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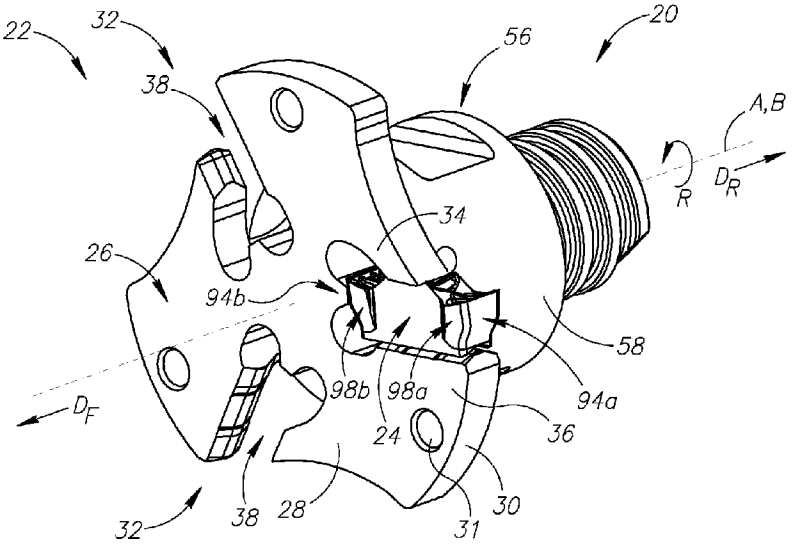

(57) Abrégé/Abstract:
A slotting tool body (22) includes a disc-like cutter portion (26) and a shank portion (56) projecting rearwardly therefrom. The cutter portion (26) includes a resilient clamping portion (32) having a peripherally disposed insert receiving slot (38). The shank portion (56) includes a peripherally disposed forward shank recess (60) that is axially adjacent the cutter portion (26). A radially inward portion of the insert receiving slot (38) merges in the rearward direction with the forward shank recess (60). A cutting insert (24) is releasably and resiliently clamped in the insert receiving slot (38) to form a rotary slot cutting tool (20). The cutting insert (24) includes two cutting portions (94a, 94b) that each include a long and short insert lateral extension (98a, 98b), the long insert lateral extension (98a) being longer than the short insert lateral extension (98b). The longest insert lateral extensions (98a) are located on opposite sides of the cutting insert (24).

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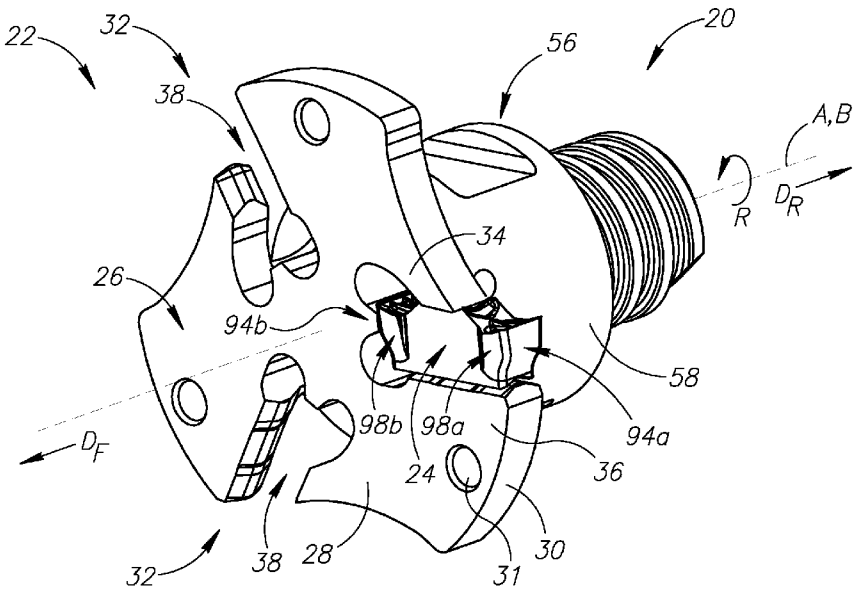

(57) Abstract: A slotting tool body (22) includes a disc-like cutter portion (26) and a shank portion (56) projecting rearwardly therefrom. The cutter portion (26) includes a resilient clamping portion (32) having a peripherally disposed insert receiving slot (38). The shank portion (56) includes a peripherally disposed forward shank recess (60) that is axially adjacent the cutter portion (26). A radially inward portion of the insert receiving slot (38) merges in the rearward direction with the forward shank recess (60). A cutting insert (24) is releasably and resiliently clamped in the insert receiving slot (38) to form a rotary slot cutting tool (20). The cutting insert (24) includes two cutting portions (94a, 94b) that each include a long and short insert lateral extension (98a, 98b), the long insert lateral extension (98a) being longer than the short insert lateral extension (98b). The longest insert lateral extensions (98a) are located on opposite sides

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of the cutting insert (24).

SLOTTING TOOL BODY HAVING INWARDLY OFFSET INSERT RECEIVING SLOT, ROTARY SLOT CUTTING TOOL HAVING SAME AND CUTTING INSERT

FIELD OF THE INVENTION

The subject matter of the present application relates to rotary slot cutting tools having a slotting tool body with a disc-like cutter portion having a plurality of circumferentially disposed insert receiving pockets, for releasably retaining a cutting insert therein, in general, and to such slotting tool bodies where the insert receiving pocket resiliently clamps the cutting insert therein, in particular.

BACKGROUND OF THE INVENTION

Rotary slot cutting tools can have a slotting tool body that has a disc-like cutter portion and a shank portion that extends perpendicular to the disc-like cutter portion. The disc-like cutter portion can be provided with a plurality of circumferentially disposed insert receiving pockets for retaining a cutting insert therein. The cutting insert can be retained in the insert receiving pocket by a retaining screw. Examples of such rotary cutting tools are disclosed in, for example, US 6,571,451 and US 8,834,075.

In other rotary slotting cutting tools, the cutting insert can be retained in the insert receiving pocket by a resilient clamping member. Examples of such rotary cutting tools are disclosed in, for example, US 6,116,823 and US 8,708,610, where the cutting inserts are single ended. Alternatively, the cutting insert can also be double-ended as shown in US 5,059,068.

In yet other rotary slotting cutting tools, in particular for internal grooving in small holes it can be preferable to use disc shaped solid carbide slotting heads having a plurality of cutting edges. Examples of such rotary cutting tools are disclosed in, for example, US 6,276,879 and US 8,708,611. However, such slotting heads are relatively expensive to manufacture and if one cutting edges is damaged the entire slotting head needs to be replaced.

SUMMARY OF THE INVENTION

In accordance with a first aspect of the subject matter of the present application there is provided a slotting tool body, having a body central axis that defines opposite forward and rearward directions and about which the slotting tool body is rotatable in a rotational direction, the slotting tool body comprising:

a disc-like cutter portion comprising a resilient clamping portion having a peripherally disposed insert receiving slot; and

a shank portion projecting rearwardly from the cutter portion, the shank portion comprising a shank peripheral surface which extends circumferentially about the body central axis and a forward shank recess recessed in, and opening out to, the shank peripheral surface adjacent to the cutter portion; wherein:

a radially inward portion of the insert receiving slot merges in the rearward direction with the forward shank recess.

In accordance with a second aspect of the subject matter of the present application there is provided a rotary slot cutting tool comprising:

a slotting tool body of the type described above; and

a cutting insert, releasably and resiliently clamped in the insert receiving slot.

In accordance with a third aspect of the subject matter of the present application there is provided a cutting insert, longitudinally elongated in a direction defining an insert longitudinal axis, comprising:

opposing insert upper and lower surfaces and an insert peripheral surface extending therebetween, the insert peripheral surface comprising two opposing insert end surfaces connecting the insert upper and lower surfaces and two opposing insert side surfaces also connecting the insert upper and lower surfaces;

an insert longitudinal plane containing the insert longitudinal axis, passing between the insert side surfaces, and intersecting the insert upper and lower surfaces and also intersecting the opposite insert end surfaces; and

two cutting portions located at opposite ends of the cutting insert, each comprising a cutting edge formed at the intersection of the insert upper surface and one of the two insert end surfaces; wherein:

each insert cutting portion comprises two insert lateral extensions which project laterally from opposite sides of the cutting insert in a direction away from the insert longitudinal plane, and upon which the cutting edge extends;

the two insert lateral extensions comprise a wide and narrow insert lateral extension, the wide insert lateral extension being longer than the narrow insert lateral extension in a direction perpendicular to the insert longitudinal plane; and

the wide insert lateral extensions are located on opposite sides of the insert longitudinal plane.

In accordance with a fourth aspect of the subject matter of the present application there is provided a slotting tool body, having a body central axis that defines opposite forward and rearward directions and about which the slotting tool body is rotatable in a rotational direction, the slotting tool body comprising:

a disc-like cutter portion comprising a resilient clamping portion having a peripherally disposed insert receiving slot; and

a shank portion projecting rearwardly from the cutter portion, the shank portion comprising a shank peripheral surface which extends circumferentially about the body central axis and a forward shank recess recessed in, and opening out to, the shank peripheral surface adjacent to the cutter portion; wherein:

in a forward view of the slotting tool body, in a direction along the body central axis, the shank portion is partially visible through the insert receiving slot.

It is understood that the above-said is a summary, and that features described hereinafter may be applicable in any combination to the subject matter of the present application, for example, any of the following features may be applicable to the slotting tool body and the rotary slot cutting tool and the cutting insert:

The cutter portion and the shank portion can be integrally formed so that the slotting tool body has a unitary, one-piece construction.

The clamping portion can further comprise a resilient clamping member and a lower jaw member which oppose each other and are spaced apart from one another by the insert receiving slot, the resilient clamping member being arranged rotationally ahead of the lower jaw member and configured to resiliently retain a cutting insert in the insert receiving slot.

The resilient clamping member can be axially adjacent the forward shank recess.

The shank portion can comprise a peripherally disposed non-recessed forward shank portion that can be circumferentially adjacent the forward shank recess and axially adjacent the cutter portion.

The cutter portion can further comprise at least one additional resilient clamping portion to form a plurality of clamping portions that are angularly spaced apart from each other. The shank portion can further comprise at least one additional forward shank recess to form a plurality of forward shank recesses that are angularly spaced apart from each other. The shank portion can further comprise at least one additional non-recessed forward shank portion to form a plurality of non-recessed forward shank portions that are angularly spaced apart from each other, each non-recessed forward shank portion being located between two circumferentially adjacent forward shank recesses. A radially inward portion of each insert receiving slot can merge in the rearward direction a respective forward shank recess.

In a direction along the body central axis;

an imaginary radius line extending between the body central axis and a furthest portion on the non-recessed forward shank portion defines a shank portion radius of a shank portion circle that is centered at the body central axis and that has a shank portion diameter; and

the cutter portion defines a circumscribed cutter portion circle that is centered at the body central axis and that has a cutter portion diameter.

In a direction along the body central axis, the shank portion circle can intersect the insert receiving slot.

The insert receiving slot can be defined by an elongated slot peripheral surface comprising a slot lower jaw abutment surface located on the lower jaw member. In a direction along the body central axis, the shank portion circle intersects the slot lower jaw abutment surface.

The slot peripheral surface can further comprise a slot clamping member abutment surface located on the resilient clamping member. In a direction along the body central axis, the slot clamping member abutment surface can be located radially outside the shank portion circle.

The slot peripheral surface can further comprise a slot radial stop surface located circumferentially between the slot clamping member abutment surface and the slot lower jaw

abutment surface. In a direction along the body central axis, the slot radial stop surface can be located radially inside the shank portion circle.

The forward shank recess can further comprise a peripherally disposed recess outer gap defined by a forwardly facing recess outer base surface and a recess outer peripheral surface extending transversely thereto, the recess outer base surface and each end of the recess outer peripheral surface intersecting the shank peripheral surface.

The forward shank recess can comprise a recess inner gap defined by a forwardly facing recess inner base surface and a recess inner peripheral surface extending transversely thereto. The recess inner base surface can intersect the recess outer peripheral surface. Each end of the recess inner peripheral surface can intersect the recess outer peripheral surface.

The recess outer gap can be formed by a circumferential groove that extends in the circumferential direction.

In a direction along the body central axis, the recess outer peripheral surface can be concavely curved and defined by a recess outer peripheral radius.

In a side view of the slotting tool body, the recess outer peripheral surface can be concavely curved and defined by a peripheral side radius.

The cutting insert can be longitudinally elongated in a direction defining an insert longitudinal axis, the cutting insert can comprise:

opposing insert upper and lower surfaces and an insert peripheral surface extending therebetween, the insert peripheral surface comprising two opposing insert end surfaces connecting the insert upper and lower surfaces and two opposing insert side surfaces also connecting the insert upper and lower surfaces;

an insert longitudinal plane containing the insert longitudinal axis, passing between the insert side surfaces, and intersecting the insert upper and lower surfaces and also intersecting the opposite insert end surfaces; and

a cutting portion located at one end of the cutting insert, the cutting portion comprising a cutting edge formed at the intersection of the insert upper surface and one of the two insert end surfaces; wherein:

the insert end surface opposite the cutting portion comprises an insert recessed portion comprising an insert key surface which is closer to the insert lower surface than to the insert upper surface, the insert key surface being

configured for abutment by a displacement prong of a key used for extracting the cutting insert from the insert receiving slot.

In a side view of the cutting insert, the insert key surface can be concavely curved.

The insert key surface can be located entirely below an insert median plane that extends midway between the insert upper and lower surfaces and contains the insert longitudinal axis.

The insert end surface opposite the cutting portion can further comprise an insert stop surface which can be closer to the insert upper surface than to insert lower surface, the insert stop surface being planar.

The cutting insert can comprise an additional cutting portion forming two cutting portions, the two cutting portions being formed at opposite ends of the cutting insert.

Each insert cutting portion can comprise two insert lateral extensions which project laterally from opposite sides of the cutting insert in a direction away from the insert longitudinal plane, and upon which the cutting edge extends. The two insert lateral extensions can comprise a wide and a narrow insert lateral extension, the wide insert lateral extension being longer than the narrow insert lateral extension in a direction perpendicular to the insert longitudinal plane. The wide insert lateral extensions can be located on opposite sides of the insert longitudinal plane.

The two cutting portions can comprise an active cutting portion and a non-active cutting portion, the cutting edge of the active cutting portion being located beyond the radial extent of the cutter portion. The wide insert lateral extension of the active cutting portion can be the axially forwardmost of the two insert lateral extensions with respect to the axial direction.

The insert receiving slot can comprise a slot insert portion defined by an insert profile of the cutting insert in a direction along the body central axis. A radially inward portion of the slot insert portion can merge in the rearward direction with the forward shank recess.

BRIEF DESCRIPTION OF THE FIGURES

For a better understanding of the present application and to show how the same may be carried out in practice, reference will now be made to the accompanying drawings, in which:

Fig. 1 is a forward perspective view of a rotary slot cutting tool, with a cutting insert resiliently clamped in an insert receiving slot, in accordance with the present application;

Fig. 2 is an exploded rearward perspective view of the rotary slot cutting tool shown in Fig. 1;

Fig. 3 is a forward view of a slotting tool body in Fig. 1;

Fig. 4 is a side view of the slotting tool body shown in Fig. 3;

Fig. 5 is a side view of a clamping portion in Fig. 3, with an insert profile superimposed;

Fig. 6 is a front view of the clamping portion in Fig. 5, taken along the direction line "VI";

Fig. 7 is a perspective view of a cutting insert, in accordance with the present application;

Fig. 8 is a side view of the cutting insert shown in Fig. 7;

Fig. 9 is a top view of the cutting insert shown in Figs. 7 and 8; and

Fig. 10 is an analogous view shown in Fig. 1, prior to extraction of the cutting insert from the insert receiving slot with a key.

It will be appreciated that for simplicity and clarity of illustration, elements shown in the figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements may be exaggerated relative to other elements for clarity, or several physical components may be included in one functional block or element. Further, where considered appropriate, reference numerals may be repeated among the figures to indicate corresponding or analogous elements.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, various aspects of the subject matter of the present application will be described. For purposes of explanation, specific configurations and details are set forth in sufficient detail to provide a thorough understanding of the subject matter of the present application. However, it will also be apparent to one skilled in the art that the subject

matter of the present application can be practiced without the specific configurations and details presented herein.

Attention is first drawn to Figs. 1 and 2, showing a rotary slot cutting tool **20**, depicting an aspect of the present application, having a tool central axis **A**, suitable for slotting cutting operations. The rotary slot cutting tool **20** may exhibit rotational symmetry about the tool central axis **A**. The rotary slot cutting tool **20** has a slotting tool body **22** which can be typically made from steel. The rotary slot cutting tool **20** has a cutting insert **24** which can be typically made from cemented carbide. The cutting insert **24** is releasably attached to the slotting tool body **22.**

It is noted that the term "rotary slot cutting tool" as used herein may be replaced with other terms applicable in the metal cutting field for such cutting tools, for example, "slotting cutter", "slot milling cutter", "slitting cutter", "grooving cutter", "slot mill cutter", "groove milling cutter", "side milling cutter", "disc milling cutter", and the like.

Reference is now made also to Figs. 3 and 4, showing another aspect of the subject matter of the present application, relating to the slotting tool body **22.** The slotting tool body **22** has a body central axis **B** that is co-incident with the tool central axis **A**. The body central axis **B** defines opposite forward and rearward directions $\mathbf{D_F}$, $\mathbf{D_R}$. The body central axis **B** forms an axis of rotation about which the slotting tool body **22** is rotatable in a rotational direction **R**.

It should be appreciated that use of the terms "forward" and "rearward" throughout the description and claims refer to a relative position in a direction of the body central axis **B** downwardly and upwardly, respectively, in Fig. 4. Moreover, the terms "axial" and "radial" are with respect to the tool central axis **B**, unless specified otherwise.

As shown in Fig. 3, the slotting tool body **22** includes a disc-like cutter portion **26**. The cutter portion **26** includes two opposing cutter portion side surfaces **28** and a cutter portion peripheral surface **30** that extends between the cutter portion side surfaces **28**. The cutter portion peripheral surface **30** extends circumferentially about the body central axis **B**. The body central axis **B** intersects the two cutter portion side surfaces **28** at a central portion thereof. In a forward view of the slotting tool body **22**, in a direction along the body central axis **B** (i.e. Fig. 3), the cutter portion **26** defines a circumscribed cutter portion circle **CC** that is centered at the body central axis **B** and that has a cutter portion diameter **DC**.

As shown in Fig, 4, in the axial direction, measured between the two cutter portion side surfaces **28**, the cutter portion **26** has a cutter portion width **WC**. In accordance with some

embodiments of the subject matter of the present application, the two cutter portion side surfaces **28** can be planar and perpendicular to the body central axis **B**. The cutter portion **26** can include a pivot prong hole **31**, for receiving a pivot prong **51b** of a key **52** when detaching the cutting insert **24** from the cutter portion **26**, as discussed later in the description.

The cutter portion **26** includes a clamping portion **32**. In accordance with some embodiments of the subject matter of the present application, the cutter portion **26** can further include at least one additional clamping portion **32** to form a plurality of clamping portions **32** that are angularly spaced apart from each other. It is understood in the following description that any feature that relates to a single clamping portion **32** can also relate to the other clamping portions **32** if present. The plurality of clamping portions **32** can be arranged at the same axial position along the body central axis **B** in the forward-to-rearward direction. Each clamping portion **32** can have a chip gullet **33** at the cutter portion peripheral surface **30**, so that the cutter portion **26** may not be completely circular in a forward view.

The clamping portion **32** includes a resilient clamping member **34** and a lower jaw member **36** which are opposite each other and spaced apart from one another by an insert receiving slot **38**. That is to say, the insert receiving slot **38** is formed between the resilient clamping member **34** and the lower jaw member **36**. The insert receiving slot **38** extends along an insert receiving slot axis **C**, such that in a forward view of the slotting tool body **22**, the resilient clamping member **34** and the lower jaw member **36** are located on opposite sides of the insert receiving slot axis **C**. The resilient clamping member **34** is arranged rotationally ahead of the lower jaw member **36** and the insert receiving slot **38**. The resilient clamping member **34** is configured to resiliently retain the cutting insert **24** in the insert receiving slot **38**. The resilient clamping member **34** is resiliently displaceable relative to the lower jaw member **36**. In other words, the clamping portion **32** is resilient. It is noted that the clamping portion **32** is devoid of a resilience slot located rotationally forward of the resilient clamping member **34** as disclosed in US 6,116,823 and US 8,388,270.

Reference is further made to Fig. 5, showing a side view of the clamping portion **32** (i.e. perpendicular to the insert receiving slot axis **C**), the insert receiving slot **38** opens out to the cutter portion peripheral surface **30**. Thus, the insert receiving slot **38** is peripherally disposed. Reverting to Fig. 4, the insert receiving slot **38** opens out laterally on both sides to the cutter portion side surfaces **28**. It is understood the context of "laterally" in reference to the insert

receiving slot 38 means perpendicular to the insert receiving slot axis **C**, and thus generally in a direction parallel to the body central axis **B**.

The insert receiving slot 38 is defined by an elongated slot peripheral surface **40** having ends that extend to the cutter portion peripheral surface **30**. The slot peripheral surface **40** extends between the two cutter portion side surfaces **28**. The slot peripheral surface **40** includes a slot clamping member abutment surface **42** located on the resilient clamping member 34, for abutting a corresponding surface on the cutting insert 24. The slot peripheral surface **40** includes a slot lower jaw abutment surface **44** located on the lower jaw member 36, for abutting a corresponding surface on the cutting insert 24. The slot peripheral surface **40** includes a slot radial stop surface **46**, for positioning the cutting insert **24** in an exact predetermined radial position. The slot radial stop surface **46** faces radially outwardly. In accordance with some embodiments of the subject matter of the present application, slot radial stop surface **46** can be located circumferentially between the slot clamping member abutment surface **42** and the slot lower jaw abutment surface **44**.

Referring to Fig. 5, the insert receiving slot 38 includes a slot insert portion **48** defined by an insert profile **IP** of the cutting insert **24** in a direction along the body central axis **B** when releasably and resiliently clamped in the insert receiving slot 38. The insert receiving slot 38 includes a slot key portion **50** extending radially inwardly from the insert receiving slot 38. One purpose of the slot key portion **50** is to act as a stress relief groove (as is known in the art). However, the slot key portion **50** has a larger dimension than normal stress relief grooves so that it can also serve to receive a displacement prong **51a** of the key **52** when extracting the cutting insert **24** from the insert receiving slot 38. Moreover, the slot key portion **50** is positioned further rotationally forward than would be normally required if its purpose was only as a stress relief groove. For example, the majority of the insert key portion **50** is located above an extension of the slot lower jaw abutment surface **44**. This allows the displacement prong **51a** to be able to abut an end of the cutting insert **24**, while being located in the slot key portion **50**. The insert receiving slot 38 includes a slot resilience portion **54**, for providing the desired resilience to the resilient clamping member 34. The slot resilience portion **54** is located rotationally forward from the slot key portion **50**.

Referring to Figs. 2 and 4, the slotting tool body **22** includes a shank portion **56** that projects from the rearmost one of the cutter portion side surfaces **28**. That is to say, the shank

portion **56** projects rearwardly from the cutter portion **26**. The shank portion **56** includes a shank peripheral surface **58** which extends circumferentially about the body central axis **B**. In accordance with some embodiments of the subject matter of the present application, the shank portion **56** can be integrally formed with the cutter portion **26** so that the slotting tool body **22** has a unitary, one-piece construction. i.e., the shank portion **56** and the cutter portion **26** are formed (e.g., machined) from a single continuous piece of material. The shank portion **56** can have a cylindrical basic shape. As seen in Fig. 4, the shank peripheral surface **58** can intersect the cutter side surface **28** at a shank fillet surface **59** that has a concave curvature. Said concave curvature can have a shank fillet radius **RF** that is greater or equal to 1 mm and less than or equal to 2 mm.

Reverting back to Figs. 4 and 6, the shank portion **56** includes a forward shank recess **60** that is recessed in, and opens out to, the shank peripheral surface **58**. That is to say, the forward shank recess **60** is peripherally disposed, and is radially recessed in the shank peripheral surface **58** proximate a forward end thereof. The forward shank recess **60** is axially adjacent the cutter portion **26**. In accordance with some embodiments of the subject matter of the present application, the shank portion **56** can further include at least one additional forward shank recess **60** to form a plurality of forward shank recesses **60** that are angularly spaced apart from each other. It is understood in the following description that any feature that relates to a single forward shank recess **60** can also relate to the other forward shank recesses **60** if present.

In accordance with some embodiments of the subject matter of the present application, shank portion **56** can include a non-recessed forward shank portion **62** formed by a part of the shank peripheral surface **58** that is non-recessed. Like the forward shank recess **60**, the non-recessed forward shank portion **62** is peripherally disposed. The non-recessed forward shank portion **62** can be circumferentially adjacent the forward shank recess **60** and axially adjacent the cutter portion **26**. Thus, the forward shank recess **60** may not extend around the full circumferential extent of the shank portion **56** (i.e. may not have an angular extent of 360°). In a similar manner to the forward shank recess **60**, in accordance with some embodiments of the subject matter of the present application, the shank portion **56** can further include at least one additional non-recessed forward shank portion **62** to form a plurality of non-recessed forward shank portions **62** that are angularly spaced apart from each other. The number of non-recessed forward shank portions **62** can match the number of forward shank recesses **60**. Each non-

recessed forward shank portion **62** can be located between two circumferentially adjacent forward shank recesses **60**. That is to say, the forward shank recess **60** and the non-recessed forward shank portion **62** can alternate in a circumferential direction. It is understood in the foregoing description that any feature that relates to a single non-recessed forward shank portion **62** also relates to the other non-recessed forward shank portions **62** if present.

As seen in Fig. 3, in a direction along the body central axis **B**, an imaginary radius line that extends between the body central axis **B** and a furthest portion on the non-recessed forward shank portion **62** defines a shank portion radius **RS** of a shank portion circle **CS** that is centered at the body central axis **B** and that has a shank portion diameter **DS**. In the configuration with the plurality of non-recessed forward shank portions **62**, the shank portion circle **CS** is a circumscribed circle defined by the plurality of non-recessed forward shank portions **62**. It is noted that if the shank peripheral surface **58** has a fillet, as described above, the shank portion diameter **DS** can be different (e.g. greater) than the diameter of a circumscribed circle (not shown) defined by the shank portion **56** taken at a further rearward axial position.

In accordance with some embodiments of the subject matter of the present application, the resilient clamping member **34** can be axially adjacent the forward shank recess **60**. That is to say, the free end of the resilient clamping member **34** is not connected to any part of the shank portion **56**. As seen in Fig. 2, a rearward facing surface **34a** of the clamping member **34** faces the forward shank recess **60**. At the forward shank recess **60**, the resilient clamping member **34** is circumferentially cantilevered in a direction opposite the direction of rotation R, relative to a rotationally forward non-recessed forward shank portion **62**. Advantageously, this allows the resilient clamping member to **34** to bend slightly when the cutting insert **24** encounters the work piece (along with the lower jaw member **36** and the cutting insert **24**) in order to maintain a firm clamping force on the cutting insert **24**. A radially inward portion of the lower jaw member **36** can be connected to the non-recessed forward shank portion **62**.

Referring back to Fig. 5, in accordance with some embodiments of the subject matter of the present application, the forward shank recess **60** can include a recess outer gap **64** that is defined by a forwardly facing recess outer base surface **66** and a recess outer peripheral surface **68** that extends transversely to the recess outer base surface **66**. The recess outer base surface **66** and each end of the recess outer peripheral surface **68** can intersect the shank peripheral surface **58**. Thus, the recess outer gap **64** is peripherally disposed. The ends of the recess outer

peripheral surface **68** intersect with the shank peripheral surface **58** at two peripheral intersections **72** that subtend a recess outer gap angle **δ** (indicated in Fig. 3) at the body central axis **B**. The recess outer gap angle **δ** can be in the range $60° \leq \delta \leq 80°$. The recess outer gap **64** can be formed by a circumferential groove that can extend in the circumferential direction. In a direction along the body central axis **B**, the recess outer peripheral surface **68** can be concavely curved and can be defined by a recess outer peripheral radius **RO**. In a side view of the slotting tool body **22** (perpendicular to the body central axis **B**), the recess outer peripheral surface **68** can be concavely curved and can be defined by a peripheral side radius **RS**. As seen in Fig. 6, showing a front view of the clamping portion **32** along the insert receiving slot axis **C**, in the axial direction, the recess outer gap **64** has a recess outer gap width **WO**, measured between the cutter portion **26** and the recess outer base surface **66**. The recess outer gap width **WO** can be generally twice the peripheral side radius **RS**.

In accordance with some embodiments of the subject matter of the present application, the forward shank recess **60** can include a recess inner gap **74** that is defined by a forwardly facing recess inner base surface **76** and a recess inner peripheral surface **78** that extends transversely to the recess inner base surface **76**. The recess inner base surface **76** can intersect the recess outer peripheral surface **68**. Each end of the recess inner peripheral surface **78** can intersect the recess outer peripheral surface **68**. Generally speaking, the recess inner gap **74** is radially inward from the recess outer gap **64**. The slot peripheral surface **40** at the slot key portion **50** and the slot resilience portion **54** can each transition uniformly and continuously into the recess inner peripheral surface **78**. Likewise, the slot radial stop surface **46** can transition uniformly and continuously into the recess inner peripheral surface **78**. Thus, in a direction along the body central axis **B**, the slot peripheral surface **40** at the slot key portion **50** and the slot resilience portion **54** and the slot radial stop surface **46** can be aligned with the recess inner peripheral surface **78**. As seen in Fig. 6, in the axial direction, the recess inner gap **74** has a recess inner gap width **WI**, measured between the cutter portion **26** and the recess inner base surface **76.**

In accordance with some embodiments of the subject matter of the present application, the recess outer gap width **WO** can be greater or equal 1 mm and less than or equal to 2 mm ($1 \text{ mm} \leq \mathbf{WO} \leq 2 \text{ mm}$). The recess inner gap width **WI** can be less than the recess outer gap width **WO** (**WI** < **WO**). That is to say, the recess inner gap **74** can be narrower than the recess

outer gap **64** in the axial direction. The recess outer gap width **WO** can be less than the cutter portion width **WC** (**WO** < **WC**). That is to say, the recess outer gap **64** can be narrower than the cutter portion **26** in the axial direction.

A radially inward portion of the insert receiving slot **38** merges laterally on one side (i.e. the side of the insert receiving slot **38** that opens out to the rearmost one of the two cutter portion side surfaces **28**, i.e., in the rearward direction $\mathbf{D_R}$) with the forward shank recess **60**. Thus, the insert receiving slot **38** is inwardly offset. Clearly, in the configuration with the plurality of clamping portions **32** and plurality of forward shank recesses **60**, the radially inward portion of each insert receiving slot **38** merges in the rearward direction $\mathbf{D_R}$ with a respective forward shank recess **60**. In a forward view of the slotting tool body **22**, in a direction along the body central axis **B**, the shank portion **56** is partially visible. More specifically, the shank portion **56** is partially visible through the slot insert portion **48**. Thus, when the cutting insert **24** is releasably and resiliently clamped in the insert receiving slot **38**, the forward shank recess **60** is partially hidden.

In accordance with some embodiments of the subject matter of the present application, in a direction along the body central axis **B**, the shank portion circle **CS** can intersect the insert receiving slot **38**. In particular, the shank portion circle **CS** can intersect the slot insert portion **48**. Thus, a radially inward portion of the slot insert portion **48** can merge in the rearward direction $\mathbf{D_R}$ with the forward shank recess **60**. Further in particular, the shank portion circle **CS** can intersect the slot lower jaw abutment surface **44**. The slot clamping member abutment surface **42** can be located radially outside the shank portion circle **CS**. The slot radial stop surface **46** can be located radially inside the shank portion circle **CS**. The slot key and resilience portions **50, 54** can be located radially inside the shank portion circle **CS**.

Referring to Figs. 2 and 6, in accordance with some embodiments of the subject matter of the present application, the shank portion **56** can include a shank coolant channel **80** that opens out to the shank peripheral surface **58** at a coolant channel exit **82**. The coolant channel exit **82** can intersect the forward shank recess **60**.

Reference is now made to Figs. 7 to 9, showing another aspect of the subject matter of the present application, relating to the cutting insert **24**. The cutting insert **24** is longitudinally elongated in a direction that defines an insert longitudinal axis **A**. The cutting insert **24** includes opposing insert upper and lower surfaces **84, 86** and an insert peripheral surface **88** that

extends therebetween. The insert upper and lower surfaces **84, 86** include insert upper and lower abutment surfaces **84a, 86a**, respectively, for abutment with corresponding surfaces on the insert receiving slot **38**. In accordance with some embodiments of the subject matter of the present application, the insert lower surface **86** can contain a linear insert imaginary line **L** parallel to the insert longitudinal axis **A**. The insert upper and/or lower abutment surfaces **84a, 86a** can have a prismatic shape that matches a shape of the slot clamping member abutment surface **42** and/or slot lower jaw abutment surface **44**, respectively, in order to prevent displacement of the cutting insert **24** in the lateral direction of the cutting insert **24**.

The insert peripheral surface **88** includes two opposing insert end surfaces **90** that connect the insert upper and lower surfaces **84, 86**. The insert peripheral surface **88** includes two opposing insert side surfaces **92** that connect the insert upper and lower surfaces **84, 86**. The insert longitudinal axis **A** intersects the insert end surfaces **90** and extends between the insert side surfaces **92** (Fig. 9) and also extends between insert upper and lower surfaces **84, 86** (Fig. 8). An insert lateral axis **E** extends perpendicular to the insert longitudinal axis **A** midway between the insert end surfaces **90** and intersects the two insert side surfaces **92**, defining an insert lateral direction of the cutting insert **24**. An insert central axis **F** extends perpendicular to the insert longitudinal axis **A** midway between the insert end surfaces **90** and intersects the insert upper and lower surfaces **84, 86**. An insert median plane **M** contains the insert longitudinal axis **A** and the insert lateral axis **E**.

As seen in Fig. 9, the insert longitudinal axis **A** lays on an insert longitudinal plane **P1** which contains the insert central axis **F**, passes midway between the insert side surface **92**, and intersects both end surfaces **90**. An insert central plane **P2** perpendicular to the insert longitudinal plane **P1** and also to the insert longitudinal axis **A**, contains the insert central axis **F** and the insert lateral axis **E**. In accordance with some embodiments of the subject matter of the present application, the cutting insert **24** can have 180° rotational symmetry about the insert central axis **F**. The cutting insert **24** may not be mirror symmetrical about the insert central plane **P2** nor the insert longitudinal plane **P1**.

The cutting insert **24** includes a cutting portion **94a** located at one end of the cutting insert **24**. In accordance with some embodiments of the subject matter of the present application, the cutting insert **24** can further include one additional cutting portion **94b** to form two cutting portions **94a, 94b**, an active and a non-active cutting portion **94a, 94b**. The two

cutting portions **94a, 94b** are located at opposite ends of the cutting insert **24**. Stated differently, the cutting insert **24** is double-ended and can be indexed by 180° rotation about the insert central axis **F** (i.e. the active cutting portion **94a** becomes the non-active cutting portion **94b** and vice versa). The two cutting portions **94a, 94b** can be identical. It is understood in the following description that any feature that relates to a single cutting portion **94a** can also relate to the other cutting portion **94b** if present.

The cutting portion **94a** includes a cutting edge **96** formed at the intersection of the insert upper surface **84** and one of the two insert end surfaces **90**. A portion of the insert end surface **90** adjacent the cutting edge **96** serves as a relief surface. Likewise, a portion of the insert upper surface **84** adjacent the cutting edge **96** serves as a rake surface. When the cutting insert **24** is releasably and resiliently clamped in the insert receiving slot **38**, the cutting edge **96** of the active cutting portion **94a** is located beyond the radial projection of the cutter portion **26** (i.e. beyond the circumscribed cutter portion circle **CC**). Preferably, such radial projection is no more than 1 mm. As seen in Fig. 9, the insert longitudinal plane **P1** intersects the cutting edge **96**, that is, the cutting edge **96** extends on both sides of the insert longitudinal plane **P1**.

Each insert side surface **92** bulges outwardly at the cutting portion **94a**. That is to say, the cutting portion **94a** includes two insert lateral extensions **98a, 98b** which project laterally in a direction away from the insert longitudinal plane **P1** (i.e. perpendicular to the insert longitudinal plane **P1**), from opposite sides of the cutting insert **24**. The cutting edge **96** extends onto the two insert lateral extensions **98a, 98b**. In accordance with some embodiments of the subject matter of the present application, the two insert lateral extensions **98a, 98b** can include a wide insert lateral extension **98a** and a narrow insert lateral extension **98b**, the width being measured in a direction perpendicular to the insert longitudinal plane **P1**. As seen in a top view of the cutting insert **24** (i.e. Fig. 9), measured in the lateral direction with respect to a non-bulging portion of the insert side surface **92**, the wide insert lateral extension **98a** has a wide extension width **WW** and the narrow insert lateral extension **98b** has a narrow extension width **WN**, where the wide extension width **WW** can be greater than narrow extension width **WN**. Thus, the wide insert lateral extension **98a** is longer than the narrow insert lateral extension **98b** in the insert lateral direction, i.e., in the direction perpendicular to the insert longitudinal plane **P1**. Thus, the wide and narrow insert lateral extensions **98a, 98b** are not identical. The wide insert lateral extension **98a** can be longer than the narrow insert lateral

extension **98b** by between 1 mm and 2 mm, in the direction perpendicular to the insert longitudinal plane **P1**. When there are two cutting portions **94a, 94b** at opposite ends **90** of the cutting insert **24**, the wide insert lateral extension **98a** can be located on opposite sides of the insert longitudinal plane **P1**. As seen in Fig. 1, the wide insert lateral extension **98a** of the active cutting portion **94a** can be the axially forwardmost of the two insert lateral extensions **98a, 98b** with respect to the longitudinal direction of the cutting insert **24**. Advantageously, this allows for face milling since the short insert lateral extension **98b** of the non-active cutting portion **94b** does not interfere with the work piece. When a double-ended cutting insert **24** is retained in an insert receiving slot **38**, the wide lateral extension **98a** belonging to the non-active cutting portion **94b** located at the radially inner portion of the insert receiving slot **38**, protrudes into the forward shank recess **60**. Thus, one function of the forward shank recess **60** is to accommodate, and thus provide clearance for, the inactive lateral extension **98a**.

The insert end surface **90** opposite the cutting portion **94a** includes an insert recessed portion **100** having an insert key surface **102**, configured for abutment with the displacement prong **51a** of the key **52** used for extracting the cutting insert **24** from the insert receiving slot **38**. The insert key surface **102** is closer to the insert lower surface **86** than to the insert upper surface **84**. In accordance with some embodiments of the subject matter of the present application, the insert key surface **102** can be located entirely below the insert median plane **M**. In a side view of the cutting insert **24**, perpendicular to the insert longitudinal axis **A** (i.e. Fig. 8), the insert key surface **102** can be concavely curved. It is understood that a side view of the cutting insert **24** is a view along (i.e., parallel to) the insert lateral axis **E**. Preferably, the insert key surface **102** can be defined by an insert key surface radius **RK**. The insert key surface radius **RK** can be greater than or equal to 0.6 mm and less than or equal to 1.0 mm. Such a configuration ensures smooth transfer of extraction forces from the displacement prong **51a** to the cutting insert **24**.

In accordance with some embodiments of the subject matter of the present application, the insert end surface **90** opposite the cutting portion **94a** can include an insert stop surface **104**, for contact with the slot radial stop surface **46**. The insert stop surface **104** can be closer to the insert upper surface **86** than to insert lower surface **86**. The insert stop surface **104** can be planar. It is understood that in a double-ended cutting insert, such as seen the figures, both

opposite end surfaces **90** are provided with a recessed portion **100** having a key surface **102** and a stop surface **104**.

In the assembled state of the rotary slot cutting tool **20**, the cutting insert **24** is releasably and resiliently clamped in the insert receiving slot **38** by the resilient clamping member **34**. The slot clamping member abutment surface **42** abuts the insert upper abutment surface **84a**. The slot lower jaw abutment surface **44** abuts the insert lower abutment surface **86a**. As is known, the slot clamping member abutment surface **42** and/or the slot lower jaw abutment surface **44** can include two or more spaced apart abutment sub-surfaces and thus each may not literally be a single abutment surface. In this non-limiting example shown in the drawings (e.g. Fig. 5, the slot lower jaw abutment surface **44** includes two longitudinally spaced apart abutment sub-surfaces. The slot radial stop surface **46** abuts the insert stop surface **104**.

To extract the cutting insert **24** from the insert receiving slot **38** the key **52** can be used. The key **52** has two prongs, the displacement prong **51a** and the pivot prong **51b**. Simultaneously, the displacement prong **51a** is inserted into the slot key portion **50** and the pivot prong **51b** is inserted into the pivot prong hole **31**. The key **52** is then pivoted about the pivot prong **51b** so that the displacement prong **51a** urges the cutting insert **24** out of the insert receiving slot **38**, along the insert receiving slot axis **C**.

It is noted that by virtue of the inwardly offset insert receiving slot **38**, the cutter portion diameter **DC** can be reduced without the need to reduce also the shank portion diameter **DS**. This is advantageous for performing internal slotting in a small hole. For example, for cutter portion diameter **DC** less than 30 mm, the cutter portion diameter **DC** can be less than twice the shank portion diameter **DS**. In particular, in a configuration having exactly three clamping portions **32**, exactly three forward shank recesses **60**, and exactly three non-recessed forward shank portions **62**, the cutter portion diameter **DC** can be less than or equal to 20 mm. In such tools, the cutting insert **24** is correspondingly sized. For example, the insert length can be between 6 mm to 7 mm, the insert width can be between 1.5 mm to 2.5 mm and the insert height can be between 2 mm to 3 mm.

It is further noted that, by virtue of the insert receiving slot **38** being inwardly offset, the coolant channel exit **82** is located in the vicinity of the cutting edge **96** of the active cutting portion **94a**.

It is yet further noted that, by virtue of the cutting insert **24** being resiliently clamped in the insert receiving slot **38**, the cutting insert **24** can be devoid of a through hole for a retaining screw. It is yet further noted that by virtue of positioning the insert key surface **102** in the insert recessed portion **100** of the insert end surface **90**, the size of the slot key portion **50** of any given the insert receiving slot **38** can be reduced. This is advantageous in small diameter tools where otherwise the slot key portion **50** would be close enough to adjacent clamping portions **32** to detrimentally affect their clamping abilities.

Although the subject matter of the present application has been described to a certain degree of particularity, it should be understood that various alterations and modifications could be made without departing from the spirit or scope of the invention as hereinafter claimed.

CLAIMS

1. A slotting tool body (22), having a body central axis (B) that defines opposite forward and rearward directions (D_F, D_R) and about which the slotting tool body (22) is rotatable in a rotational direction (R), the slotting tool body (22) comprising:

a disc-like cutter portion (26) comprising a resilient clamping portion (32) having a peripherally disposed insert receiving slot (38); and

a shank portion (56) projecting rearwardly from the cutter portion (26), the shank portion (56) comprising a shank peripheral surface (58) which extends circumferentially about the body central axis (B) and a forward shank recess (60) recessed in, and opening out to, the shank peripheral surface (58) adjacent to the cutter portion (26); wherein:

a radially inward portion of the insert receiving slot (38) merges in the rearward direction (D_R) with the forward shank recess (60).

2. The slotting tool body (22), according to claim 1, wherein the cutter portion (26) and the shank portion (56) are integrally formed so that the slotting tool body (22) has a unitary, one-piece construction.

3. The slotting tool body (22), according to claims 1 or 2, wherein the clamping portion (32) further comprises a resilient clamping member (34) and a lower jaw member (36) which oppose each other and are spaced apart from one another by the insert receiving slot (38), the resilient clamping member (34) being arranged rotationally ahead of the lower jaw member (36) and configured to resiliently retain a cutting insert (24) in the insert receiving slot (38).

4. The slotting tool body (22), according to claim 3, wherein the resilient clamping member (34) is axially adjacent the forward shank recess (60).

5. The slotting tool body (22), according to claims 3 or 4, wherein the shank portion (56) comprises a peripherally disposed non-recessed forward shank portion (62) that is circumferentially adjacent the forward shank recess (60) and axially adjacent the cutter portion (26).

6. The slotting tool body (22), according to claim 5, wherein:

the cutter portion (26) further comprises at least one additional resilient clamping portion (32) to form a plurality of clamping portions (32) that are angularly spaced apart from each other;

the shank portion (56) further comprises at least one additional forward shank recess (60) to form a plurality of forward shank recesses (60) that are angularly spaced apart from each other;

the shank portion (56) further comprises at least one additional non-recessed forward shank portion (62) to form a plurality of non-recessed forward shank portions (62) that are angularly spaced apart from each other, each non-recessed forward shank portion (62) being located between two circumferentially adjacent forward shank recesses (60); and

a radially inward portion of each insert receiving slot (38) merges in the rearward direction (D_R) with a respective forward shank recess (60).

7. The slotting tool body (22), according to claims 5 or 6, wherein, in a direction along the body central axis (B);

an imaginary radius line extending between the body central axis (B) and a furthest portion on the non-recessed forward shank portion (62) defines a shank portion radius (RS) of a shank portion circle (CS) that is centered at the body central axis (B) and that has a shank portion diameter (DS); and

the cutter portion (26) defines a circumscribed cutter portion circle (CC) that is centered at the body central axis (B) and that has a cutter portion diameter (DC).

8. The slotting tool body (22), according to claim 7, wherein in a direction along the body central axis (B), the shank portion circle (CS) intersects the insert receiving slot (38).

9. The slotting tool body (22), according to claims 7 or 8, wherein:

the insert receiving slot (38) is defined by an elongated slot peripheral surface (40) comprising a slot lower jaw abutment surface (44) located on the lower jaw member (36); and

in a direction along the body central axis (B), the shank portion circle (CS) intersects the slot lower jaw abutment surface (44).

10. The slotting tool body (22), according to claim 9, wherein:

the slot peripheral surface (40) further comprises a slot clamping member abutment surface (42) located on the resilient clamping member (34); and

in a direction along the body central axis (B), the slot clamping member abutment surface (42) is located radially outside the shank portion circle (CS).

11. The slotting tool body (22), according to claim 10, wherein:

the slot peripheral surface (40) further comprises a slot radial stop surface (46) located circumferentially between the slot clamping member abutment surface (42) and the slot lower jaw abutment surface (44); and

in a direction along the body central axis (B), the slot radial stop surface (46) is located radially inside the shank portion circle (CS).

12. The slotting tool body (22), according to any one of claims 1-11, wherein the forward shank recess (60) comprises a peripherally disposed recess outer gap (64) defined by a forwardly facing recess outer base surface (66) and a recess outer peripheral surface (68) extending transversely thereto, the recess outer base surface (66) and each end of the recess outer peripheral surface (68) intersecting the shank peripheral surface (58).

13. The slotting tool body (22), according to claim 12, wherein:

the forward shank recess (60) further comprises a recess inner gap (74) defined by a forwardly facing recess inner base surface (76) and a recess inner peripheral surface (78) extending transversely thereto;

the recess inner base surface (76) intersects the recess outer peripheral surface (68); and

each end of the recess inner peripheral surface (78) intersects the recess outer peripheral surface (68).

14. The slotting tool body (22), according to claims 12 or 13, wherein the recess outer gap (64) is formed by a circumferential groove that extends in the circumferential direction.

15. The slotting tool body (22), according to claim 14, wherein in a direction along the body central axis (B), the recess outer peripheral surface (68) is concavely curved and defined by a recess outer peripheral radius (RO).

16. The slotting tool body (22), according to any one of claims 12-15, wherein, in a side view of the slotting tool body (22), the recess outer peripheral surface (68) is concavely curved and defined by a peripheral side radius (RS).

17. A rotary slot cutting tool (20) comprising:
a slotting tool body (22) in accordance with any one of claims 1-16; and
a cutting insert (24), releasably and resiliently clamped in the insert receiving slot (38).

18. The rotary slot cutting tool (20), according to claim 17, wherein:
the cutting insert (24) is longitudinally elongated in a direction defining an insert longitudinal axis (A), the cutting insert (24) comprising:
opposing insert upper and lower surfaces (84, 86) and an insert peripheral surface (88) extending therebetween, the insert peripheral surface (88) comprising two opposing insert end surfaces (90) connecting the insert upper and lower surfaces (84, 86) and two opposing insert side surfaces (92) also connecting the insert upper and lower surfaces (84, 86);
an insert longitudinal plane (P1) containing the insert longitudinal axis (A), passing between the insert side surfaces (92), and intersecting the insert upper and lower surfaces (84, 86) and also intersecting the opposite insert end surfaces (90); and
a cutting portion (94a) located at one end of the cutting insert (24), the cutting portion (94a) comprising a cutting edge (96) formed at the intersection of the insert upper surface (84) and one of the two insert end surfaces (90); wherein:
the insert end surface (90) opposite the cutting portion (94a) comprises an insert recessed portion (100) comprising an insert key surface (102) which is

closer to the insert lower surface (86) than to the insert upper surface (84), the insert key surface (102) being configured for abutment by a displacement prong (51b) of a key (52) used for extracting the cutting insert (24) from the insert receiving slot (38).

19. The rotary slot cutting tool (20), according to claim 18, wherein in a side view of the cutting insert (24), the insert key surface (102) is concavely curved.

20. The rotary slot cutting tool (20), according to claims 18 or 19, wherein the insert key surface (102) is located entirely below an insert median plane (M) that extends midway between the insert upper and lower surfaces (84, 86) and contains the insert longitudinal axis (A).

21. The rotary slot cutting tool (20), according to any one claims 18-20, wherein the insert end surface (90) opposite the cutting portion (94a) further comprises an insert stop surface (104) which is closer to the insert upper surface (84) than to insert lower surface (86), the insert stop surface (104) being planar.

22. The rotary slot cutting tool (20), according to any one of claims 18-21, wherein:

the cutting insert (24) comprises an additional cutting portion (94a) forming two cutting portions (94a, 94b), the two cutting portions (94a, 94b) being formed at opposite ends of the cutting insert (24).

23. The rotary slot cutting tool (20), according to claim 22, wherein:

each insert cutting portion (94a, 94b) comprises two insert lateral extensions (98a, 98b) which project laterally from opposite sides of the cutting insert (24) in a direction away from the insert longitudinal plane (P1), and upon which the cutting edge (96) extends;

the two insert lateral extensions (98a, 98b) comprise a wide and a narrow insert lateral extension (98a, 98b), the wide insert lateral extension (98a) being longer than the narrow insert lateral extension (98b) in a direction perpendicular to the insert longitudinal plane (P1); and

the wide insert lateral extensions (98a) are located on opposite sides of the insert longitudinal plane (P1).

24. The rotary slot cutting tool (20), according to claim 23, wherein:

the two cutting portions (94a, 94b) comprise an active cutting portion (94a) and a non-active cutting portion (94b), the cutting edge (96) of the active cutting portion (94a) being located beyond the radial extent of the cutter portion (26); and

the wide insert lateral extension (98a) of the active cutting portion (94a) is the axially forwardmost of the two insert lateral extensions (98a, 98b) with respect to the axial direction.

25. The rotary slot cutting tool (20), according to any one of claims 17-24, wherein

the insert receiving slot (38) comprises a slot insert portion (48) defined by an insert profile (IP) of the cutting insert (24) in a direction along the body central axis (B); and

a radially inward portion of the slot insert portion (48) merges in the rearward direction (D_R) with the forward shank recess (60).

26. A cutting insert (24), longitudinally elongated in a direction defining an insert longitudinal axis (A), comprising:

opposing insert upper and lower surfaces (84, 86) and an insert peripheral surface (88) extending therebetween, the insert peripheral surface (88) comprising two opposing insert end surfaces (90) connecting the insert upper and lower surfaces (84, 86) and two opposing insert side surfaces (92) also connecting the insert upper and lower surfaces (84, 86);

an insert longitudinal plane (P1) containing the insert longitudinal axis (A), passing between the insert side surfaces (92), and intersecting the insert upper and lower surfaces (84, 86) and also intersecting the opposite insert end surfaces (90); and

two cutting portions (94a, 94b) located at opposite ends of the cutting insert (24), each comprising a cutting edge (96) formed at the intersection of the insert upper surface (84) and one of the two insert end surfaces (90); wherein:

each insert cutting portion (94a, 94b) comprises two insert lateral extensions (98a, 98b) which project laterally from opposite sides of the cutting insert (24) in a direction away from the insert longitudinal plane (P1), and upon which the cutting edge (96) extends;

the two insert lateral extensions (98a, 98b) comprise wide and narrow insert lateral extension (98a, 98b), the wide insert lateral extension (98a) being longer than the narrow insert lateral extension (98b) in a direction perpendicular to the insert longitudinal plane (P1); and

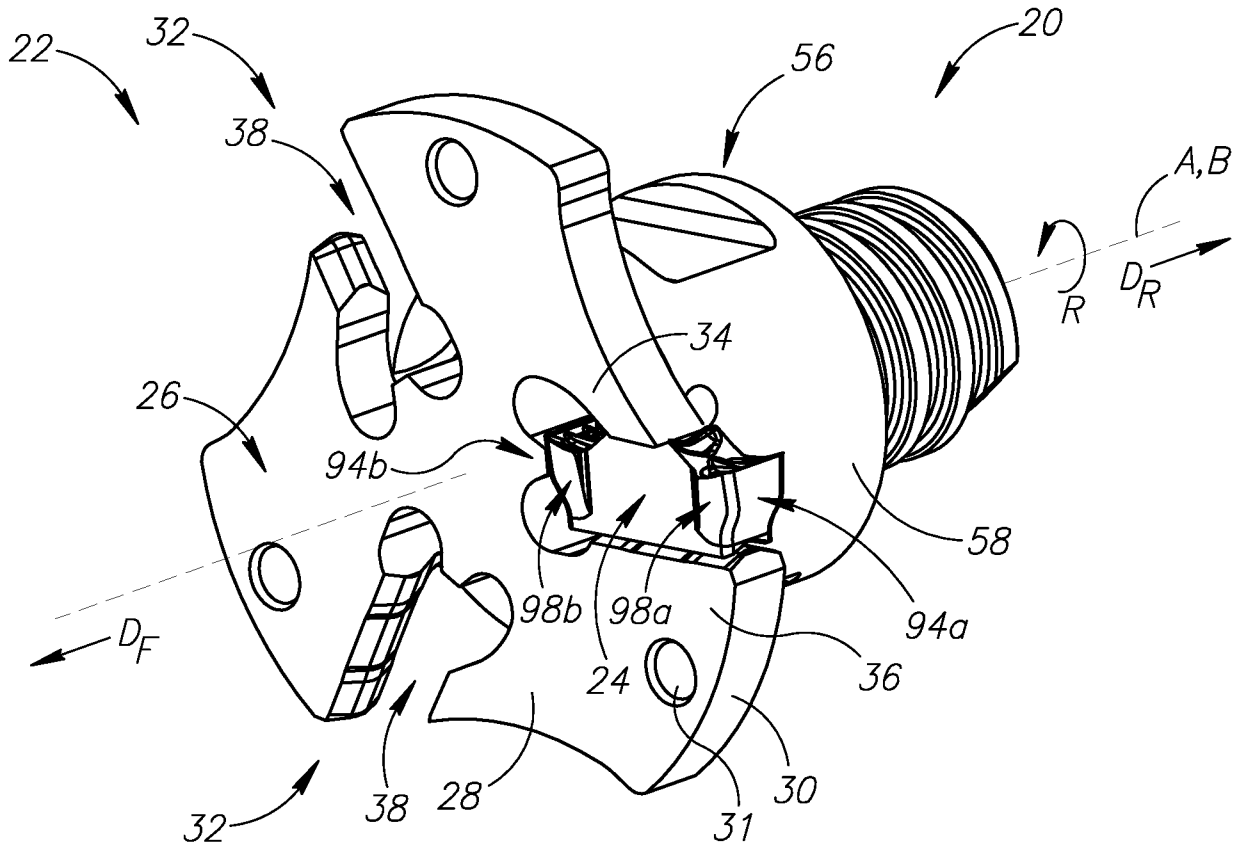
the wide insert lateral extensions (98a) are on opposite sides of the insert longitudinal plane (P1).

27. A slotting tool body (22), having a body central axis (B) that defines opposite forward and rearward directions (D_F, D_R) and about which the slotting tool body (22) is rotatable in a rotational direction (R), the slotting tool body (22) comprising:

a disc-like cutter portion (26) comprising a resilient clamping portion (32) having a peripherally disposed insert receiving slot (38); and

a shank portion (56) projecting rearwardly from the cutter portion (26), the shank portion (56) comprising a shank peripheral surface (58) which extends circumferentially about the body central axis (B) and a forward shank recess (60) recessed in, and opening out to, the shank peripheral surface (58) adjacent to the cutter portion (26); wherein:

in a forward view of the slotting tool body (22), in a direction along the body central axis (B), the shank portion (56) is partially visible through the insert receiving slot (38).


22
32
38
56
20
A,B
D_R
R
34
26
94b
58
98b
98a
94a
D_F
24
36
32
38
28
30
31

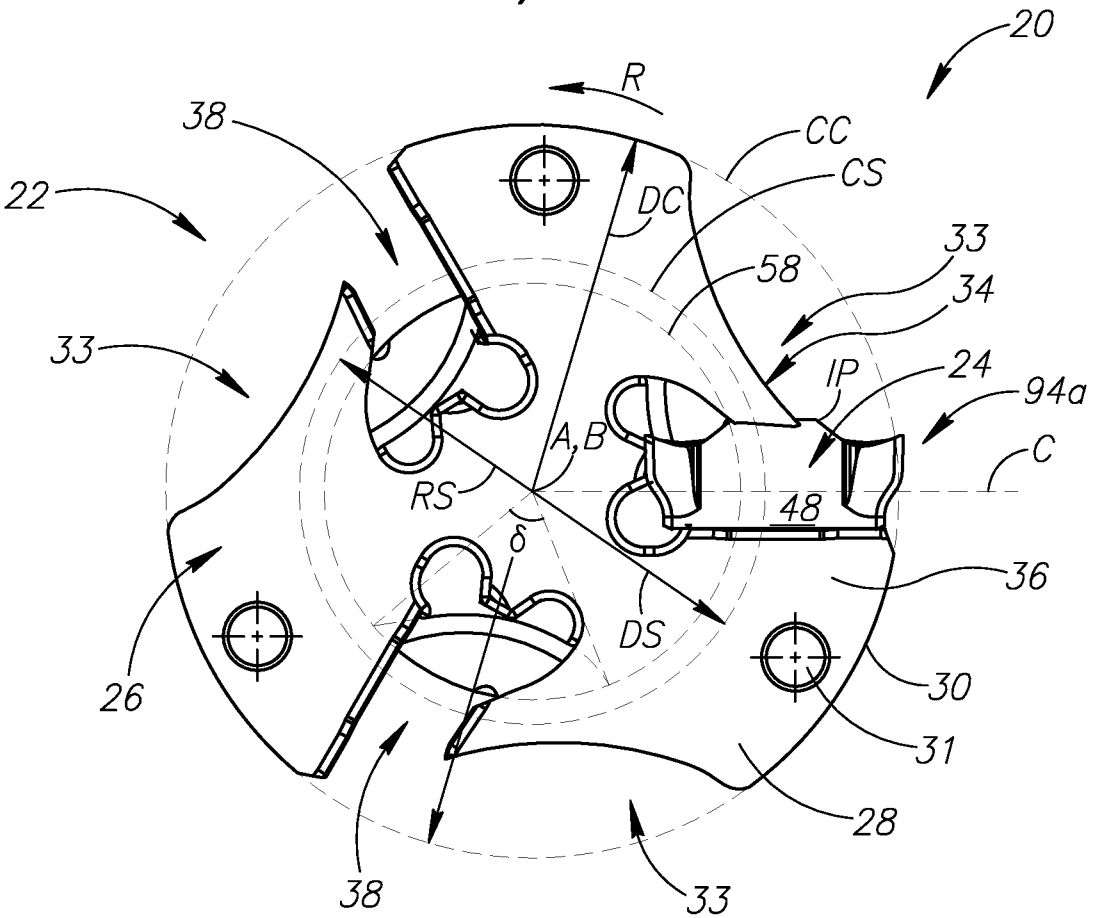

20
R
38
CC
CS
22
DC
58
33
34
33
IP
24
94a
A,B
C
RS
48
δ
36
DS
26
30
31
28
38
33

FIG.3

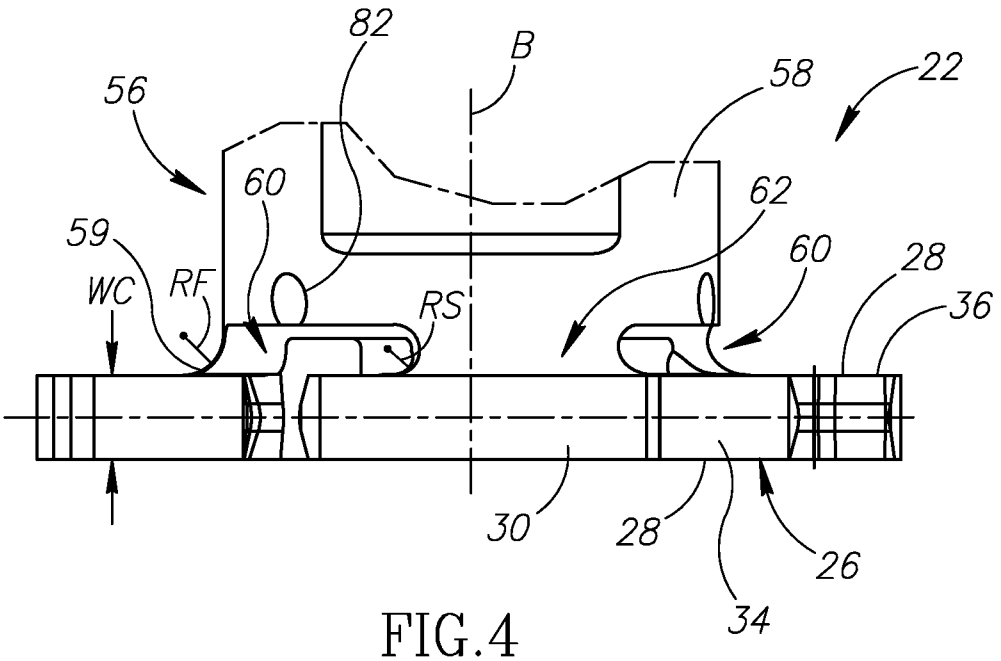

82
B
56
58
22
60
62
59
60
28
WC
RF
RS
36
30
28
26
34

FIG.4

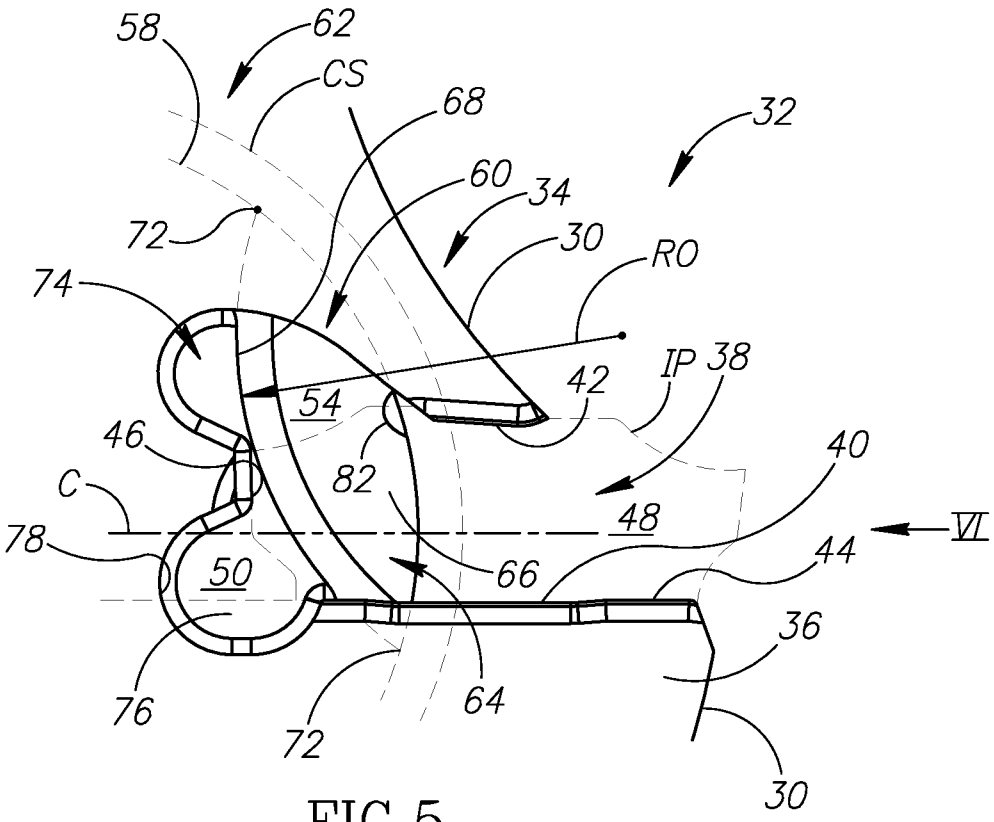

58
62
CS
68
32
60
34
72
30
RO
74
IP
38
42
54
46
40
82
C
48
VI
78
50
66
44
36
76
64
72
30

FIG.5

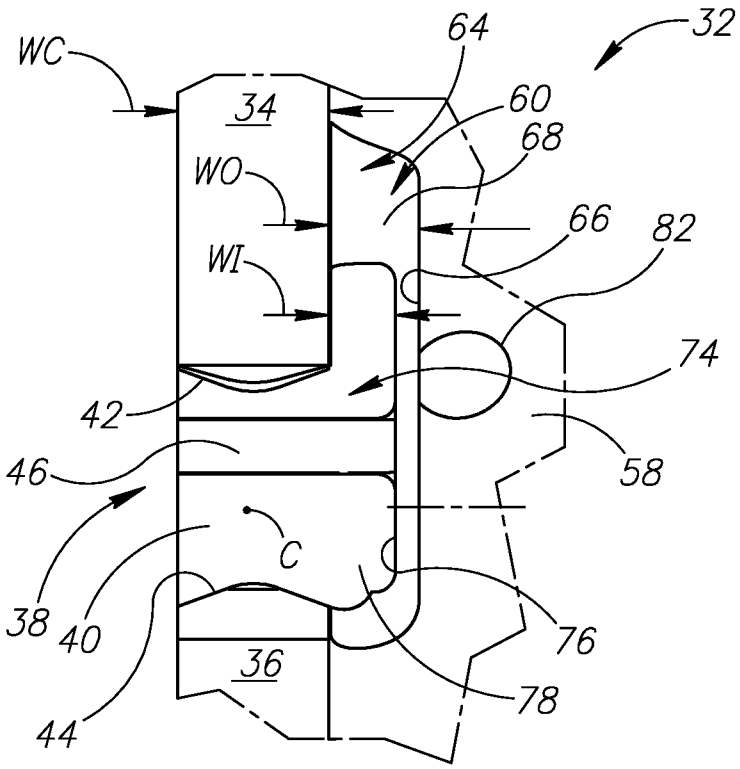

64
32
WC
34
60
68
WO
66
82
WI
74
42
58
46
C
38
40
76
36
78
44

FIG.6

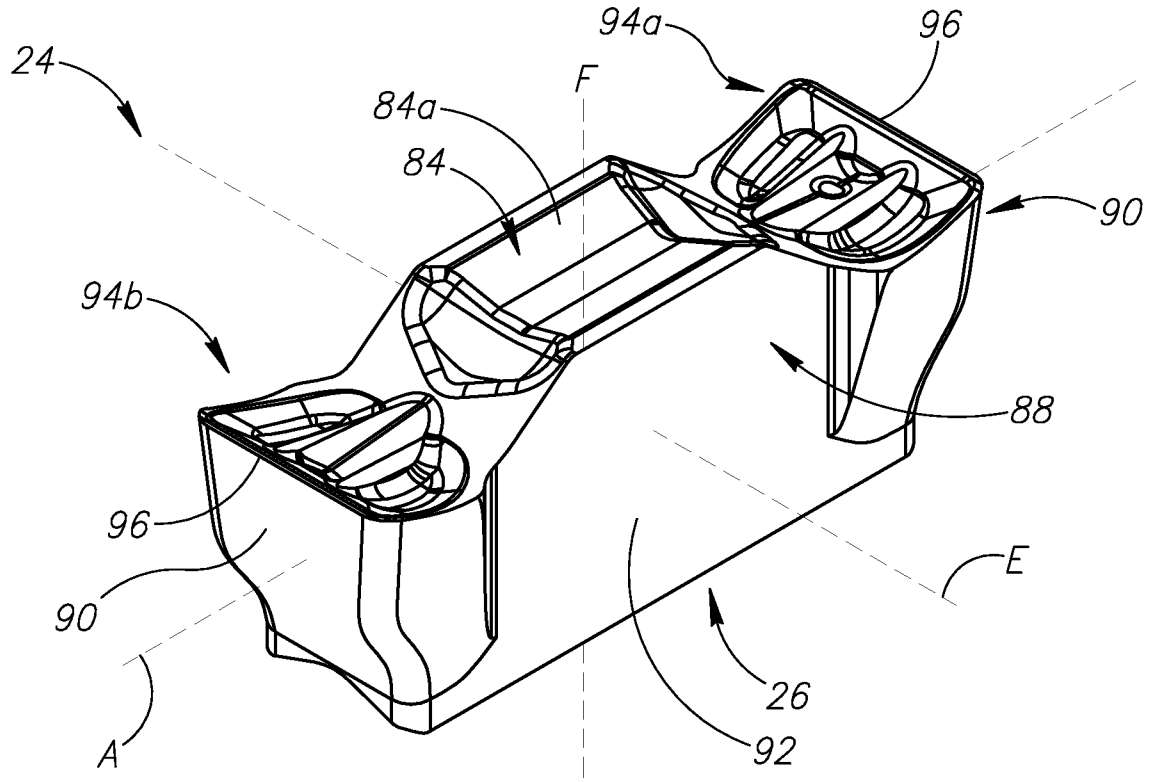

24
94a
96
F
84a
84
90
94b
88
96
90
E
A
26
92

FIG.7

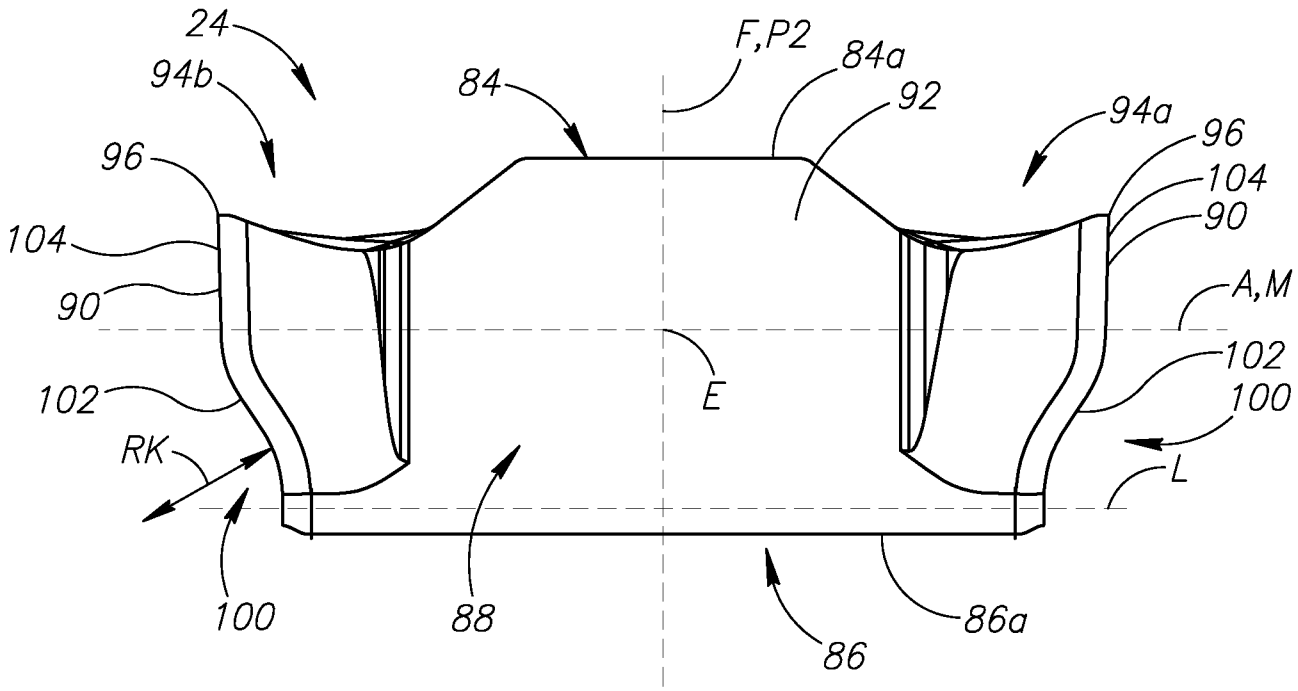

24
94b
F,P2
84a
84
92
94a
96
104
90
96
104
90
A,M
102
E
102
100
RK
L
100
88
86
86a

FIG.8

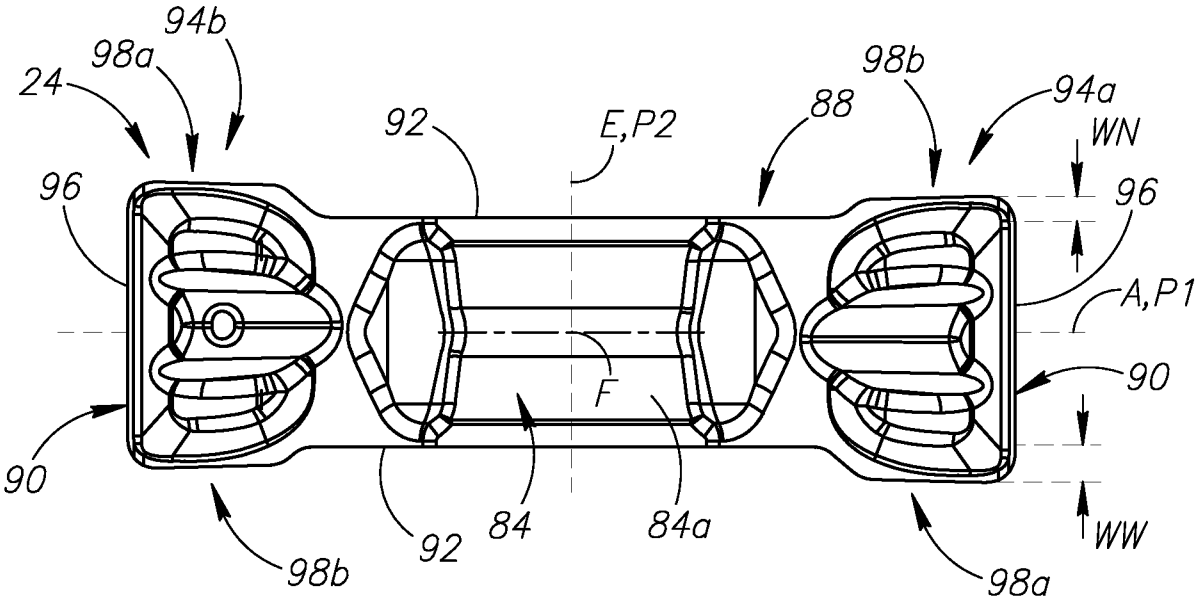

94b
98a
24
98b
94a
92
E,P2
88
WN
96
96
A,P1
90
F
90
84
84a
92
98b
98a
WW

FIG.9

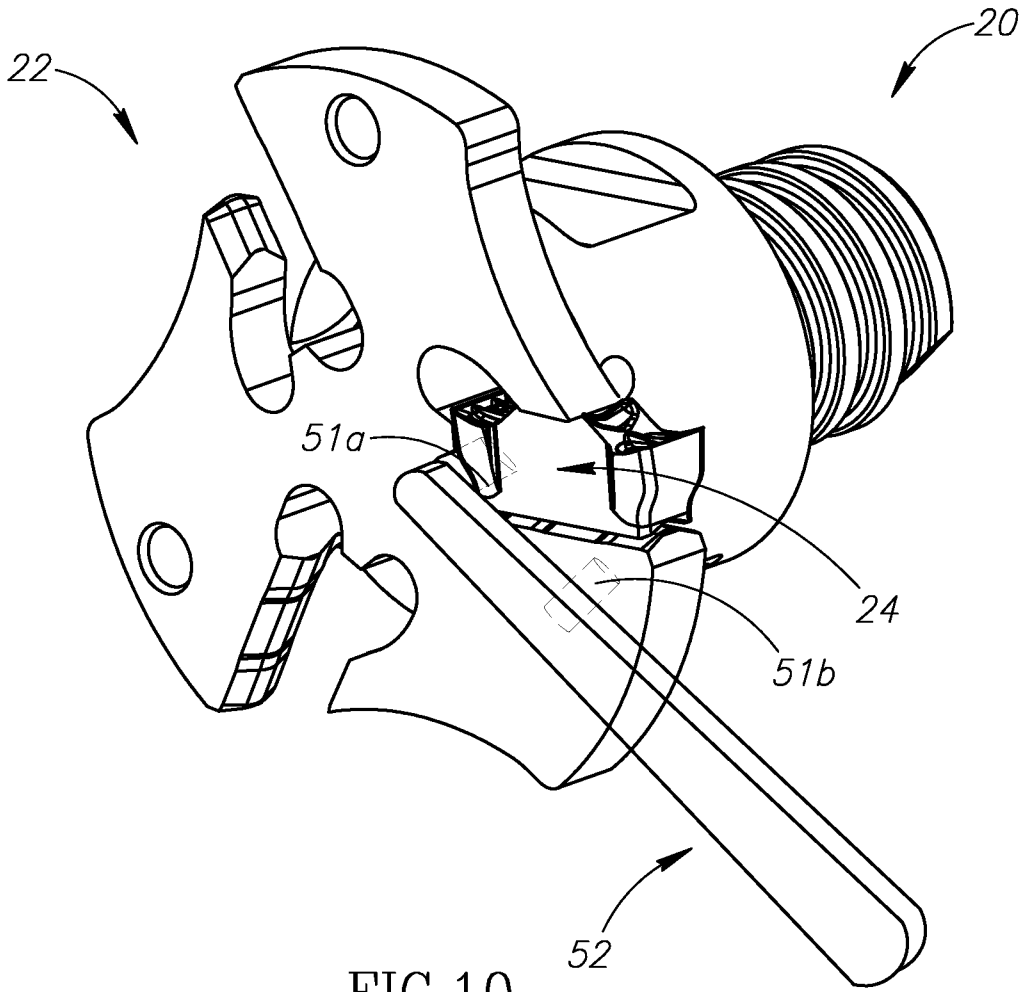
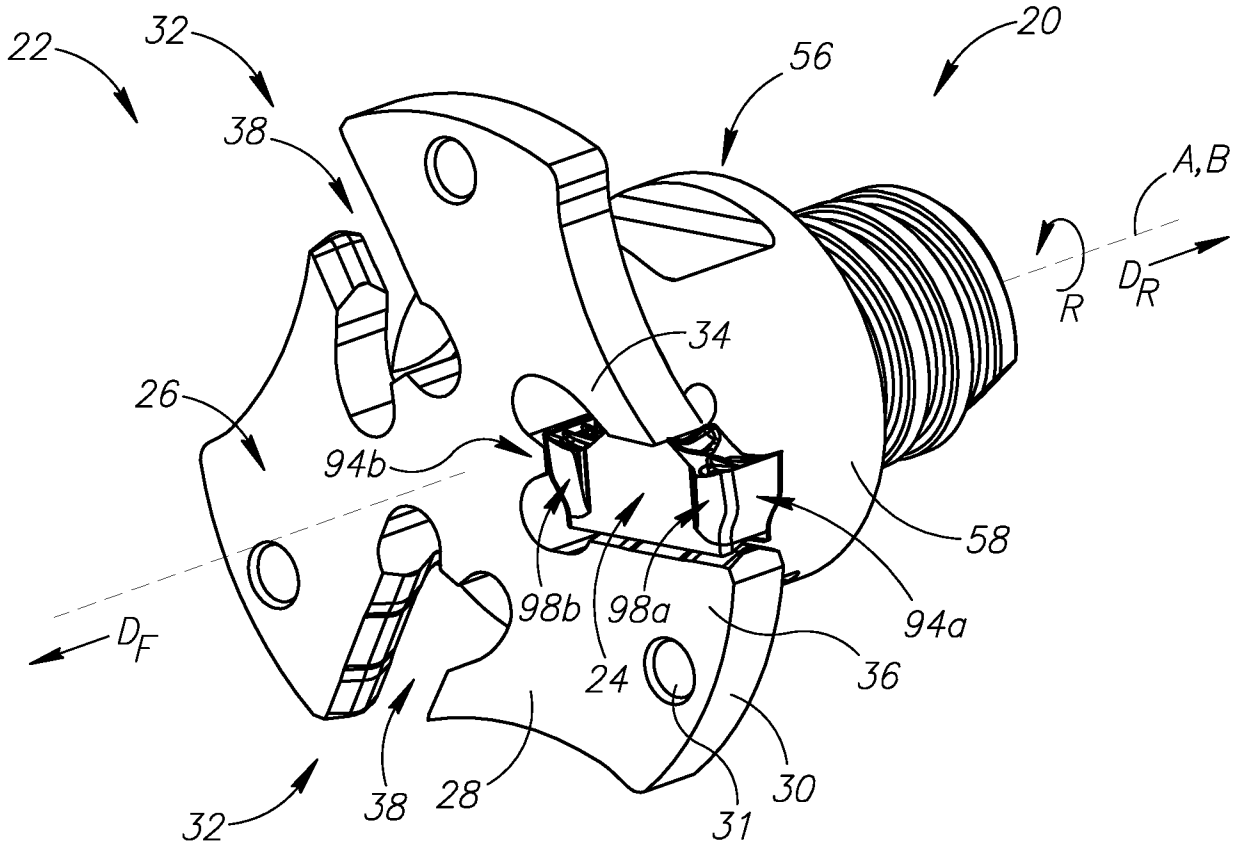

20
22
51a
24
51b
52

FIG.10


22
32
38
56
20
A,B
D_R
R
34
26
94b
58
98b
98a
94a
D_F
24
36
32
38
28
30
31