US006786811B2

(12) United States Patent
Krondorfer et al.

(10) Patent No.: US 6,786,811 B2
(45) Date of Patent: Sep. 7, 2004

(54) GRINDING MACHINE TOOL SUPPORT

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 18 days.

(21) Appl. No.: **09/980,933**

(22) PCT Filed: **Mar. 28, 2001**

(86) PCT No.: **PCT/DE01/01178**

§ 371 (c)(1), (2), (4) Date: **Feb. 20, 2002**

(87) PCT Pub. No.: **WO01/76822**

PCT Pub. Date: **Oct. 18, 2001**

(65) **Prior Publication Data**

US 2003/0104773 A1 Jun. 5, 2003

(30) **Foreign Application Priority Data**

Apr. 7, 2000 (DE) 100 17 458

(51) **Int. Cl.**[7] **B24B 41/00**

(52) **U.S. Cl.** **451/342**; 451/508

(58) **Field of Search** 451/342, 340, 451/359, 509, 508, 510, 341, 358, 352

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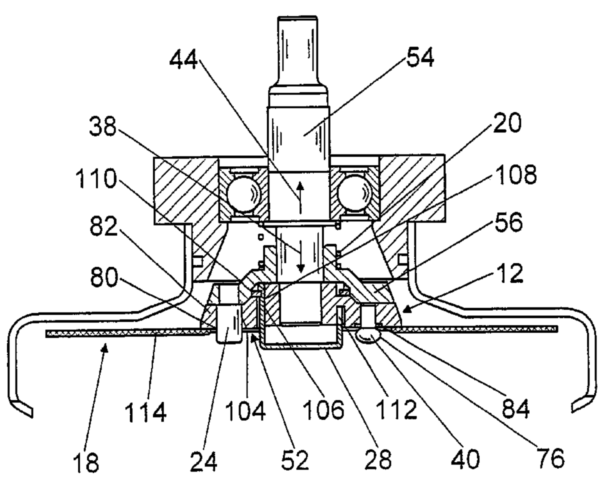
(74) *Attorney, Agent, or Firm*—Michael J. Striker

(57) **ABSTRACT**

A grinding machine tool receptacle for a hand-guided angle grinding machine has a slaving device by which an insert tool is operatively connectable to a drive shaft, the insert tool is operatively connectable to the slaving device via at least one detent element supported movably counter to a spring element, which detent element snaps into place in an operating position of the insert tool driven by the spring element and fixes the insert tool by positive engagement, the detent element is displaceable in the axial direction counter to the spring element, and the insert tool is connected to the slaving device in the circumferential direction via at least a first element and in the axial direction via at least a second element, with the second element arranged for fixing of the insert tool with a spring force.

19 Claims, 9 Drawing Sheets



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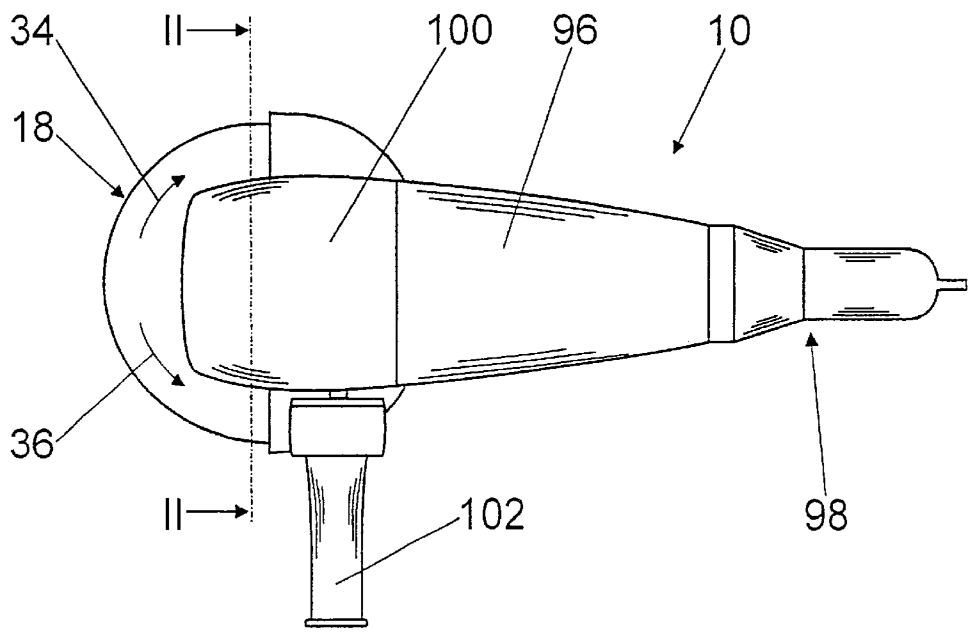

Fig. 1

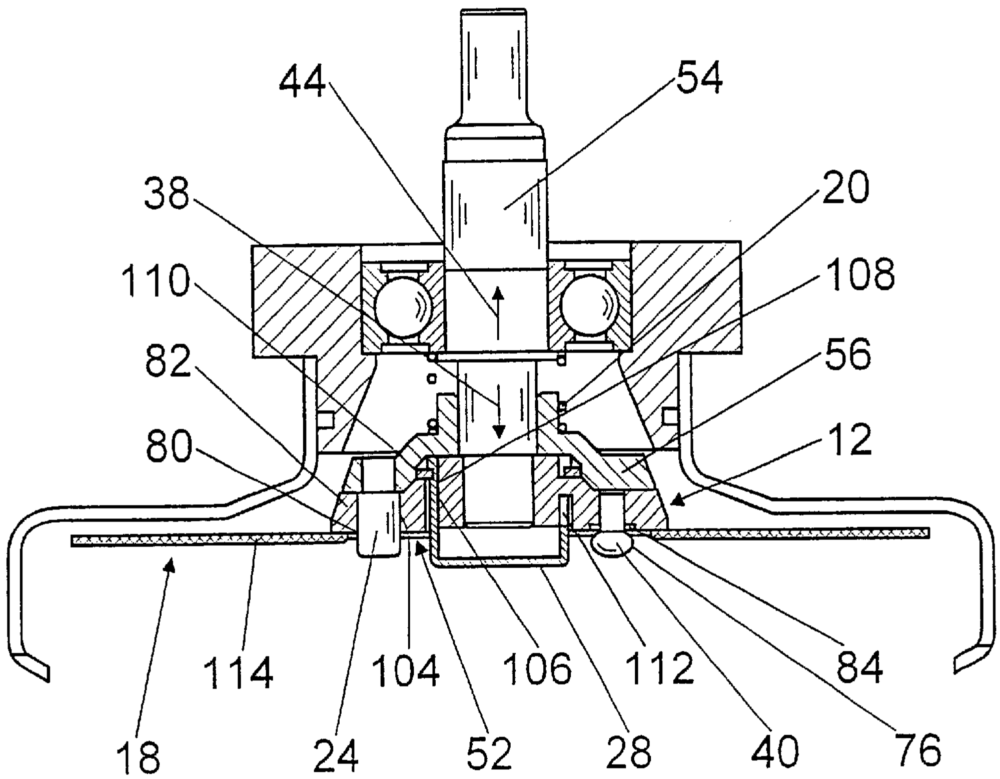
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Fig. 2

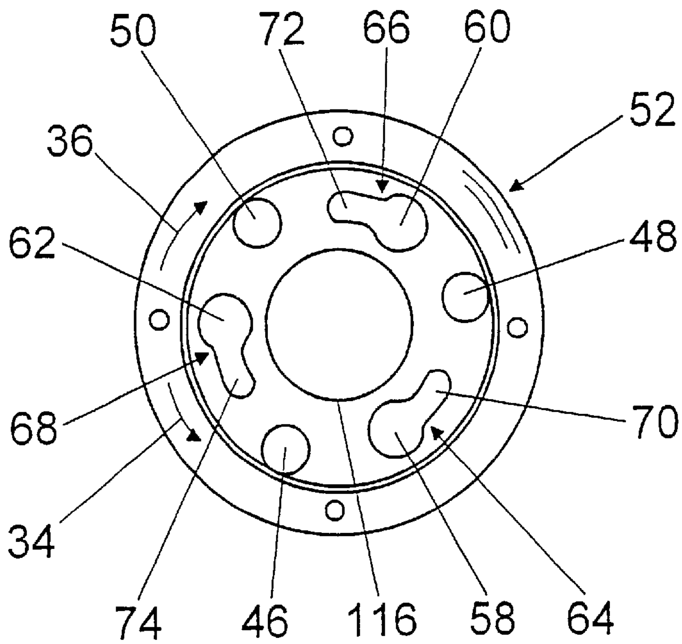
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Fig. 3

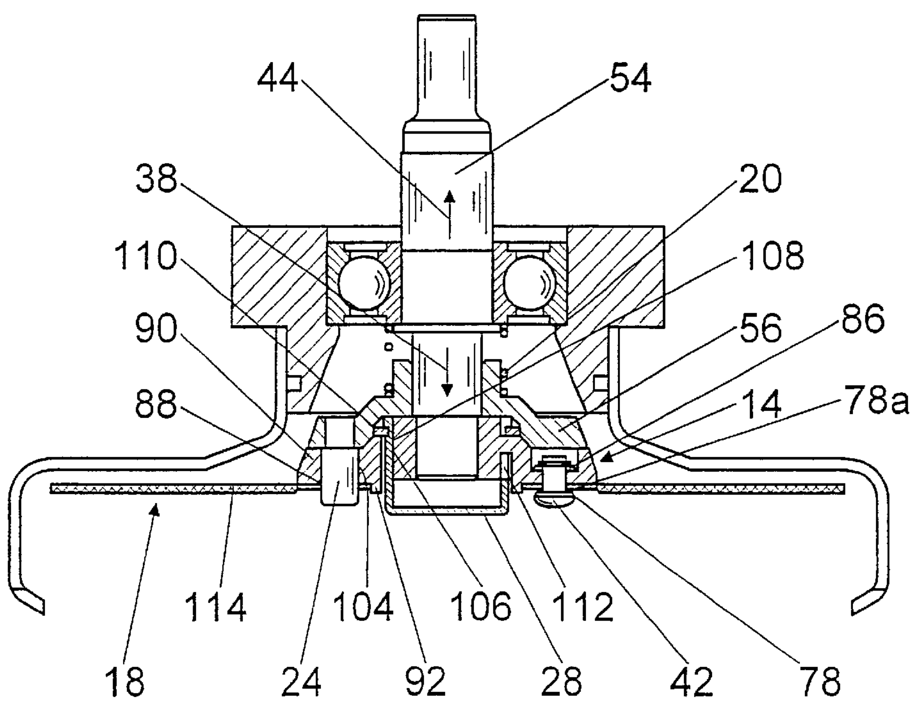
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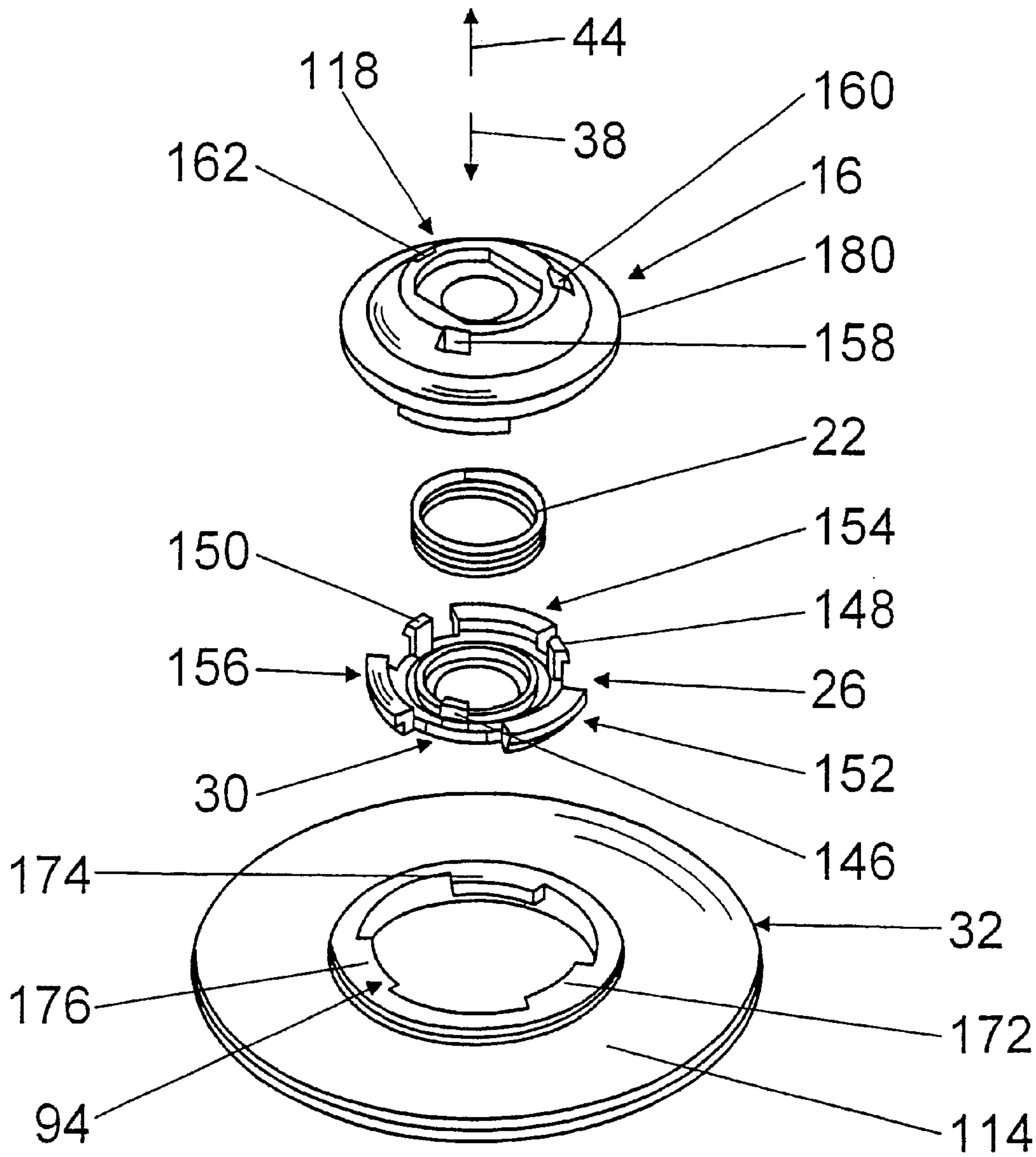
Fig. 4



44
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Fig. 5

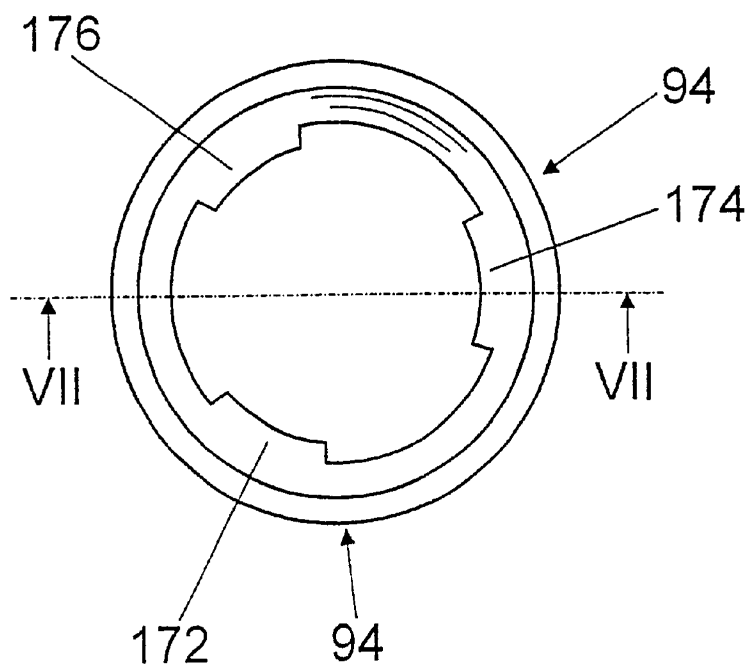

Fig. 6

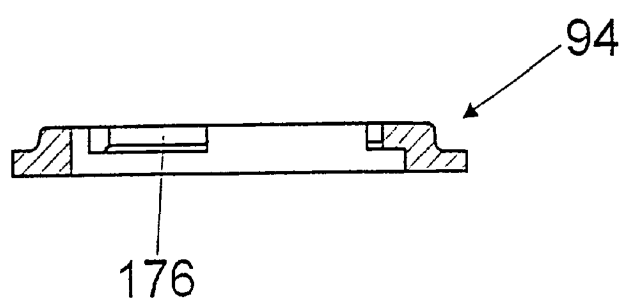

Fig. 7

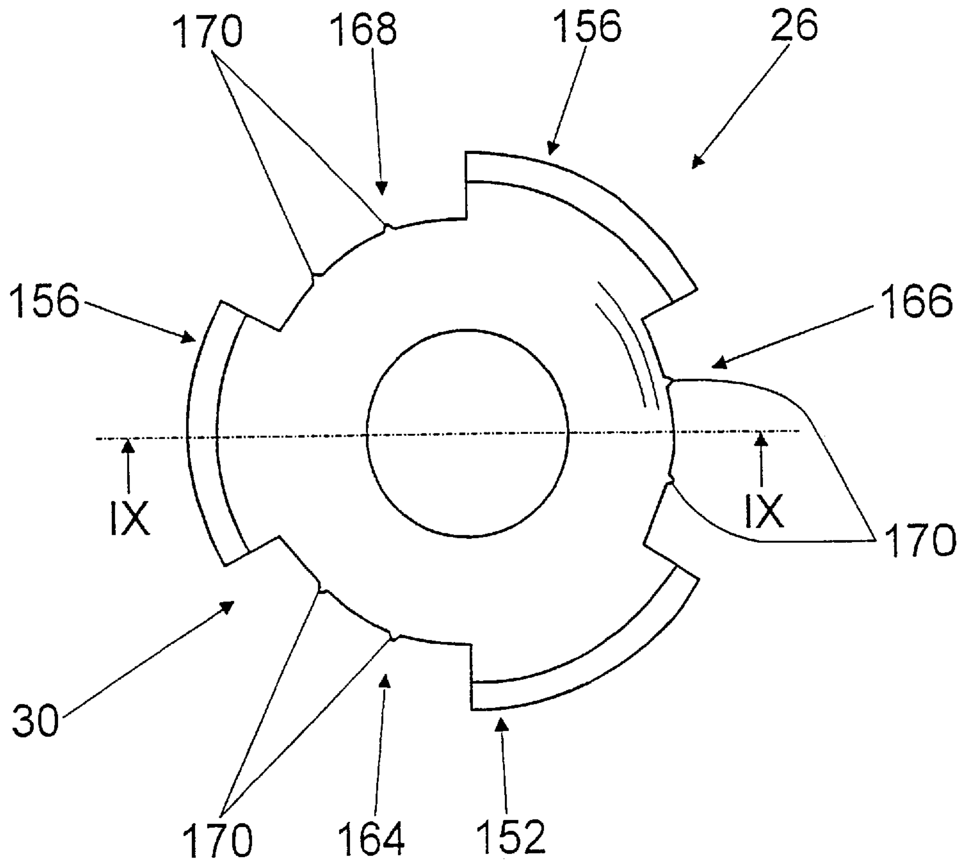

Fig. 8

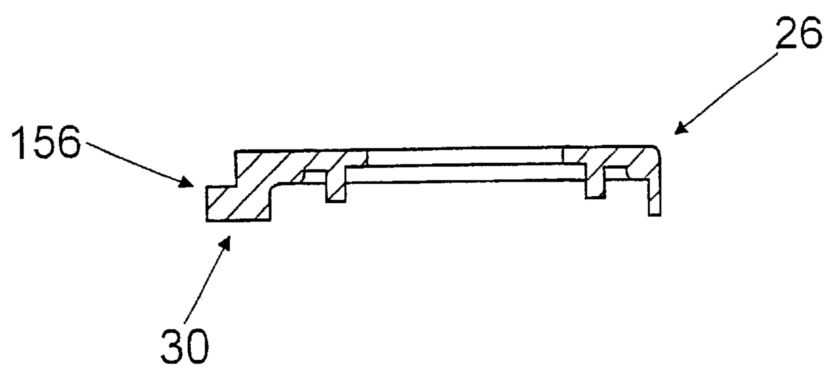

Fig. 9

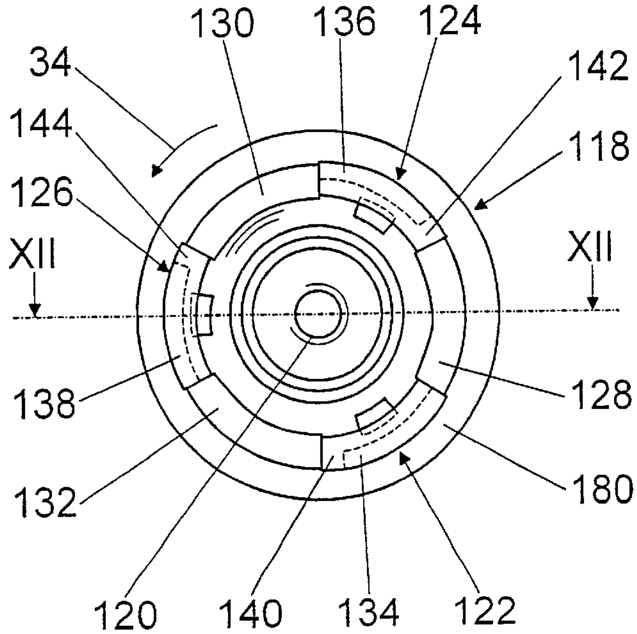

Fig. 10

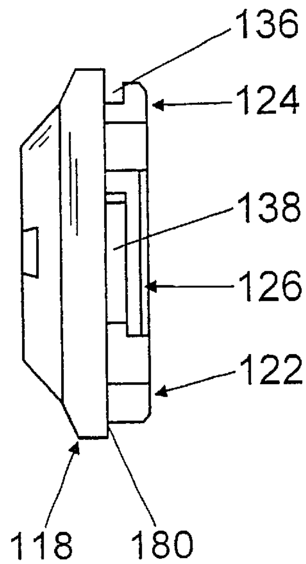

Fig. 11

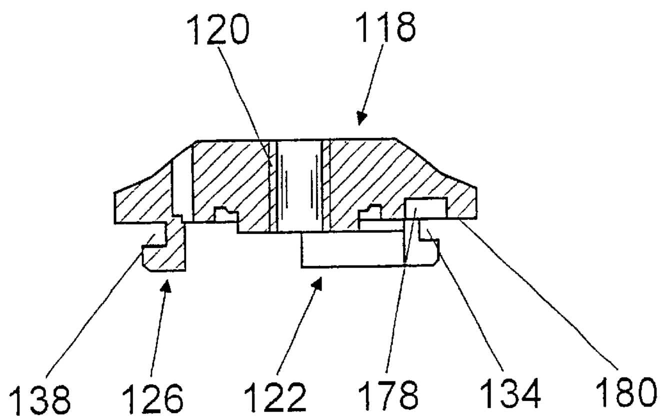

Fig. 12

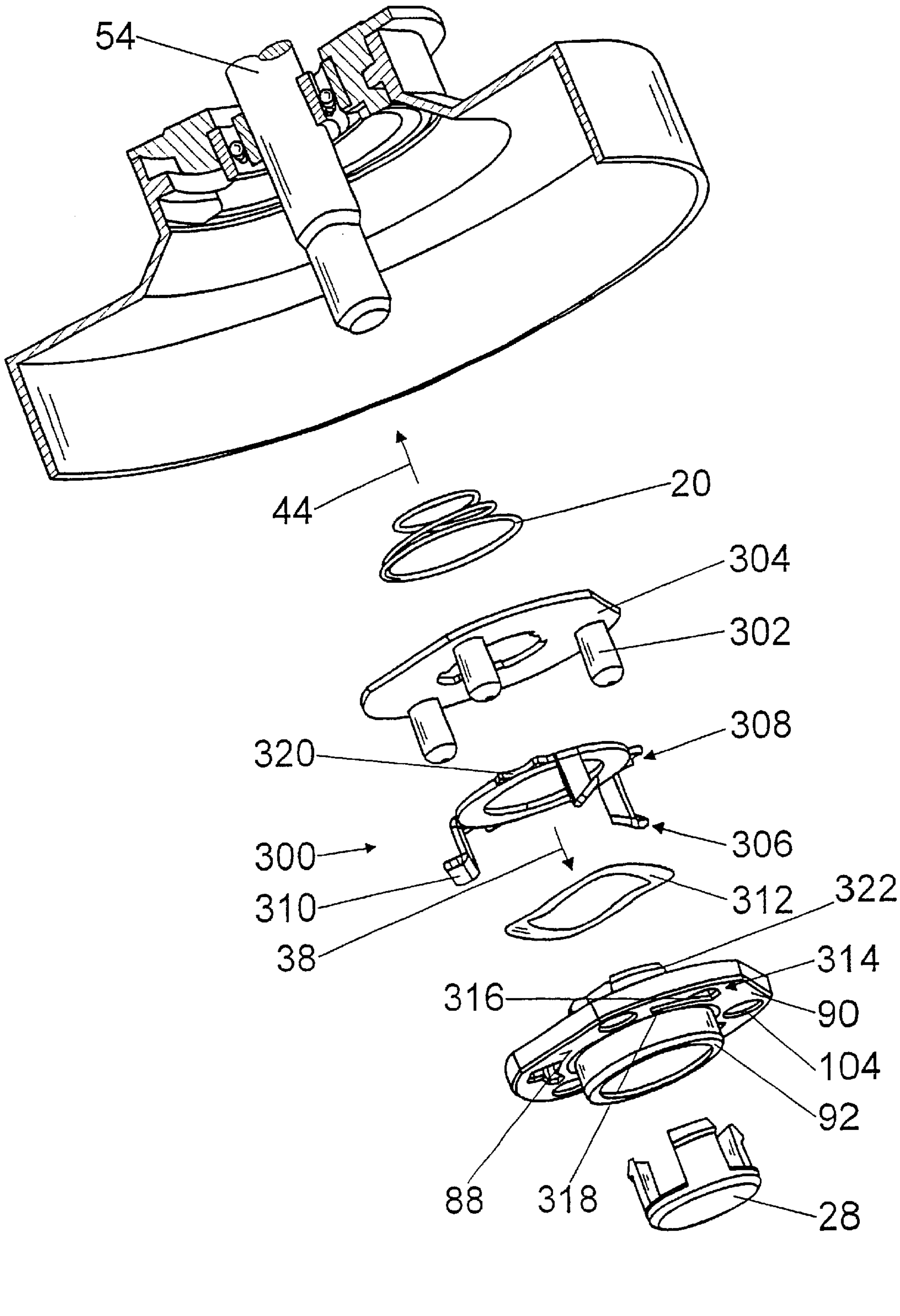
54
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Fig. 13

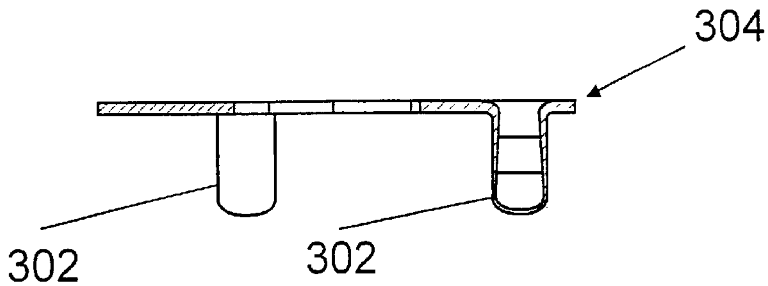

Fig. 14

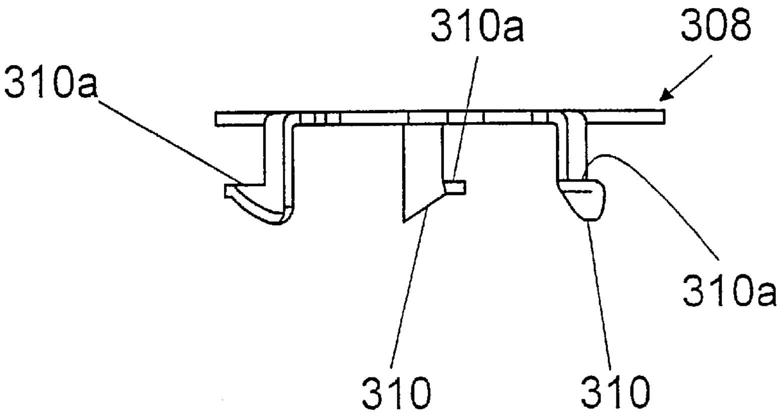

Fig. 15

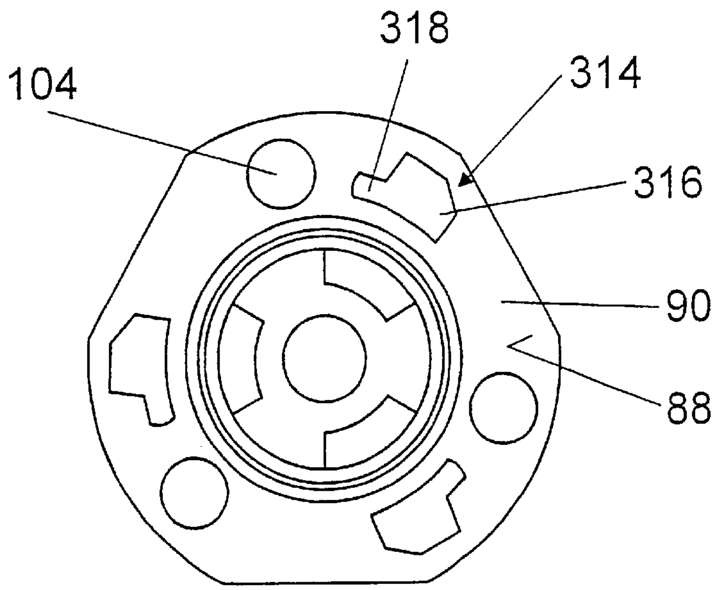

Fig. 16

GRINDING MACHINE TOOL SUPPORT

BACKGROUND OF THE INVENTION

The invention is based on a grinding machine tool receptacle.

From European Patent Disclosure EP 0 904 896 A2, a grinding machine tool receptacle for a hand-held angle grinding machine is also known. The angle grinding machine has a drive shaft that has a thread on the side toward the tool.

The grinding machine tool receptacle also has a slaving means and a lock nut. For mounting a grinding wheel, the slaving means is slipped with a mounting opening onto a collar of the drive shaft and braced against a bearing face of the drive shaft by nonpositive engagement via the lock nut. The slaving means has a collar, extending axially on the side toward the tool, that on two radially opposed sides on its outer circumference has recesses that extend axially as far as a bottom of the collar. From each of the recesses, a respective groove extends on the outer circumference of the collar, counter to the driving direction of the drive shaft. The grooves are closed counter to the driving direction of the drive shaft and taper axially, beginning at the recesses, counter to the drive direction of the drive shaft.

The grinding wheel has a hub with a mounting opening, in which two opposed tongues are disposed, pointing radially inward. The tongues can be introduced axially into the recesses and then in the circumferential direction, counter to the driving direction, into the grooves. The grinding wheel is fixed by positive engagement in the grooves in the axial direction via the tongues and by nonpositive engagement by means of the tapering contour of the grooves. During operation, the nonpositive engagement increases as a consequence of reaction forces exerted on the grinding wheel, which act counter to the driving direction.

To prevent the grinding wheel from running off center when the drive shaft is braked by the slaving means, a stopper, which is movably supported in the axial direction in an opening, is disposed in the region of a recess on the circumference of the collar. In a working position where the grinding wheel points downward, the stopper is deflected axially by gravity in the direction of the grinding wheel and closes the groove in the direction of the recess and blocks a motion of the tongue, located in the groove, in the driving direction of the drive shaft.

SUMMARY OF THE INVENTION

The invention is based on a grinding machine tool receptacle, in particular for a hand-held angle grinding machine, having a slaving device, by way of which an insert tool can be operatively connected to a drive shaft.

It is proposed that the insert tool is operatively connectable to the slaving device via at least one detent element, supported movably counter to a spring element, which detent element snaps into place in an operating position of the insert tool and fixes the insert tool by positive engagement. By means of the positive engagement, high security can be attained, and a simple, economical, tool-less fast-clamping system can be created. Unintended running off center of the insert tool can be reliably avoided, even in braked drive shafts in which major braking moments can occur.

By means of the movably supported detent element, major deflection of the detent element in the assembly of the

insert tool can be made possible, and as a result on the one hand a large overlap between two corresponding detent elements and an especially secure positive engagement can be attained, and on the other, a clearly audible snap-in noise can be achieved, which advantageously tells the user that the snap-in operation has been completed as desired.

The detent element can fix the insert tool by positive engagement either directly or indirectly via an additional component, for instance via a detent lever or tappet and the like that is coupled with the detent element and is supported rotatably and/or axially displaceably. The detent element can fix the insert tool by positive engagement directly and/or indirectly in various directions, such as the radial direction, axial direction, and/or especially advantageously the circumferential direction. It is also possible that as a result of the positive-engagement fixation of the insert tool with the detent element in a first direction, such as the radial direction, the insert tool is fixed by positive engagement in a second direction, such as the circumferential direction, by means of a component that is separate from the detent element.

The movably supported detent element can be embodied in various forms that appear useful to one skilled in the art, for instance as an opening, protrusion, peg, bolt and the like, and can be disposed on the insert tool and/or on the slaving device. The detent element itself can be supported movably in a component in a bearing location, for instance in a flange of the slaving device or in a tool hub of the insert tool. However, the detent element can advantageously also be solidly connected by nonpositive, positive and/or material engagement to a component supported movably in a bearing location, or can be embodied integrally with such a component, for instance with a component supported on the drive shaft or with a tool hub of the insert tool.

Also by means of the positive engagement, an advantageous encoding can be achieved, so that only the intended insert tools can be secured in the grinding machine the tool receptacle. The slaving device can be embodied at least in part as a detachable adapter part, or it can be connected nondetachably to the drive shaft by nonpositive, positive and/or material engagement.

With the grinding machine tool receptacle, various insert tools that appear useful to one skilled in the art can be secured, such as insert tools for severing, grinding, rough-machining, brushing and so forth. A tool receptacle of the invention can also be used to secure a grinding plate of eccentric grinding machines.

The detent element can be embodied movably in various directions counter to a spring element, for instance in the circumferential direction or especially advantageously in the axial direction, making a structurally simple embodiment attainable.

In a further feature of the invention, it is proposed that a drive moment can be transmitted via a positive-engagement connection between the insert tool and the slaving device. A major drive moment can be securely transmitted, and moreover, it is possible to prevent a drive moment from acting on a nonpositive connection.

If the detent element can be released from its detent position by an unlocking button and in particular is movable counter to the spring element, then an independent release of the detent connection which could for instance be caused by a braking moment can be reliably prevented, thus enhancing safety. Operation of the insert tool in two circumferential directions can be made possible in principle, making it more convenient to install and remove the insert tool.

It also proposed that the insert tool is connectable to the slaving device via a tongue-and-groove connection, which is secured by positive engagement via at least one detent element in an operating position of the insert tool. With a tongue-and-groove connection an especially space-saving, lightweight construction can be attained in which individual components are used for multiple functions, for instance the detent element and/or spring elements engaging grooves for radial centering, fixation in the axial direction, and/or fixation in the circumferential direction.

However, if the insert tool is connected to the slaving device in the circumferential direction via at least a first element and in the axial direction via at least a second element, then simple, economical tool hubs can be achieved which can advantageously be embodied in plane form. The tool hubs can be prevented from catching on each other in production and storage, and good manipulation of the insert tool with its tool hubs can be made possible. In addition, the components can advantageously be designed for their function, that is, either for the fixation in the circumferential direction or the fixation in the axial direction. The elements can be formed by one component or advantageously by separate components. The tool hubs can simply and advantageously be embodied with a closed centering bore, and low-vibration action of the insert tool can be made possible. In addition, given a suitable choice of the diameter of the centering bore, it is possible for the insert tools intended for the grinding machine tool receptacle of the invention to be secured to conventional grinding machines via fastening elements that have been known previously, specifically via fastening elements in which the insert tool can be fixed positively in the axial direction and nonpositively in the circumferential direction by an adjusting nut and a tensioning flange on the drive shaft against a bearing face.

In a further feature, it is proposed that at least one detent element, extending in the axial direction, snaps into a recess, corresponding to the detent element, of a tool hub of the insert tool in an operating position of the insert tool and fixes the insert tool in the circumferential direction by positive engagement. With a structurally simple embodiment, an advantageous positive engagement in one circumferential direction and preferably in both circumferential directions can be attained. The detent element extending in the axial direction can be formed by a separate bolt or a formed-on peg produced for instance by a deep-drawing operation.

Advantageously, at least one detent element extending in the axial direction is secured in a component supported displaceably on the drive shaft counter to the spring element. One and especially advantageously a plurality of detent elements via a large bearing area on the drive shaft. Tilting of the detent elements and relative motion of the detent elements can be reliably avoided, and with a spring element that can advantageously be disposed centrally and rotationally symmetrically, a desired spring force for a detent operation can be achieved. However, it is also possible for one or more detent elements, each at bearing points, to be embodied as displaceable counter to a respective spring element or counter to one common spring element.

It is also proposed that the slaving device has at least one fastening element, extending in the axial direction, which element can be passed through at least one region of an elongated slot of a tool hub of the insert tool and in the elongated slot is displaceable in a narrowed region of the elongated slot, and by way of which element the insert tool is axially fixable in the elongated slot via a contact face disposed on the fastening element. The tool hub can advantageously be embodied economically and essentially plane and can be used as a spring element, for instance by providing that the tool hub is elastically deformed upon displacement of the component in the elongated slot. The tool hub can also be used to deflect a component counter to a spring element in the axial direction. This economizes on additional components, assembly effort, and expenses.

To make a long spring travel of the tool hub possible, advantageously a component forming a bearing face for the insert tool, in the fastened state of the insert tool, has a recess in the region of the elongated slot, into which recess part of the tool hub is pressed elastically, in an operating position of the insert tool.

If the fastening element extending in the axial direction is supported elastically displaceably in the axial direction counter to a spring element, for axially the insert tool, then on the one hand an advantageously long spring travel can be attained independently of the tool hub, and on the other, the component and the spring element can be designed in a targeted way for their separate functions. However, the fastening element can also be embodied integrally with a spring element, at least in part. If for axial fixation a plurality of components extending in the axial direction are provided, then they can each be loaded via a respective spring element or advantageously all via one common spring element, making it possible to economize on additional components, assembly effort, weight, and expense.

To attain advantageous centering and low-vibration action of the insert tool, a collar by way of which the insert tool can be radially centered is preferably formed onto a component of the slaving device that forms a bearing face for the insert tool. A self-contained centering face can simply be formed. Forces on the insert tool in the radial direction can advantageously be absorbed by positive engagement, such as forces in the radial direction upon cutting of some object. Forces in the radial direction can be prevented from acting on components that are axially displaceable, thus preventing consequent damage or wear to these components. Furthermore, radial play of the insert tool is reliably avoided, making better concentricity attainable. In principle, instead of a collar, an indentation is also conceivable, which the tool hub engages with a protrusion in the fastened state.

If at least one detent element is formed integrally on a disklike component and/or if at least two elements for fixation of the insert tool in the axial direction are integrally formed onto a disklike component, then additional components and installation effort and expense can be saved. Furthermore, press-fitted connections between individual components with the attendant weak points can be avoided.

BRIEF DESCRIPTION OF THE DRAWING

Further advantages will become apparent from the ensuing description of the drawings. Exemplary embodiments of the invention are shown in the drawing. The drawing, description and claims include numerous characteristics in combination. One skilled in the art will expediently consider the characteristics individually as well and put them together to make useful further combinations.

Shown are:

FIG. **1**, an angle grinder from above;

FIG. **2**, a schematic cross section taken along the line II—II of FIG. **1** through a grinding machine tool receptacle of the invention;

FIG. **3**, a tool hub seen from below;

FIG. **4**, a variant of FIG. **2**;

FIG. **5**, an exploded view of a variant of FIG. **4**;

FIG. 6, a tool hub of FIG. 5 from below;

FIG. 7, a section taken along the line VII—VII of FIG. 6;

FIG. 8, an unlocking button of FIG. 5 from below;

FIG. 9, a section taken along the line IX—IX of FIG. 8;

FIG. 10, a slaving element of FIG. 5 from below;

FIG. 11, the slaving element of FIG. 10 from the side;

FIG. 12, a section taken along the line XII—XII of FIG. 10;

FIG. 13, an exploded view of a variant of FIG. 2;

FIG. 14, a section through a slaving disk of FIG. 13 with a bolt formed onto it;

FIG. 15, a side view of a sheet-metal plate of FIG. 13; and

FIG. 16, a slaving flange from FIG. 13, seen from below.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows an angle grinding machine **10** from above, with an electric motor, not shown, supported in a housing **96**. The angle grinding machine **10** can be guided via a first handle **98**, which is integrated with the housing **96** on the side remote from a cutting disk **18** and extending longitudinally, and via a second handle **102**, secured to a gearbox **100** in the region of the cutting disk **18** and extending transversely to the longitudinal direction.

With the electric motor, via a gear not shown, a drive shaft **54** can be driven, on whose end pointing toward the cutting disk **18** a slaving device **12** is disposed (FIG. **2**). The slaving device **12**, on a side toward the cutting disk **18**, has a slaving flange **82** pressed firmly onto the drive shaft **54**, and on a side remote from the cutting disk **18**, it has a slaving disk **56** that is supported displaceably on the drive shaft **18** axially counter to a centrally disposed helical spring **20**.

In the slaving flange **82**, three pins **40** disposed at uniform intervals one after the other in the circumferential direction **34, 36** and extending in the axial direction **38** to the cutting disk **18** past the slaving flange **82** are press-fitted into the slaving flange **82**. On their end pointing toward the cutting disk **18**, the pins **40** each have one head, which has a larger diameter than a remainder of the pin **40**, and on a side toward the slaving flange **82**, this head has a transmission face **76** that narrows in the axial direction **44**. The slaving flange **82** forms an axial bearing face **80** for the cutting disk **18**, which face defines an axial position of the cutting disk **18**; recesses **84** are made in this face in the region of the pins **40**. Three axial through bores **104** are also made in the slaving flange **82** one after the other in the circumferential direction **34, 36**; specifically, one through bore **104** is disposed between each two pins **40** in the circumferential direction **34, 36**.

Three bolts **24** are press-fitted one after the other in the circumferential direction **34, 36** into the slaving disk **56** that is supported axially displaceably on the drive shaft **54**; these bolts extend in the axial direction **38** to the cutting disk **18** via the slaving disk **56**. The slaving disk **56** is pressed by the helical spring **20** in the direction **38** toward the cutting disk **18** against the slaving flange **82**. The bolts **24** protrude through the through bores **104** and extend in the axial direction **38** past the slaving flange **82**.

The slaving device **12** also has a cup-shaped unlocking button **28**, disposed centrally on the side toward the cutting disk **18**. The unlocking button **28** has three segments **106**, distributed uniformly in the circumferential direction **34, 36** and extending in the axial direction **44** to the axially movably supported slaving disk **56**, which segments reach through corresponding recesses **108** in the slaving flange **82** and are secured against falling out in the axial direction **38, 44** via a snap ring **110** with the slaving disk **56**. The unlocking button **28** is guided displaceably in the axial direction **38, 44** in an annular recess **112** in the slaving flange **82**.

The cutting disk **18** has a sheet-metal hub **52**, which is connected solidly to a grinding means **114** via a rivet connection, not shown in detail, and pressed (FIG. **3**). The tool hub could also be made of some other material appearing useful to one skilled in the art, such as plastic, and so forth. The sheet-metal hub **52**, in succession in the circumferential direction **34, 36**, has three uniformly distributed bores **46, 48, 50**, whose diameter is slightly greater than the diameter of the bolts **24**. The sheet-metal hub **52** also has three elongated slots **64, 66, 68**, extending in the circumferential direction **34, 36** and distributed uniformly in the circumferential direction **34, 36**, each having a respective narrow region **70, 72, 74** and a respective wide region **58, 60, 62** that is produced by means of a bore, and whose diameter is slightly greater than the diameter of the heads of the pins **40**.

The sheet-metal hub **52** has a centering bore **116**, whose diameter is advantageously selected such that the cutting disk **18** can be clamped on a conventional angle grinding machine using a conventional chucking system with a chucking flange and a spindle nut. This assures so-called downward compatibility.

Upon installation of the cutting disk **18**, the cutting disk **18** is slipped with its centering bore **116** onto the unlocking button **28** and centered radially. Next, the cutting disk **18** is rotated, until the pins **52** engage the wide regions **58, 60, 62**, intended for them, in the elongated slots **64, 66, 68** of the sheet-metal hub **52**. Pressing the sheet-metal hub **52** against the bearing face **80** of the slaving flange **82** has the effect that the bolts **24** in the through bores **104** and also the slaving disk **56** are displaced counter to a spring force of the helical spring **20** axially on the drive shaft **54** in the direction **44** remote from the cutting disk **18**.

Further rotation of the sheet-metal hub **52** counter to the drive direction **34** has the effect that the pins **40** are displaced into the curved, narrow regions **70, 72, 74** of the elongated slots **64, 66, 68**. In the process, with their conical contact faces **76**, the pins **40** press against the edges of the elongated slots **64, 66, 68** and press them elastically into the recesses **84** of the slaving flange **82**. As a result, the sheet-metal hub **52** is pressed against the bearing face **80** and is fixed in the axial direction **38, 44**.

In a terminal position, or in an operating position of the cutting disk **18** that is attained, the bores **46, 48, 50** in the sheet-metal hub **52** come to rest above the through bores **104** of the slaving flange **82**. By the spring force of the helical spring **20**, the bolts **24** are axially displaced in the direction **38** of the cutting disk **18** and snap into the bores **46, 48, 50** of the sheet-metal hub **52** and fix the sheet-metal hub by positive engagement in both circumferential directions **34, 36**. Upon snapping into place, a snapping noise that is audible to a user occurs, indicating operating readiness to the user.

A driving moment of the electric motor of the angle grinding machine **10** can be transmitted by the drive shaft **54** to the slaving flange **82** by nonpositive engagement and by the slaving flange **82** to the cutting disk **18** via the bolts **24** by positive engagement. The drive moment is transmitted solely via the bolts **24**, since the elongated slots **64, 66, 68** are designed such that when the bolts **24** have snapped into place, the pins **40** do not come to rest on the end of the narrow regions **70**, **72**, **74** of the elongated slots **64**, **66**, **68**. In addition, a braking moment that occurs when the electric motor is switched off and thereafter and which is oriented counter to the driving moment can be transmitted by positive engagement from the slaving flange **82** to the cutting disk **18** via the bolts **24**. Unintended loosening of the cutting disk **18** is reliably avoided. By means of the three bolts **24** uniformly distributed in the circumferential direction **34**, **36**, an advantageous uniform distribution of both force and mass is attained.

To release the cutting disk **18** from the angle grinding machine **10**, the unlocking button **28** is pressed. The slaving disk **56** is displaced with the bolts **24** via the unlocking button **28**, counter to the helical spring **20**, in the axial direction **44** remote from the cutting disk **18**, and as a result the bolts **24** move in the axial direction **44** out of their detent position, that is, out of the bores **46**, **48**, **50** of the sheet-metal hub **52**. Next, the cutting disk **18** is rotated in the driving direction **34**, specifically until the pins **40** come to rest in the wide regions **58**, **60**, **62** of the elongated slots **64**, **66**, **68**, and the cutting disk **18** can be removed from the slaving flange **82** in the axial direction **38**. Once the unlocking button **28** is let go, the slaving disk **56**, bolts **24** and unlocking button **28** are displaced backward into their outset positions by the helical spring **20**.

In FIG. **4**, an alternative exemplary embodiment to the exemplary embodiment of FIG. **2** is shown, with a slaving device **14**. Components that remain essentially the same are identified by the same reference numerals in the exemplary embodiments shown. Also, the description of the exemplary embodiment in FIGS. **2** and **3** can be referred to for characteristics and functions that remain the same.

The slaving device **14** has a slaving flange **102** pressed onto the drive shaft **54**. A collar **92** is formed onto the slaving flange **90**, which forms a bearing face **88** for the cutting disk **18**; by way of this collar, the cutting disk **18** is radially centered in the state in which it is mounted with its centering bore **116**. Radial forces can advantageously be absorbed by the slaving flange **90** without putting a load on the unlocking button **28**.

Also in the slaving flange **90**, three pins **42** distributed uniformly in the circumferential direction **34**, **36** and extending in the axial direction **38** past the bearing face **88** are supported displaceably in the axial direction **38**, each against a respective cup spring **86**, for the sake of axial fixation of the cutting disk **18**. Each of the pins **42**, on its end pointing toward the cutting disk **18**, has a head, which has a larger diameter than a remaining portion of the pin **42**, and on a side toward the slaving flange **90**, the pins have a conical contact face **78**, which tapers in the axial direction **44**, and a contact face **78***a* extending parallel to the bearing face **78**. If the heads of the pins **42** are guided bythe wide regions **58**, **60**, **62** of the elongated slots **64**, **66**, **68**, then a rotation of the sheet-metal hub **52** counter to the driving direction **34** causes the pins **40** to be displaced into the curved narrow regions **70**, **72**, **74** of the elongated slots **64**, **66**, **68**. In the process, the pins **42** are displaced axially in the direction **38**, counter to the pressure of the cup springs **86**, via the conical contact faces **78** until the contact faces **78***a* of the pins **42** cover the edges of the elongated slots **64**, **66**, **68** in the curved narrow regions **70**, **72**, **74**.

In the installed state, the cup springs **86**, via the contact faces **78***a* of the pins **428**, press the cutting disk **18** against the bearing face **88**. Instead of being loaded with a plurality of cup springs **86**, the pins can also be loaded via other spring elements that appear useful to one skilled in the art, such as one cup spring, not shown, extending over the full circumference. The exemplary embodiment shown in FIG. **4**, with the axially displaceably supported pins **42**, is especially suitable for thick tool hubs or tool hubs that are not very deformable elastically.

In FIGS. **5**–**12**, one further exemplary embodiment with a slaving device **16** is shown. The slaving device **16** has a slaving flange **118** (FIG. **5**; FIGS. **10**, **11** and **12**) secured via a thread **120** to a drive shaft not identified by reference numeral. The slaving flange could also be joined to the drive shaft via an inseparable connection or integrally embodied with it.

The slaving flange **118** has three segments **122**, **124**, **126**, distributed uniformly in the circumferential direction **34**, **36** and extending in the axial direction **38** toward a cutting disk **32**, and between the segments it has interstices **128**, **130**, **132** (FIG. **10**). Each of these segments **122**, **124**, **126** has a groove **134**, **136**, **138** on its circumference; these grooves are closed counter to the drive direction **34**, each via a respective rotation stop **140**, **142**, **144**, and are open in the drive direction **34**. The slaving flange **118** furthermore has a bearing face **180**, which defines an axial position of the cutting disk **32**. The segments **122**, **124**, **126** furthermore form a centering collar for the cutting disk **32**, by way of which the cutting disk **32** can be centered.

In the installed state, a detent element **26** is connected to the slaving flange **118** via three detent pegs **146**, **148**, **150** distributed in the circumferential direction **34**, **36**, which reach through corresponding recesses **158**, **160**, **162** of the slaving flange **118** and radially outward engage the slaving flange **118** from behind (FIGS. **5**, **8** and **9**). On the detent element **26**, which at the same time forms an unlocking button **30**, three radially outward-extending blocking segments **152**, **154**, **156** are formed on, distributed uniformly in the circumferential direction **34**, **36**. Between the slaving flange **118** and the detent element **26** is a helical compression spring **22**, against which the detent element **26** is displaceable, in the axial direction **44** remote from the cutting disk **32**, relative to the slaving flange **118**. Via radially outward-pointing bearing faces **164**, **166**, **168** between the blocking segments **152**, **154**, **156**, the detent element **26** is guided in radially inward-pointing faces of the segments **122**, **124**, **126** of the slaving flange **118**. To prevent canting of the detent element **26** and to attain small bearing faces **164**, **166**, **168**, the bearing faces **164**, **166**, **168** are formed by radially outward-extending protrusions **170** (FIG. **8**).

In the installed state, the blocking segments **152**, **154**, **156** are located in the interstices **128**, **130**, **132** of the slaving flange **118** and protrude radially past a groove bottom of the grooves **134**, **136**, **138**. In an outset position, before the cutting disk **32** is installed, the blocking segments **152**, **154**, **156** of the detent element **26** are located in front of the grooves **134**, **136**, **138**, and specifically are loaded by the prestressed helical compression spring **22**.

The cutting disk **32** has an annular sheet-metal hub **94**, which is pressed on its outer diameter by a grinding means **114** and on its inner diameter has radially inward-pointing tongues or spring elements **172**, **174**, **176** (FIGS. **5**, **6** and **7**). In conjunction with the slaving flange **118** and the unlocking button **30**, the spring elements **172**, **174**, **176** serve to transmit the drive moment, to position the cutting disk **32** axially, and to secure the cutting disk **32** against running off center when the electric motor is turned off or the drive shaft is braked. In addition, along with the segments **122**, **124**, **126**, the spring elements can be used for centering the cutting disk **32** relative to the drive shaft.

In the installation of the cutting disk **32**, the cutting disk is aligned with the slaving flange **118**, so that the spring elements **172, 174, 176** on the inner diameter of the sheet-metal hub **94** point into the interstices **128, 130, 132** between the segments **122, 124, 126** of the slaving flange **118**. The spring elements **172, 174, 176** of the cutting disk **32** rest on the blocking segments **152, 154, 156** of the unlocking button **30**. Next, the cutting disk **32** is pressed in the axial direction **44** until it reaches the bearing face **180** of the slaving flange **118**. The spring elements **172, 174, 176** of the cutting disk **32** rest on the blocking segments **152, 154, 156** of the unlocking button **30**. Next, the cutting disk **32** is pressed in the axial direction **44** until it reaches the bearing face **180** of the slaving flange **118**. The spring elements **172, 174, 176** displace the unlocking button **30**, with its blocking segments **152, 154, 156**, in the direction **44** axially remote from the cutting disk **32**, counter to the spring force of the helical compression spring **22**. The blocking segments **152, 154, 156** are pressed into recesses **178** of the slaving flange **118** (FIG. **12**), so that the spring elements **172, 174, 176** come to rest in front of the grooves **134, 136, 138**.

In the process, the cutting disk **32** is radially centered via the centering collar formed by the segments **122, 124, 126**. By rotation of the cutting disk **32** counter to the drive direction **34**, the spring elements **172, 174, 176** engage the grooves **134, 136, 138** of the slaving flange **118**. A tongue-and-groove connection is made. The spring elements **172, 174, 176** have the same length, or a slightly shorter length, in the circumferential direction **36** than the grooves **134, 136, 138**. Once the spring elements **172, 174, 176** have been thrust all the way into the grooves **134, 136, 138**, that is, once an operating position of the cutting disk **32** is reached, the detent element **26** with its blocking segments **152, 154, 156** snaps into place, and the helical compression spring **22** presses the detent element **26** with its blocking segments **152, 154, 156** into its outset position, so that once again the blocking segments **152, 154, 156** come to rest in front of the grooves **134, 136, 138**. With its blocking segments **152, 154, 156**, the detent element **26** fixes the cutting disk **32** by positive engagement counter to the drive direction **34**. The process of snapping into place creates a snap-in noise that is audible to a user and indicates to the user that the snap-in process has been completed as desired, and the system is ready for operation.

The transmission of the drive moment to the spring elements **172, 174, 176** of the sheet-metal hub **94** or cutting disk **32** is done by positive engagement via the rotation stops **140, 142, 144** of the slaving flange **118**. The cutting disk **32** is centered via the centering collar formed by the segments **122, 124, 126** of the slaving flange **118** and is held in its axial position by the bearing face **180** and the grooves **134, 136, 138**. In addition, a braking moment, oriented counter to the drive moment and occurring upon and after the shutoff of the electric motor, is transmitted by positive engagement from the blocking segments **152, 154, 156** and the slaving flange **118** to the spring elements **172, 174, 176** of the cutting disk **32**.

An equalization of play is achieved in the axial direction by means of a spring element, not identified by reference numeral but formed by a sheet-metal strip, in the grooves **134, 136, 138**. An equalization of play could also be attained via other spring elements appearing useful to one skilled in the art, such as spring-loaded balls that are placed at suitable points of the slaving flange and that fix the tool hub of the cutting disk without play, and/or with a slight oversize of the spring elements of the tool hub, by means of a slightly wedgelike shape of the grooves and the spring elements of the tool hub, and so forth.

For releasing the cutting disk **32**, the unlocking button **30** is pressed in the axial direction **44** remote from the cutting disk **32**. The blocking segments **152, 154, 156** of the unlocking button **30** and of the detent element **26** are displaced into the recesses **178** of the slaving flange **118**. Next, with its spring elements **172, 174, 176**, the cutting disk **32** can be rotated in the drive direction **34** out of the grooves **134, 136, 138** of the slaving flange **118** and pulled off in the axial direction **38**. As the cutting disk **32** is pulled off, the unlocking button **30** is compressed into its outset position by the helical compression spring **22**.

In FIG. **13**, an alternative exemplary embodiment to the exemplary embodiment of FIG. **4** is shown, with a slaving device **300**. The slaving device **300** has a slaving flange **90**, which forms a bearing face **88** for a cutting disk, not identified by reference numeral here. On the side toward the cutting disk, a collar **92** is formed onto the slaving flange **90**, and by way of this collar the cutting disk with its centering bore is radially centered in the installed state. Radial forces can advantageously be absorbed by the slaving flange **90**, without putting a load on an unlocking button **28**.

On a side of the slaving flange **90** remote from the cutting disk, a sheet-metal plate **308** for axial fixation of the cutting disk is disposed, having three circumferentially uniformly distributed, integrally formed-on fastening elements **306** that extend in the axial direction **38**. The fastening elements **306** are formed onto the sheet-metal plate **308** in a bending operation.

Upon installation, the slaving flange **90**, a wave washer **312** and the sheet-metal plate **308** are pre-installed. In the process, the wave washer **312** is slipped onto a collar **322**, pointing in the direction away from the cutting disk, of the slaving flange **90**. Next, the fastening elements **306** of the sheet-metal plate **308**, which on their free end have a hook-shaped extension with an oblique face **310** pointing in the circumferential direction (FIGS. **13** and **15**), are guided in the axial direction **38** by recesses **314** of the slaving flange **90**, specifically by widened regions **316** of the recesses **314** (FIGS. **13** and **15**). By compression and rotation of the sheet-metal plate **308** and slaving flange **90** against one another, the wave washer **312** is pre-stressed, and the sheet-metal plate **308** and the slaving flange **90** are connected by positive engagement in the axial direction **38, 44**, specifically in that the hook-shaped extensions are rotated into narrow regions **318** of the recesses **314** (FIGS. **13, 15** and **16**). Next, loaded by the wave washer **312**, the sheet-metal plate **308** is braced on the bearing face **88** of the slaving flange **90** via edges **310***a* of the hook-shaped extensions, which point axially in the direction away from the cuting disk.

Once the sheet-metal plate **308** with the formed-on fastening elements **306**, the wave washer **312** and the slaving flange **90** have been pre-installed, a compression spring **20** and a slaving disk **304**, with three circumferentially uniformly distributed, integrally formed-on bolts **302** extending in the axial direction **38**, are slipped onto a drive shaft **54**. The bolts **302** are formed onto a sheet-metal plate forming the slaving disk **304** in a deep-drawing operation (FIG. **14**).

Next, the pre-installed group of components, comprising the sheet-metal plate **308**, wave washer **312** and slaving flange **90**, are mounted on the drive shaft **54**. In this operation, the bolts **302** are guided by recesses **320** formed onto the circumference of the sheet-metal plate **308** and by through bores **104** in the slaving flange **90**, and in the installed state they reach through the through bores **104**. The sheet-metal plate **308** and the slaving flange **90** are secured against rotating relative to one another via the bolts **302**.

The slaving flange **90** is pressed onto the drive shaft **54** and then secured with a securing ring, not shown in detail. Instead of a press-fitted connection, however, other connections that appear useful to one skilled in the art are also conceivable, such as a threaded connection, and so forth.

Once in the installation of a cutting disk **18** (see FIGS. **3** and **4**) the hook-shaped extensions of the fastening elements **306** are guided through the wide regions **58**, **60**, **62** of the elongated slots **64**, **66**, **68** of the sheet-metal hub **52** (FIG. **13**), rotating the sheet-metal hub **52** counter to the driving direction **34** has the effect of displacing the hook-shaped extensions into the curved, narrow regions **70**, **72**, **74** of the elongated slots **64**, **66**, **68** of the sheet-metal hub **52**. In the process, the sheet-metal plate **308** with the fastening elements **306** is displaced axially in the direction **38** via the oblique faces **310** counter to the pressure of the wave washer **312**, until the edges **310***a* of the hook-shaped extensions come to rest in curved, narrow regions **70**, **72**, **74** laterally next to the elongated slots **64**, **66**, **68** of the sheet-metal hub **53**. In the installed state, the wave washer **312**, via the edges **310***a* of the hook-shaped extensions, presses the cutting disk **18** against the bearing face **88**.

Alternatively, the fastening elements and elongated slots in the sheet-metal hub could be embodied as rotated by 180°, reversing the direction of installation, and the sheet-metal hubs would be rotated in the driving direction upon assembly. If the fastening elements are embodied as rotated by 180°, then in operation an oblique face of a lower face-end edge of the fastening element is in the lead, so that injuries from the face-end edge can be prevented.

List of Reference Numerals	
10	Angle grinding machine
12	Slaving device
14	Slaving device
16	Slaving device
18	Insert tool
20	Spring element
22	Spring element
24	Detent element
26	Detent element
28	Unlocking button
30	Unlocking button
32	Insert tool
34	Circumferential direction
36	Circumferential direction
38	Direction
40	Fastening element
42	Fastening element
44	Direction
46	Recess
48	Recess
50	Recess
52	Tool hub
54	Drive shaft
56	Component
58	Region
60	Region
62	Region
64	Elongated slot
66	Elongated slot
68	Elongated slot
70	Region
72	Region
74	Region
76	Contact face
78	Contact face
80	Bearing face
82	Component
84	Recess
86	Spring element

-continued

List of Reference Numerals	
88	Bearing face
90	Component
92	Collar
94	Tool hub
96	Housing
98	Handle
100	Gearbox
102	Grip
104	Through bore
106	Segment
108	Recess
110	Snap ring
112	Recess
114	Grinding means
116	Centering bore
118	Slaving flange
120	Thread
122	Segment
124	Segment
126	Segment
128	Interstice
130	Interstice
132	Interstice
134	Groove
136	Groove
138	Groove
140	Rotation stop
142	Rotation stop
144	Rotation stop
146	Detent peg
148	Detent peg
150	Detent peg
152	Blocking segment
154	Blocking segment
156	Blocking segment
158	Recess
160	Recess
162	Recess
164	Bearing face
166	Bearing face
168	Bearing face
170	Protrusion
172	Spring elements
174	Spring elements
176	Spring elements
178	Recess
180	Bearing face
300	Slaving device
302	Detent element
304	Component
306	Element
308	Component
310	Oblique face
310a	Edge
312	Spring element
314	Recess
316	Region
318	Region
320	Recess
322	Collar

What is claimed is:

1. A grinding machine tool receptacle for a hand-guided angle grinding machine (**10**), having a slaving device (**12**, **14**, **16**, **300**), by way of which an insert tool (**18**, **32**) is operatively connectable to a drive shaft (**54**), characterized in that the insert tool (**18**, **32**) is operatively connectable to the slaving device (**14**, **16**, **300**) via at least one detent element (**24**, **26**, **302**), supported movably counter to a spring element (**20**, **22**), which detent element snaps into place in an operating position of the insert tool (**18**, **32**) driven by the spring element (**20**, **22**) and fixes the insert tool (**18**, **32**) by positive engagement, wherein the detent element (**24**, **26**, **302**) is displaceable in the axial direction (**44**) counter to the spring element (**20**, **22**), wherein the insert tool (**18**) is connected to the slaving device (**12, 14, 300**) in the circumferential direction (**34, 38**) via at least a first element (**24, 302**) and in the axial direction (**38**) via at least a second element (**40, 42, 306**), and wherein the second element (**40, 42, 306**) is arranged for fixing of the insert tool (**18, 32**) with a spring force.

2. The grinding machine tool receptacle of claim **1**, characterized in that a drive moment can be transmitted via a positive-engagement connection between the insert tool (**18, 32**) and the slaving device (**12, 14, 16, 300**).

3. The grinding machine tool receptacle of claim **1**, characterized in that the detent element (**24, 26, 302**) can be released from its detent position by an unlocking button (**28, 30**).

4. The grinding machine tool receptacle claim **1**, characterized in that the insert tool (**32**) is connectable to the slaving device (**16**) via a tongue-and-groove connection, which is secured by positive engagement via at least one detent element (**26**) in an operating position of the insert tool (**32**).

5. The grinding machine tool receptacle of claim **1**, characterized in that at least one detent element (**302**) is integrally formed onto a disklike component (**304**).

6. The grinding machine tool receptacle of claim **1** characterized in that at least two elements (**306**) for fixing the insert tool (**18**) in the axial direction (**38**) are integrally formed onto a diskilke component (**308**).

7. A grinding machine tool receptacle of claim **1**, characterized in that the second element (**40, 42, 306**) is supported movably and loaded by a spring element.

8. A grinding machine tool receptacle as defined in claim **7**, wherein the tool hub (**52, 94**) has a third recess provided for centering and formed separately from the first recess (**46, 48, 50**) and the second recess (**64, 66, 68**).

9. A grinding machine tool receptacle as defined in claim **1**, wherein the second element (**42, 306**) is supported movably, is provided with a contact face (**78*a*, 310*a***) and with the contact face (**78*a*, 310*a***) of the second element (**42, 306**) the insert tool (**18**) is loadable in an axial direction (**44**) from a free end of the drive shaft (**54**) to a machine-side end bearing face (**88**) with a spring force of a spring element (**86, 312**).

10. A grinding machine tool receptacle as defined in claim **1**, wherein said spring element (**86, 312**) is formed as a cup spring.

11. A grinding machine tool receptacle as defined in claim **1**, wherein the insert tool (**18, 32**) in the operating position is connected with the slaving device (**12, 14, 16, 300**) through at least two second elements which are supported movably and loaded by a common cup spring element.

12. A grinding machine insert tool for an angle grinding machine (**10**), is connectable by a tool hub (**52, 94**), via a slaving device (**12, 14, 16, 300**) of a grinding machine tool receptacle, to a drive shaft (**54**) of a grinding machine (**10**), characterized in that the tool hub (**52, 94**) is operatively connectable to the slaving device (**12, 14, 16, 300**) via at least one detent element (**24, 26, 302**), supported movably counter to a spring element (**20, 22**), which detent element snaps into place in an operating position of the tool hub (**52, 94**) and fixes the tool hub (**52, 94**) by positive engagement, wherein at least a first recess (**46, 48, 50**) for a positive-engagement connection to the slaving device (**12, 14, 300**) in at least one circumferential direction (**34, 36**), and at least one second recess (**64, 66, 68**), separated from the first recess (**46, 48, 50**), for a positive-engagement connection in the axial direction (**38**) are made in the tool hub (**52**).

13. The grinding machine insert tool of claim **12**, characterized in that at least elongated slot (**64, 66, 68**) is made in the tool hub (**52**), which elongated slot has one wide region (**58, 60, 62**) and at least one narrow region (**70, 72, 74**).

14. A grinding machine tool receptacle for a hand-guided angle grinding machine (**10**), having a slaving device (**12, 14, 16, 300**), by way of which an insert tool (**18, 32**) is operatively connectable to a drive shaft (**54**), characterized in that the insert tool (**18, 32**) is operatively connectable to the slaving device (**14, 16, 300**) via at least one detent element (**24, 26, 302**), supported movably counter to a spring element (**20, 22**), which detent element snaps into place in an operating position of the insert tool (**18, 32**) and fixes the insert tool (**18, 32**) by positive engagement, wherein the insert tool (**18**) is connected to the slaving (**12, 14, 300**) in the circumferential direction (**34, 36**) via at least a first element (**24, 302**) and in the axial direction (**38**) via at least a second element (**40, 42, 306**), and wherein at least one detent element (**24, 302**), extending in the axial direction (**38**), snaps into a recess (**46, 48, 50**), corresponding to the detent element (**24, 302**), of a tool hub (**52**) of the insert tool (**18**) in an operating position of the insert tool (**18**) and fixes the insert tool (**18**) in the circumferential direction (**34, 36**) by positive engagement.

15. A grinding machine tool receptacle fore hand-guided angle grinding machine (**10**), having a slaving device (**12, 14, 16, 300**), by way of which an insert tool (**18, 32**) is operatively connectable to a drive shaft (**54**), characterized in that the insert tool (**18, 32**) is operatively connectable to the slaving device (**14, 16, 300**) via at least one detent element (**24, 26, 302**), supported movably counter to a spring element (**20, 22**), which detent element snaps into place in an operating position of the insert tool (**18, 32**) and fixes the insert tool (**18, 32**) by positive engagement, wherein the insert tool (**18**) is connected to the slaving device (**12, 14, 300**) in the circumferential direction (**34, 36**) via at least a first element (**24, 302**) and in the axial direction (**38**) via at least a second element (**40, 42, 306**), and wherein at least one detent element (**24**) extending in the axial direction (**38**) is secured in a component (**56**) supported displaceably on the drive shaft (**54**) counter to the spring element (**20**).

16. A grinding machine tool receptacle for a hand-guided angle grinding machine (**10**), having a slaving device (**12, 14, 16, 300**), by way of which an insert tool (**18, 32**) is operatively connectable to a drive shaft (**54**), characterized in that the insert tool (**18, 32**) is operatively connectable to the slaving device (**14, 16, 300**) via at least one detent element (**24, 26, 302**), supported movably counter to a spring element (**20, 22**), which detent element snaps into place in an operating position of the insert tool (**18, 32**) and fixes the insert tool (**18, 32**) by positive engagement, wherein the insert tool (**18**) is connected to the slaving device (**12, 14, 300**) in the circumferential direction (**34, 36**) via at least a first element (**24, 302**) and in the axial direction (**38**) via at least a second element (**40, 42, 306**), and wherein the slaving device (**12, 14, 300**) has at least one fastening element (**40, 42, 306**), extending in the axial direction (**38**), which can be passed through at least one region (**58, 60, 62**) of an elongated slot (**64, 66, 68**) of a tool hub (**52**) of the insert tool (**18**) and in the elongated slot (**64, 66, 68**) is displaceable in a narrowed region (**70, 72, 74**) of the elongated slot (**64, 66, 68**), and by way of which the insert tool (**18**) is axially fixable in the elongated slot (**64, 66, 68**) via a contact face (**76, 78, 310*a***) disposed on the fastening element (**40, 42, 306**).

17. The grinding machine tool receptacle of claim **16**, characterized in that a component (**82**) forming a bearing face (**80**) for the insert tool (**18**), in the fastened state of the insert tool (**18**), has a recess (**84**) in the region of the elongated slot (**64**, **66**, **68**), into which recess part of the tool hub (**52**) is pressed elastically, in an operating position of the insert tool (**18**).

18. The grinding machine tool receptacle of claim **16**, characterized in that the fastening element (**42**, **306**) extending in the axial direction (**38**) is supported elastically displaceably in the axial direction (**38**) counter to a spring element (**86**, **312**), for axially the insert tool (**18**).

19. A grinding machine tool receptacle for a hand-guided angle grinding machine (**10**), having a slaving device (**12**, **14**, **16**, **300**), by way of which an insert tool (**18**, **32**) is operatively connectable to a drive shaft (**54**), characterized in that the insert tool (**18**, **32**) is operatively connectable to the slaving device (**14**, **16**, **300**) via at least one detent element (**24**, **26**, **302**), supported movably counter to a spring element (**20**, **22**), which detent element snaps into place in an operating position of the insert tool (**18**, **32**) and fixes the insert tool (**18**, **32**) by positive engagement, wherein the insert tool (**18**) is connected to the slaving device (**12**, **14**, **300**) in the circumferential direction (**34**, **36**) via at least a first element (**24**, **302**) and in the axial direction (**38**) via at least a second element (**40**, **42**, **306**), wherein a collar (**92**), by way of which the insert tool (**18**) can be radially centered, is formed onto a component (**90**) of the slaving device (**14**, **300**) that forms a bearing face (**88**) for the insert tool (**18**).

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