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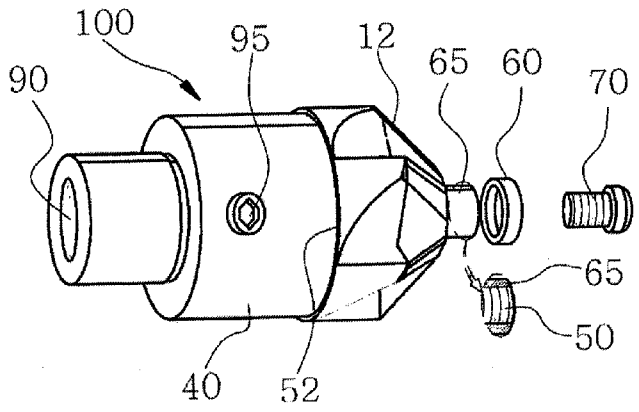
FIG. 2



(57) Abstract: The present invention provides a beveling tool (100) including a body (10) with a shaft hole (5) formed through the center; a plurality of cutter blades (20) arranged at predetermined distances on the circumferential surface of the body (10), each having a radial primary relief surface (14) with a radial primary relief angle ranging from 10 to 20 degrees and a radial secondary relief surface (16) with a radial secondary relief angle ranging from 25 to 45 degrees; discharge grooves (30) formed longitudinally between the cutter blades (20) to discharge chips produced in beveling; and a shank (40) inserted in the shaft hole (5) of the body (10), in which the body (10) and the shank (40) are connected by brazing. With the beveling tool of the present invention, it is possible to smoothly discharge chips produced in beveling and to prevent damage to the cutter blades.

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BEVELING / CHAMFERING TOOL – ROUTER HEAD FOR METAL

Technical Field

The present invention relates to a beveling tool, more commonly described as a router head for metal, which fits on standard power tools and forms the edge of a work piece more uniformly than previous tools by means of on a unique multiple blade and discharge channel cutting head design.

Background Art

The beveling machines of the related art include a drive unit and a power transmission unit in a main body having a handle and a spindle mounted on a head unit and rotated by power from the power transmission unit.

A cutter head is mounted on the free end of the spindle and a flange plate is installed between the cutter and the spindle by means of a case, a guide shaft, and a ball bearing.

In beveling tools with such a configuration, the edge of a work piece is aligned with the cutter, the driving unit in the body is driven by a power transmission unit, and the driving force rotates the spindle through the power transmission unit. With the rotation of the spindle, the cutter at the free end is rotated and machines the edge of the work piece while rotating.

When the edge of a work piece is machined with previous tools, however, beveling machines have a problem in that the work piece and the cutter come in contact with each other, the spindle chatters, which can result in an imperfect edge finish and the internal parts can be damaged by a shock due to the chattering and result in rapidly wearing tools.

A chamfering cutter, similar to the invention cutter for beveling machines includes a body with a shaft hole formed through the center, a plurality of cutter blades extending at regular intervals with a helix angle of 1 to 40 degrees around the shaft hole on the outer circumferential surface of the body while having both sides that are beveling sides, discharge grooves formed

longitudinally between the cutter blades to discharge chips formed in beveling. As such, it is possible to discharge chips even if long plane chips are produced and to machine an edge uniformly when beveling.

Disclosure of Invention

Problem to be solved by the Invention

In order to eliminate problems with the cutters of the beveling machines of the related art, one objective of the present invention is to provide a beveling tool that can machine a surface to a uniform shape with a uniform surface whenever beveling a work piece.

Another objective of the present invention is to provide a beveling tool that can easily discharge chips formed while beveling a work piece without generating sparks when discharging.

Another objective of the present invention is to provide a beveling tool that can minimize damage to the cutting blades and reduce the work load when beveling.

Means for Solving Problem

In order to achieve the objectives of the present invention, a beveling cutter may include: a body with a shaft hole formed through the center; a plurality of cutter blades arranged at predetermined distances on the circumferential surface of body, each having a radial primary blade with a radial primary relief angle ranging from 10 to 20 degrees and a radial secondary blade with a radial secondary relief angle ranging from 25 to 35 degrees; discharge grooves formed longitudinally between the cutter blades to discharge chips produced in beveling; and a shank inserted in the shaft hole of the body, in which the body and the shank are mechanically attached by means of a center connecting screw, brazing or adhesive.

A protruded post at the top of the cutter with a threaded hole for coupling to a bearing may be formed at a side of the shank, which is a main part of the present invention, and a threaded hole for coupling to an electric tool may be

formed at the opposite side of the shank.

The bearing on the top may be mounted on the protruded post by fitting the bearing onto the post and then tightening a fixing screw into the threaded hole.

Effect of the Invention

With a beveling tool such as that described as the present invention, since the radial primary relief angle and the radial secondary relief angle range from 10 to 20 degrees and from 25 to 35 degrees (or 35 to 45 degrees), respectively, there are advantages in that it is possible to reduce load generated while beveling a work piece and prevent machining interference and chattering by ensuring a sufficient gap between the work piece and the radial primary blades.

Additionally, with a beveling tool such as the present invention, since the horned portion is formed at a side of the radial primary blade, there is the advantage in that it is possible to prevent the cutter blades from breaking and chattering.

With a beveling tool such as the present invention, since the cutter blades have an edge angle ranging from 15 to 60 degrees without a helix angle, there are also advantages in that it is possible to perform more precise machining on a work piece and improve surface finish of the work piece.

Brief Description of Drawings

FIG. 1 is a plan view showing a beveling cutter according to an embodiment of the present invention;

FIG. 2 is a perspective view showing the combination status of a beveling cutter and a shank which are main parts of the present invention;

FIG. 3 is a plan view showing a beveling cutter according to another embodiment of the present invention; and

FIG. 4 is a perspective view showing the combination status of a beveling cutter and a shank which are main parts of the present invention.

FIG. 5 Shows the beveling cutter mounted on a power tool and forming the interior and exterior edge of a work piece.

Best Mode(s) of Carrying Out the Invention

In the following and in line with the embodiments of the present invention, beveling cutters will be described in detail with reference to the accompanying drawings.

FIG. 1 is a plan view showing a beveling cutter according to an embodiment of the present invention, FIG. 2 is a perspective view showing the combination status of a beveling cutter and a shank which are main parts of the present invention, FIG. 3 is a plan view showing a beveling cutter according to another embodiment of the present invention, and FIG. 4 is a perspective view showing the combination status of a beveling cutter and a shank which are main parts of the present invention.

Beveling tool 100 in the form of an embodiment of the present invention, as shown in FIGS. 1 and 2 includes a body 10, a plurality of cutter blades 20 arranged at predetermined distances on the circumferential surface of the body 10, discharge grooves 30 formed longitudinally between the cutter blades 20 to discharge chips produced in beveling, and a shank 40 inserted in the shaft hole 5 of the body 10.

The body 10, as shown in FIG. 1, has a shaft hole 5 formed through the center and six cutter blades 20 arranged at predetermined distances. The cutter blades 20 each has a radial primary blade 14 with a radial primary relief angle ranging from 10 to 20 degrees and a radial secondary blade 16 with a radial secondary relief angle ranging from 25 to 35 degrees. The width of the radial primary blade 14 ranges from 0.7 to 0.8mm and the width of the radial secondary blade 16 ranges from 2.2 to 2.3mm.

The radial primary relief angle is selected to an optimal angle, 10 to 20 degrees, to reduce load in the beveling of a work piece (not shown). The optimal angle for the radial primary relief angle is selected to provide optimal conditions for breaking and cutting a work piece.

Honed portions 12 are formed by honing a side of the radial primary blades 14 at an angle ranging from 1 to 45 degrees to prevent the cutter blades 20 from breaking or chattering. Although the honed portions 12 may be 0.05 to 0.2mm wide, it is preferable to make them 0.1mm wide.

The radial secondary relief angle is selected to an optimal angle, 25 to 35 degrees, to prevent machining interference and chattering by ensuring a sufficient gap between a work piece and the radial primary blade 14 in beveling. The radial secondary relief angle is angle data based on various tests for smooth cutting.

The cutter blades 20 are straight or with a helix angle and the edge angle is 15 to 60 degrees. The edge angle may be understood as the meaning of a beveling angle.

The shank 40 is formed in a cylindrical shape with several steps needed to be inserted in the shaft hole 5 of the body 10 of the cutter 20. The shank 40 is inserted in the shaft hole 5 of the body 10 and then brazed, such that the joint 52 is formed.

As shown in FIG. 2, a protrusion 65 with a threaded hole 50 for coupling to a bearing 60 is formed at a side of the shank 40, and a threaded hole 90 for coupling to an electric tool is formed at the opposite side of the shank 40. The bearing 60 is mounted on the protrusion 65 by fitting the bearing 60 onto the protrusion 65 and then tightening a fixing bolt 70 into the threaded hole 50. Further, a wrench portion 95 is formed at the center of the shank 40 for easy attachment/detachment of a beveling tool.

Another embodiment of such a beveling tool in the present invention is different from the embodiment described above in that four cutter blades 20 are provided, as shown in FIGS. 3 and 4. Further, the radial secondary relief angle is selected within the range of 35 to 45 degrees, different from the embodiment described above. The radial secondary relief angle changes because four cutter blades 20 are provided. The other factors, including the radial primary relief angle, are similar to those in the embodiment described above, so a detailed description is not provided.

The description below shows how to mount the beveling tool of the present invention with the configuration described above on an air tool or an electric tool and to bevel a work piece.

The beveling tool 100 in the embodiment of the present invention is fastened to an air tool or an electric tool (not shown) by inserting and fitting a rotary shaft of the air tool or the electric tool into the threaded hole 90 at the opposite side of the shank 40. With the beveling tool 100 fastened to an air tool or an electric tool, when the beveling tool 100 is brought in contact with a work piece (not shown) and the power switch is turned on the drive unit operates and rotates the cutter blades 20 of the beveling tool 100.

As the cutter blades 20 rotate, beveling on the work piece starts.

Chips (not shown) that are produced by the beveling surfaces of the cutter blades 20 are discharged through the discharge grooves 30 in beveling the work piece. Further, the cutter blades 20 are generally coated, so that the chips are easily discharged without damaging the surfaces of the cutter blades 20.

Since the cutter blades 20 have the honed portion 12 on a side of the radial primary blade 14, the cutter blades 20 can be prevented from breaking and the surface finish of the work piece can be improved in beveling the work piece. Further, small particles are sintered in the honed portion 12, so that beveling can be implemented by the cutter blades with very sharp lines even in high-speed rotation while the lifespan of the cutter blades 20 can be considerably increased and high-quality surfaces can be achieved.

Since the radial primary blade 14 has a radial primary relief angle ranging from 10 to 20 degrees, the load generated in beveling can be reduced. Further, since the radial primary blades 14 have the radial primary relief angle, it is possible to not only reduce damage to the cutter blades, but provide optimal conditions for cutting. Further, since the radial secondary relief angle of the radial secondary blade 16 connected with the radial primary blade 14 ranges from 25 to 35 degrees, a sufficient gap is ensured between the work piece and the radial primary blade 14 in beveling and thus machining interference and

chattering can be prevented. In addition, the cutter blades 20 can smoothly move in the cutting direction due to the radial secondary relief angle. This embodiment of the present invention was configured to coincide with the demands of users by changing the number of the cutter blades to four. Further, the operation of the beveling tool according to this embodiment of the present invention is almost similar to that of the embodiment described above and thus not mentioned here.

Beveling tools of the present invention are not limited to the embodiments described above. The present invention may be modified in various ways by those skilled in the art without departing from the spirit and scope of the present invention, which are described in claims, and it should be understood that such modifications are included in the range of the present invention.

Industrial Applicability

The beveling tool of the present invention is available for various types of beveling machines equipped with a cutter, in addition to cutters for machining edges of a work piece and straight surfaces as well.

Explanations of Letters or Numerals

5: Shaft hole	10: Body
14: Radial primary blade	16: Radial secondary blade
20: Cutter blade	30: Discharge groove
40: Shank	50: 90: Threaded hole
60: Bearing	65: Protrusion

CLAIMS

Claim 1

The beveling tool consists of the following: a body with a shaft hole formed through the center; a plurality of cutter blades arranged at predetermined distances on the circumferential surface of the body, each having a radial primary blade with a radial primary relief angle ranging from 10 to 20 degrees and a radial secondary blade with a radial secondary relief angle ranging from 25 to 35 degrees; discharge grooves formed longitudinally between the cutter blades to discharge chips produced in beveling; and a shank inserted in the shaft hole of the body, wherein the body and the shank are connected by brazing.

Claim 2

The beveling tool of claim 1, wherein the width of the radial primary blade ranges from 0.7 to 0.8mm and the width of the radial secondary blade ranges from 2.2 to 2.3mm.

Claim 3

The beveling tool of claim 1, wherein the cutter blades have an edge angle ranging from 15 to 60 degrees.

Claim 4

The beveling tool of claim 1, wherein a protrusion with a threaded hole for coupling to a bearing is formed at a side of the shank and a threaded hole for coupling to an electric tool is formed at the opposite side of the shank.

Claim 5

The beveling tool of claim 1, wherein the bearing is mounted on the protrusion by fitting the bearing onto the protrusion and then tightening a fixing bolt into the threaded hole.

Claim 6

The beveling tool of claim 1, wherein a wrench portion is formed at the center of the shank for easy attachment/detachment of the beveling tool.

Claim 7

The beveling cutter of claim 1, wherein honed portions are formed by honing a side of the radial primary blades of the cutter blades at an angle ranging from 1 to 45 degrees to prevent the cutter blades from breaking or chattering.

Claim 8

The beveling tool consists of the following: a body with a shaft hole formed through the center; a plurality of cutter blades arranged at predetermined distances on the circumferential surface of the body and each having a radial primary blade with a radial primary relief angle ranging from 10 to 20 degrees, a radial secondary blade with a radial secondary relief angle ranging from 35 to 45 degrees; discharge grooves formed longitudinally between the cutter blades to discharge chips produced in beveling; and a shank inserted in the shaft hole of the body, wherein the body and the shank are connected by brazing.

Claim 9

The beveling cutter of claim 7, wherein honed portions are formed by honing a side of the radial primary blades of the cutter blades at an angle ranging from 1 to 45 degrees to prevent the cutter blades from breaking or chattering.

Claim 10

The beveling tool of claim 9, wherein the width of the honed portions ranges from 0.05 to 0.2mm.

FIG. 1

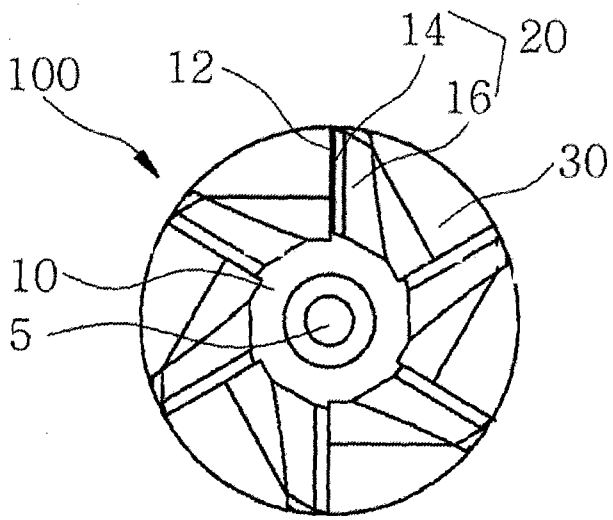


FIG. 2

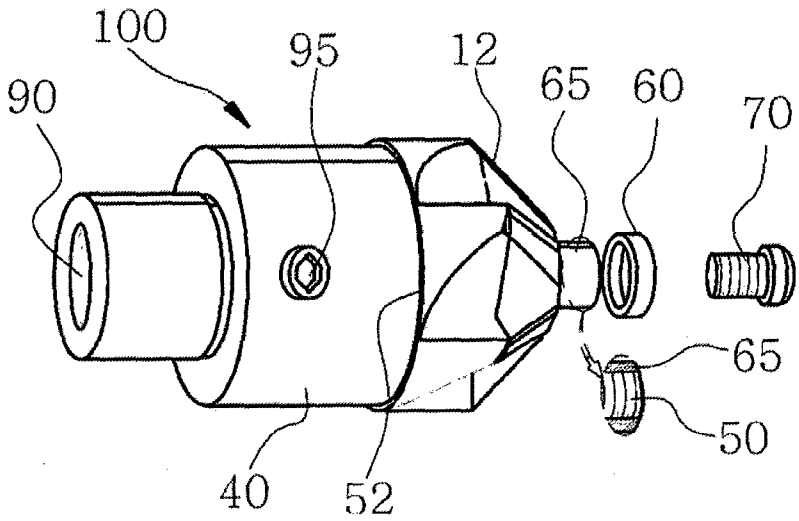


FIG. 3

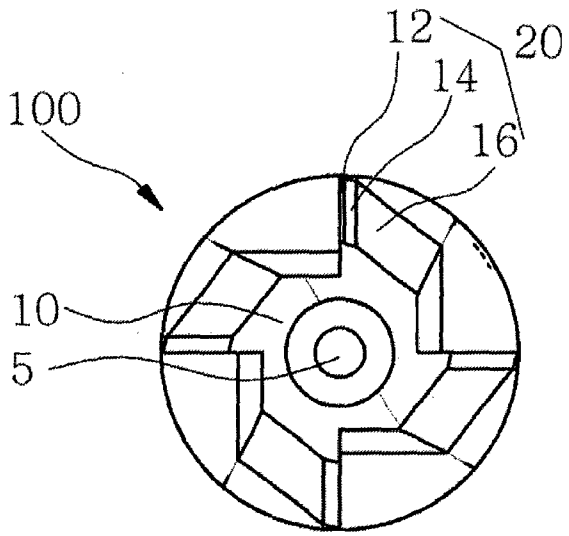


FIG. 4

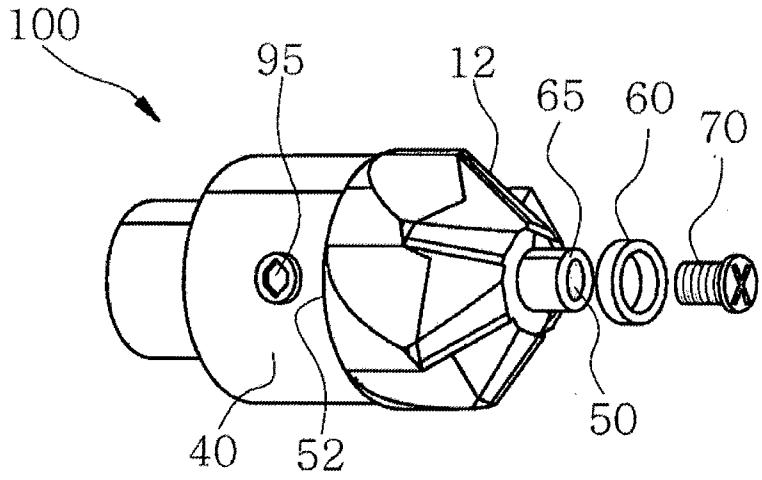
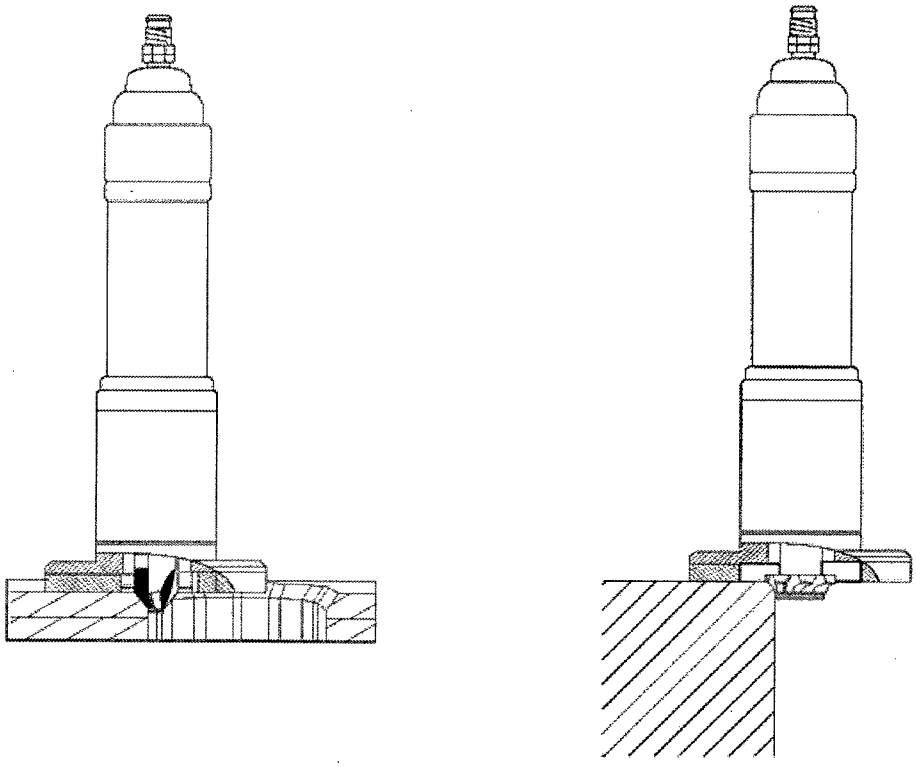


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2013/000038

A. CLASSIFICATION OF SUBJECT MATTER
INV. B23C5/10 B23C3/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	BG 19 649 A1 (.) 10 October 1975 (1975-10-10) figures	1-10
Y	CH 701 414 A1 (FRAISA HOLDING AG [CH]) 14 January 2011 (2011-01-14) paragraph [0042] - paragraph [0048] paragraph [0070] - paragraph [0073] figure 2	1-10

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 November 2013	14/11/2013

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Breare, David

INTERNATIONAL SEARCH REPORT

International application No
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