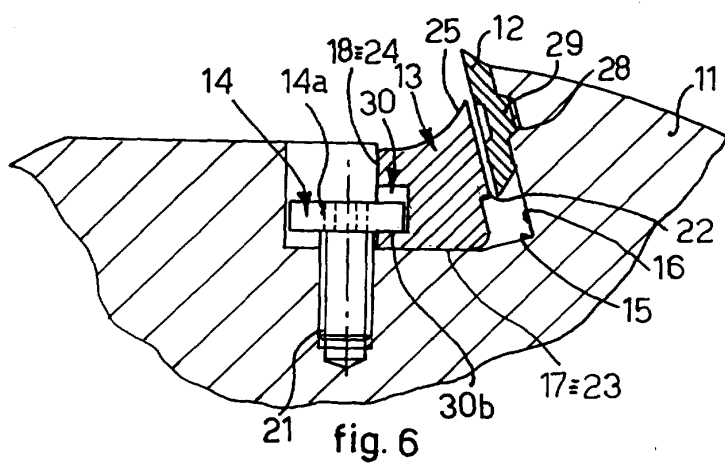
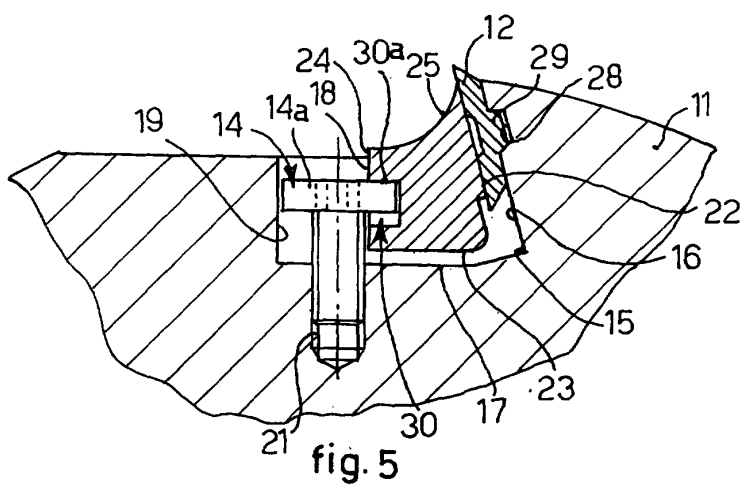
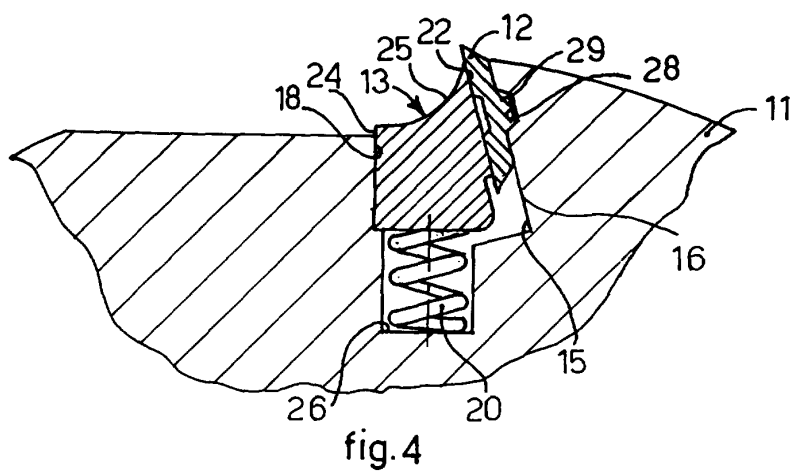
[0056] For example, the number of pins 31 or preloading springs 20 may vary, or the latter can be replaced by other elastic means with the same function.

[0057] It is also clear that, although the present invention has been described with reference to specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of planing tool, all of which shall come within the field and scope of the present invention.

Claims

1. Planing tool comprising a main body (11), at least a blade (12) and at least a clamping element (13) housed in a hollow (15) made on the periphery of said main body (11), and able to clamp said blade (12) under pressure against a wall (16) of said hollow (15), **characterized in that** it also comprises elastic means (20), able to keep said clamping element (13) normally thrust against said blade (12), and means (14) to adjust the pressure exerted by said clamping element (13) able to selectively take the latter from a first position, wherein it is thrust by said elastic means (20) in order to clamp said blade (12) under pressure against said wall (16), to a second position wherein, contrasting the thrust of said elastic means (20), it slackens the pressure on said blade (12) in order to allow it to be removed from said hollow (15). 5
2. Tool as in claim 1, wherein said hollow (15) has a profile with a dove-tailed section which narrows from the inside to the outside of said main body (11), **characterized in that** in said first position said clamping element (13) is thrust by said elastic means (20) towards the outside of said hollow (15) while in said second position said clamping element (13) is taken towards the inside of said hollow (15) by said adjustment means (14). 10 20 25
3. Tool as in claim 2, **characterized in that** said adjustment means comprise screw means (14) including at least a head (14a) able to engage on a part of said clamping element (13) in order to move it from said first to said second position and vice versa. 30 35
4. Tool as in claim 3, **characterized in that** in an adjacent position to said hollow (15) a wider portion (19) is made, able to at least partly house said screw means (14), on the bottom of said wider portion (19) a threaded hole (21) being made for said screw means (14), said wider portion (19) being open towards the outside in order to allow access to said screw means (14) from outside the tool (10). 40 45
5. Tool as in claim 3, **characterized in that** said clamping element (13) includes, on its surface (24) opposite that (22) in contact with said blade (12), a hollow (30) in which the head (14a) of said screw means (14) is able to engage, said hollow (30) defining two opposite abutment surfaces (30b, 30a) for said head (14a) in order to respectively move said clamping element from the first to the second position and vice versa. 50 55
6. Tool as in any claim hereinbefore, **characterized in that** said elastic means comprise at least a spring (20) housed in a relative seating (26) made on the bottom (17) of said hollow (15). 5
7. Tool as in any claim hereinbefore, **characterized in that** said clamping element (13) includes means (31) able to keep it guided in its movement from said first to said second position and to prevent the removal thereof from said hollow (15). 10
8. Tool as in any claim hereinbefore, wherein said hollow (15) includes, on the wall (16) in contact with said blade (12), a through groove (28), and wherein said blade (12) has a protrusion (29) able to be inserted in said through groove (28), **characterized in that**, in said second position, said clamping element (13) is distanced from said wall (16) by an entity such that said longitudinal groove (29) remains partly inserted in said through groove (28), so that said blade (12) can be removed only laterally from said hollow (15). 15 20
9. Tool as in any claim hereinbefore, wherein said hollow (15) includes, on the wall (16) in contact with said blade (12), a groove (28), and wherein said blade (12) has a protrusion (29) able to be inserted in said groove (28), **characterized in that**, in said second position, said clamping element (13) is distanced from said wall (16) by an entity such that said longitudinal protrusion (29) is completely removed from said groove (28), so that said blade (12) can also be removed radially from said hollow (15). 25 30
10. Tool as in any claim hereinbefore, **characterized in that** said blade (12) is arranged inclined with respect to the longitudinal axis ("x") of said main body (11). 35 40





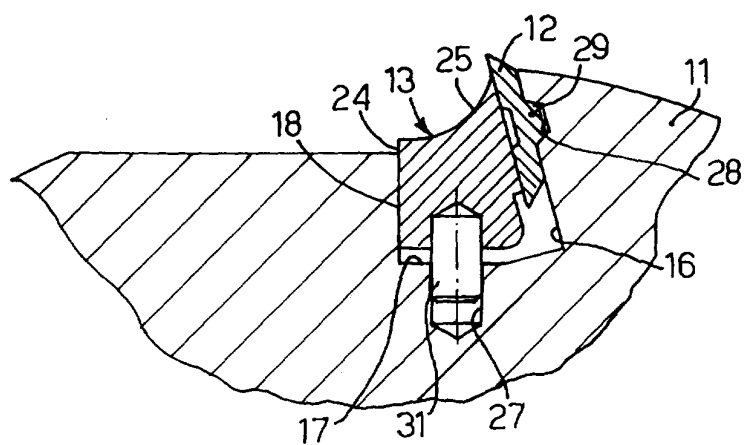


fig. 7

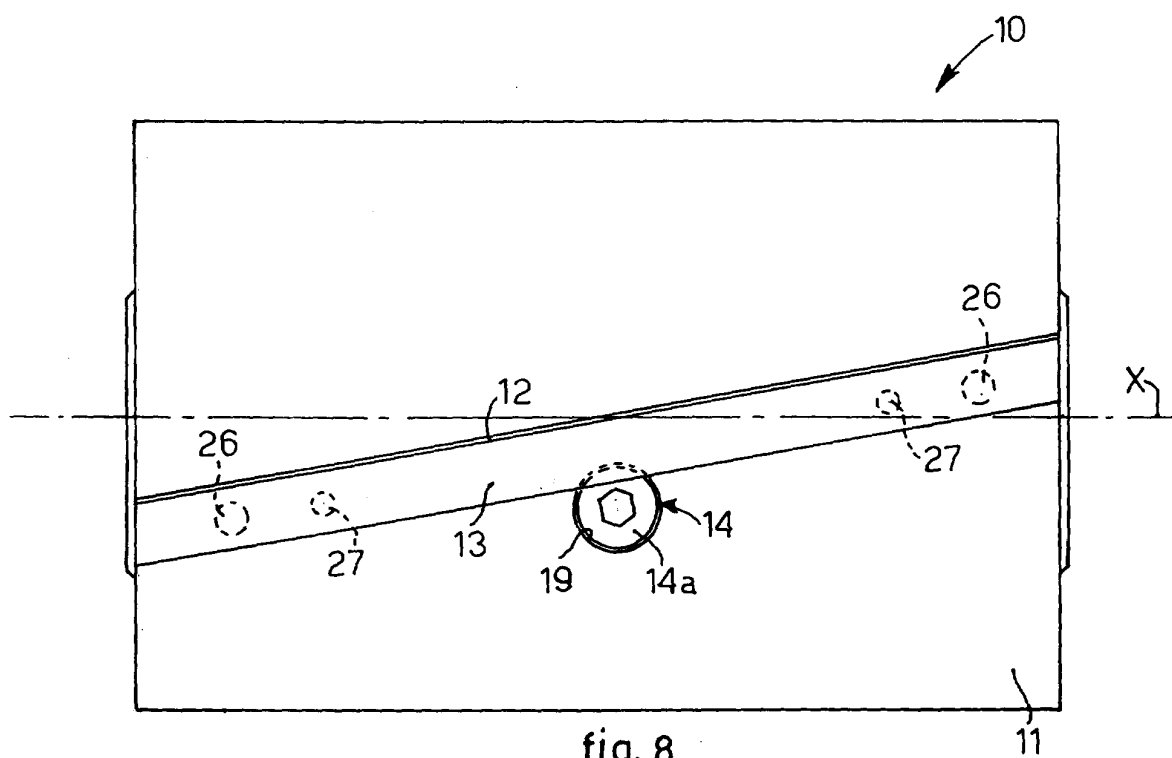


fig. 8

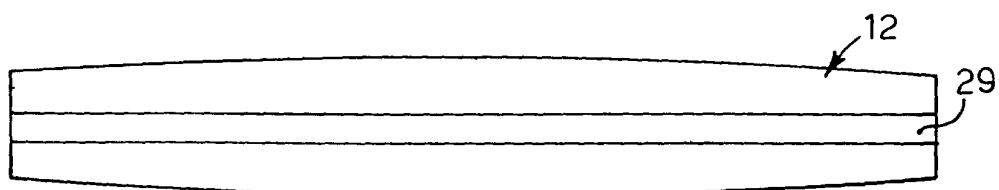


fig. 9