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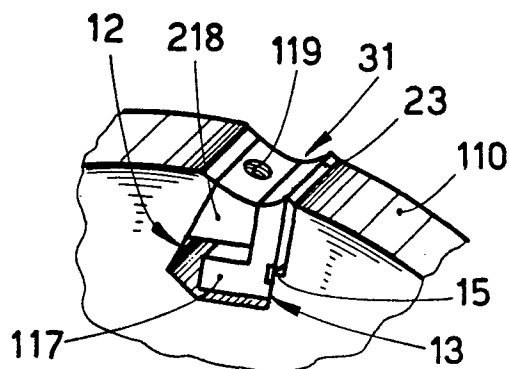
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Means to clamp inserts in rotating tools.

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The invention concerns means to clamp inserts in rotating tools, and advantageously in rotating tools employed in processing of wood, plastics or light metals, whereby said rotating tools travel at a very high speed and the inserts (23) can be re-used and readily replaced, said clamping means being characterized by the fact that in the tool holder (10) there is envisaged a plurality of housing spaces (11) which have a shape substantially like a truncated cone and which widen towards the middle of said tool holder (10), whereby a seating (14) for a tool is positioned at the side of said housing space (11) and a clamping body (17) is located in said housing space (11) and cooperates with at least one resisting block (18), and whereby at least said resisting block (18) cooperates with a regulating screw (19) able to exert on said resisting block (18) and on said clamping body (17) a lateral thrust such as will constrain said resisting block (18) against the opposing wall (12) of said housing space (11) and will constrain said clamping body (17) against said insert (23) and substantially towards the middle of said tool holder (10).



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1 Description of the invention entitled:

"MEANS TO CLAMP INSERTS IN ROTATING TOOLS"

in the name of STARK S.p.A. at Trivignano Udinese

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. This invention concerns means to clamp inserts in rotat-
ing tools.

. To be more exact, this invention concerns means to clamp
inserts in rotating tools which are employed advantageously
10 for the processing of wood or plastics, or, in any case, in
tools which rotate at high speed.

. It is known that the clamping of inserts is a grave pro-
blem for the safety of machine operatives and for the accur-
ate alignment and balancing of the tools themselves.

15 . Lastly, the clamping of the tools is reflected in the
quality of the finished product.

. At the speeds at which the tools rotate nowadays, their
clamping has become an important feature in that the inserts
have been standardised and have reached an optimal level of
20 performance.

. The problems to be overcome in up-to-date clamping means
are manifold and indeed it is necessary to be able to obtain
clamping means which are strong and stable enough to with-
stand all kinds of vibration.

25 . It is necessary to provide clamping means which do not

need to be removed during assembly and dismantling.

Clamping means have to be provided which align and secure the insert automatically.

It is necessary to provide clamping means which, owing to their very nature, constrain the insert with an action that opposes centrifugal force.

It is also necessary to provide clamping means which do not leave their housing even if they have been badly secured.

All these purposes together with further purposes and advantages are pursued by the invention according to this description.

According to the invention a housing space is envisaged which has the shape substantially of a truncated cone and which widens towards the middle of the tool holder.

At the side of the housing space is envisaged a suitable seating space for the tool, and said seating is dimensioned and positioned perfectly in relation to the middle of the tool itself so that, when said seating supports the tool or insert, said tool or insert is located perfectly in relation to the middle of the tool holder and therefore in relation to the plurality of other tools or inserts.

Into said housing space are introduced at least two bodies which cooperate with each other by means of screw means, whereby the reciprocal action carried out by the screw means is such as to thrust one body towards an opposing wall, whereas the other body, the so-called clamping body, is thrust towards the insert.

At the same time the insert is pushed by said latter body with a thrust substantially towards the middle of the tool holder.

According to a first formulation of the invention the clamping body has two clamping surfaces that cooperate with resisting blocks on which a regulating screw having a right-

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1 hand thread and a lefthand thread acts.

. By turning the screw said resisting blocks can be brought nearer to or farther from each other.

. The action of said resisting blocks on the opposing surfaces causes a sideways thrust towards the middle of the tool holder. This is so because, by pressing against the opposing wall, said blocks constrain the clamping body to move sideways towards the insert and substantially towards the middle of the tool holder.

10. According to this preferential embodiment the regulating screw comprises in an intermediate position a ring which provides lengthwise anchorage and which can cooperate with an anchorage hollow that may possibly be included in the clamping body.

15. Substitute means can also be visualised.

Said anchorage ring can cooperate with a safety pin which holds the regulating screw onto the clamping body and which can exert at the same time on the clamping body an outwards thrust that constrains said clamping body to be embedded in the housing space.

. According to another variant the anchorage ring has an intermediate hollow within which the safety pin is made to pass.

. According to a further variant the opposing surfaces are not linear but have a substantially rounded development so as to reduce to a minimum the necessity for accurate mating.

. This makes it possible to maintain at the same time a thrust strong enough to obtain an almost irreversible clamping condition when the forces in question are taken into account.

30. Moreover, the area of contact between the resisting block and the opposing wall may possibly be suitably shaped.

. According to a second further embodiment the resisting block cooperates with a screw located in an almost radial

1 position and acting on both the resisting block and the clamping body at the same time.

. Thus, by acting on said screw the two elements are moved .
towards each other or one of them is moved in a direction op-
5 pposite to the other, thus constraining the clamping body to .
thrust the insert downwards and sideways and keeping it in .
the right position in relation to the seating of the tool. .

. According to yet another embodiment the resisting block .
comprises a slit such that the walls of the block itself are
10 made elastic. .

. When a screw is caused to act on said walls, a union sub-
stantially with the shape of a truncated cone between the re-
sisting block and the clamping body forces the clamping body .
itself to move sideways and downwards and thus constrains the
15 insert to be secured perfectly within the seating of the tool.

. The invention is therefore embodied in means to clamp in-
serts in rotating tools, and advantageously in rotating tools
employed in the processing of wood, plastics or light metals,
whereby said rotating tools travel at a very high speed and .
20 the inserts can be re-used and readily replaced, said clamp-
ing means being characterised by the fact that in the tool .
holder there is envisaged a plurality of housing spaces which
have the shape substantially of a truncated cone and which .
widen towards the middle of the tool holder, whereby a seat-
25 ing for a tool is positioned at the side of said housing spa-
ce and a clamping body is located in said housing space and .
cooperates with at least one resisting block, and whereby at
least the resisting block cooperates with a regulating screw
able to exert on said resisting block and on said clamping .
30 body a lateral thrust such as will constrain said resisting .
block against the opposing wall of said housing space and wi-
ll constrain said clamping body against the insert and sub-
stantially towards the middle of the tool holder. .

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1. let us now see some preferential lay-outs of the invention with the help of the attached table, which gives some non-restrictive examples.

The table contains the following:-

5 Fig.1 gives a vertical section of a possible embodiment of the invention;

Fig.2 shows the embodiment of Fig.1 according to a lengthwise section;

Fig.3 shows a variant evolved from Fig.1;

10 Fig.4 shows an evolutive variant of the regulating screw;

Fig.5 shows the embodiment of another variant;

Fig.6 shows the embodiment of another variant in relation to Fig.5;

Figs.7 & 8 show a section and a side view of another variant.

15 With reference to the figures, the tool holder IO comprises a housing space II with an opposing wall I2 and a supporting wall I3; a lateral seating I4 for a tool is provided in the supporting wall I3.

Said seating I4 for a tool includes a supporting corner

20 I5 and a wall I6 supporting an insert.

The conformation of the housing II substantially like a truncated cone has the effect that, as the wall I6 supporting the insert 23 is substantially parallel to a plane passing through the axis of the tool holder IO, the opposing 25 wall I2 will cut said plane at a position a great deal above the middle of the tool holder IO.

The wall I6 supporting the insert and the supporting corner of said seating I4 for a tool are positioned perfectly in relation to the centre of rotation of the tool holder IO.

30 A clamping body I7 is introduced within the housing II and, in the example of Fig.1, comprises a lengthwise hollow 32 in which are located two resisting blocks I8-II8 cooperating with a regulating screw I9 having a righthand and a lefthand thread.

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1. Said regulating screw I9 includes a ring 20 for lengthwise anchorage, and said ring 20 cooperates with a hollow 21 for lengthwise anchorage formed in the clamping body I7.
- Opposing surfaces 22 are provided in the lengthwise hollow 32 of the clamping body I7 and cooperate with respective resisting surfaces I22 formed on the resisting blocks I8.
- Thus, when the regulating screw I9 is turned, the resisting blocks I8 are, for instance, drawn towards each other and the respective resisting surfaces I22 press on the opposing surfaces 22 of the clamping body I7.
- This pressure constrains the resisting blocks I8 to move sideways until they rest against the opposing wall I2.
- As soon as said resisting blocks I8 rest against the opposing wall I2, they constrain the clamping body I7 to move in its turn.
- The position of the opposing wall I2 conditions the characteristics of the movement of the clamping body I7.
- When the clamping body I7 moves, it acts on the insert 23 or tool having a re-usable and replaceable tip.
20. Said tool 23 comprises one or more holes 24 which cooperate with appropriate pins 25 solidly fixed to the clamping body I7.
- Owing to the action of the resisting blocks I8 against the clamping body I7 the pin 25 rests against the bottom of the hole 24 and engages the insert 23.
- This action constrains the insert 23 to rest perfectly against the wall I6 and at the same time against the corner I5 and to be positioned perfectly in relation to the middle of the tool holder I0 and to the other tools.
30. The clamping body I7 is advantageously envisaged as comprising a protective outlet 26 which cooperates with the cutting edge of the insert 23 lying against the supporting corner I5.

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1. So as to prevent the regulating screw I9, and therefore the resisting blocks I8, from becoming detached possibly from the clamping body I7 during movement, it is possible to visualise a safety pin 27 which engages the clamping body I7 and the regulating screw I9.

It is possible to obtain an auxiliary safety function with said safety pin 27 if said safety pin protrudes from the lower side of the body I7 and cooperates with the bottom of the housing II.

10. In such a case, if the safety pin 27 is elastic enough and is made to work by bending against the bottom of the housing II, it will constrain the clamping body I7 with an outwards thrust.

This makes it possible to ensure a grip and security which could not be obtained otherwise in the case of imperfect clamping by the resisting blocks I8.

Said safety pin 27 can be single, as in Fig. I, or double, as in Fig. 3, or can have other suitable shapes according to the requirements of the design.

20. According to a variant the ring 20 providing lengthwise anchorage and comprised in the regulating screw I9 can have an intermediate hollow 28 within which the safety pin 27 is made to lodge; in this way the hollow 21 providing lengthwise anchorage is rendered substantially useless.

25. The embodiment now shown entails a movement substantially parallel to the axis of rotation of the tool holder I0.

With the invention, however, it is also possible to obtain clamping of the inserts 23 by making use of an action of the resisting blocks 218 in a substantially radial direction.

30. This too is due to the reciprocal disposition of the wall I2 and wall I3 in relation to the centre of rotation of the tool holder I0.

Indeed, as can be seen in Figs. 5 & 6, a clamping action

1. can be obtained which is in principle substantially the same as that of Fig. I but which is substantially different as an embodiment to be applied.

According to said variants the resisting block 2I8 is thrust towards the opposing wall I2 by screw means II9, which also have a righthand and a lefthand thread and which engage the resisting block 2I8 and the clamping body II7 at one and the same time.

In this way the clamping body II7 is thrust not only towards the supporting wall I3 but also towards the insert 23 and constrains said insert 23 to rest against the supporting corner I5.

The difference between the lay-outs of Figs. 5 & 6 lies substantially in greater security of the invention in the example of Fig. 6.

In fact, the twofold inclination permits safer and more longlasting anchorage in the long term even when there are vibrations.

Indeed, the reciprocal sliding wall 3I of Fig. 5 is substantially parallel to the wall I3, whereas there is an angle between said walls in Fig. 6.

In the examples of Figs. 7 & 8 the resisting block 3I8 comprises a hollow which enables the two sides A & B of the block itself to bend in relation to each other, whereby the side B is able to lodge the head 30 of the screw 230, whereas the side A can lodge the threaded part I30 thereof.

When the screw 2I9 is turned, the two sides A & B of the resisting block 2I8 tend to come nearer to each other.

This action is opposed by the presence of the body 2I7, which is thrust towards the insert 23, whereas the resisting block 3I8 is thrust towards the wall I2, the two oblique sides I3I acting as wedge means.

We have described herein some preferential embodiments,

1 but variants are possible and it can be seen that some embod-
iments are suitable for wide tools and others for narrow tools
whereas others again are suitable for very narrow tools.

Thus, the proportions, sizes and parts can be varied and
5 various parts can be combined together according to the in-
ventions.

It is possible to visualise that the opposing surfaces 22-
I22 are rounded or crown-shaped; it can be envisaged that the
sliding surfaces 3I between the body 2I8 and body 2I7 may
10 possibly have a special shape, and so forth.

These and other variants are all possible for a technician
in this field.

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1. C L A I M S

I. Means to clamp inserts in rotating tools, and advantageously in rotating tools employed in the processing of wood, plastics or light metals, whereby said rotating tools travel at a very high speed and the inserts (23) can be re-used and readily replaced, said clamping means being characterised by the fact that in the tool holder (10) there is envisaged a plurality of housing spaces (II) which have the shape substantially of a truncated cone and which widen towards the middle of the tool holder (10), whereby a seating (14) for a tool is positioned at the side of said housing space (II) and a clamping body (17) is located in said housing (II) and cooperates with at least one resisting block (18), and whereby at least the resisting block (18) cooperates with a regulating screw (19) able to exert on said resisting block (18) and on said clamping body (17) a lateral thrust such as will constrain said resisting block (18) against the opposing wall (12) of said housing (II) and will constrain said clamping body (17) against said insert (23) and substantially towards the middle of said tool holder (10).

2. Means to clamp inserts in rotating tools as in Claim I, characterised by the fact that the conformation of the housing spaces (II) substantially like a truncated cone has the effect that, as the wall (16) supporting the insert (23) is positioned substantially parallel to a plane passing through the axis of the tool holder (10), the opposing wall (12) cuts said plane in a position a great deal above the middle of the tool holder (10).

3. Means to clamp inserts in rotating tools as in Claim I or 2, characterised by the fact that the clamping body (17) comprises lengthwise hollow means (32) substantially normal to the opposing wall (12) and having two opposing surfaces (22) disposed as counterparts of each other.

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4. Means to clamp inserts in rotating tools as in Claim .
I or in one or the other of the Claims thereafter, character-
ised by the fact that two resisting blocks (I8) cooperate .
in the lengthwise hollow (32) comprised in the clamping body
5. (I7) with opposing surfaces (I22) and with a regulating sc-
rew (I9) having a righthand and a lefthand thread.

5. Means to clamp inserts in rotating tools as in Claim .
I or in one or another of the Claims thereafter, character-
ised by the fact that the clamping body (I7) cooperates with
10. safety pin means (27), whereby said means (27) anchor the .
regulating screw (I9) and advantageously protrude elastical-
ly into the lower part of said clamping body (I7) so as to .
cooperate with the bottom of the housing space (II).

6. Means to clamp inserts in rotating tools as in Claim .
I and in one or another of the Claims thereafter, character-
ised by the fact that the safety pin means (27) cooperate .
with anchorage ring means (20) located on the regulating .
screw means (I9).

7. Means to clamp inserts in rotating tools as in Claim .
I and in one or another of the Claims thereafter, character-
ised by the fact that the regulating screw means (I9) coop-
erate at their side with hollow means providing lengthwise .
anchorage (2I) comprised in the clamping body (I7).

8. Means to clamp inserts in rotating tools as in Claim .
I and in one or another of the Claims thereafter, character-
ised by the fact that the resisting block means (2I8) are .
one in number and cooperate in a lateral and higher position
with clamping body means (II7) by means of regulating screw
means (I9) and with sliding and facing sides (3I)(Figs.5 &
30. 6).

9. Means to clamp inserts in rotating tools as in Claim .
I and in one or another of the Claims thereafter, character-
ised by the fact that the resisting block means (3I8) com-

prise two sides (A - B) having a hollow between them (29) .
and bound together by screw means (219) and having oblique .
sides (131) cooperating wedge-wise with the clamping body .
(217)(Figs.7 & 8).

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