United States Patent [19]

Vanek

[11] **3,892,265**

[45] **July 1, 1975**

[54] **CHIPPER BIT AND HOLDER**

[75] Inventor: **Stanley Donald Vanek,** Seattle, Wash.

[73] Assignee: **Nicholson Manufacturing Company,** Seattle, Wash.

[22] Filed: **Apr. 6, 1973**

[21] Appl. No.: **348,858**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 141,595, May 10, 1973, Pat. No. 3,757,839, which is a continuation-in-part of Ser. No. 883,038, Dec. 8, 1969, Pat. No. 3,661,192.

[52] **U.S. Cl.** **144/230;** 144/241; 144/172; 241/193

[51] **Int. Cl.** **B27l 11/02;** B27g 13/00

[58] **Field of Search** 144/241, 172, 162, 218, 144/230; 241/193

[56] **References Cited**

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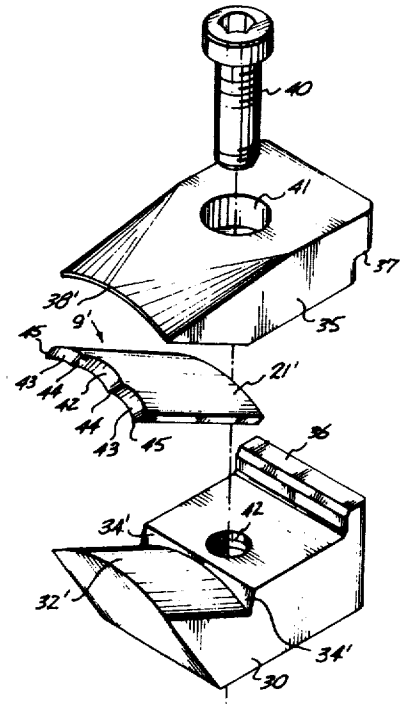
Primary Examiner—Donald R. Schran

Attorney, Agent, or Firm—Robert W. Beach

[57] **ABSTRACT**

Bits clamped between fixed blocks and removable blocks are arranged in a spiral row around a hollow rotating chipping drum. Each bit is curved, a particular form of bit being substantially cylindrically curved. Each bit is clamped between bit-holding blocks enegaging opposite bit faces with the bit-cutting edges projecting beyond the periphery of the chipping drum. The cutting edges are concave with adjacent cutting edges meeting in a cusp.

14 Claims, 19 Drawing Figures



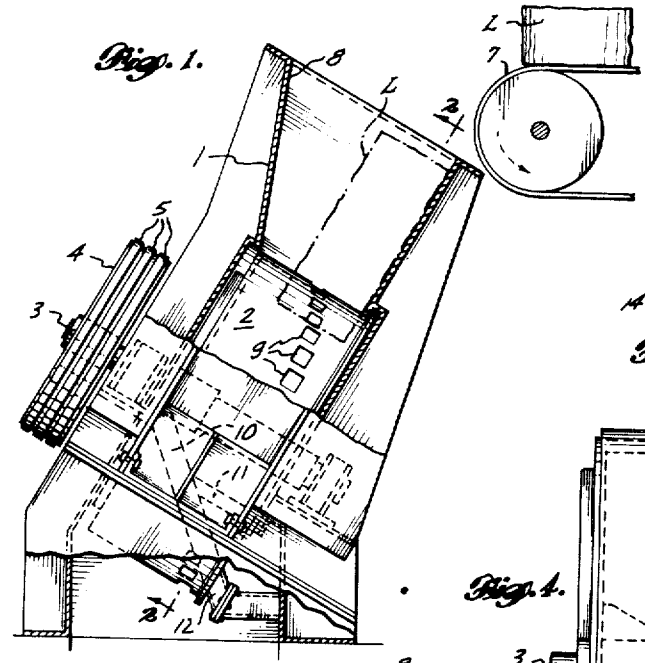


Fig. 1.

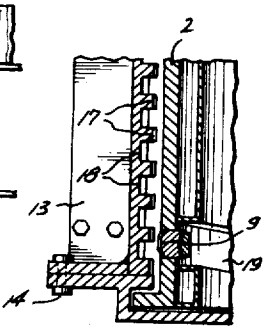


Fig. 3.

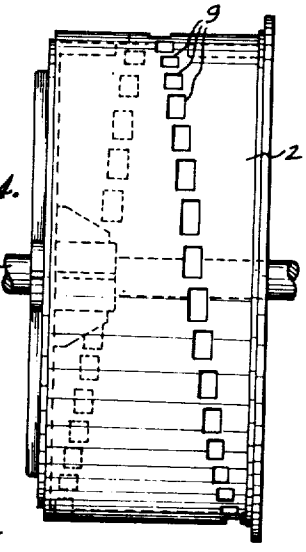


Fig. 4.

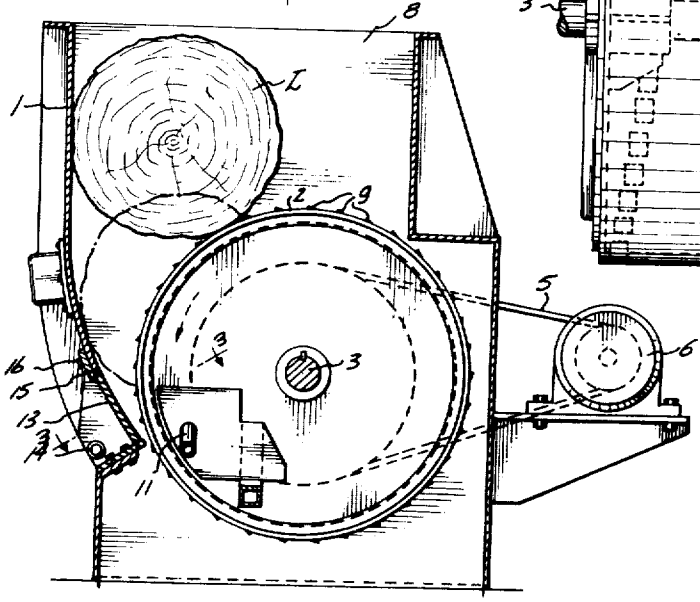
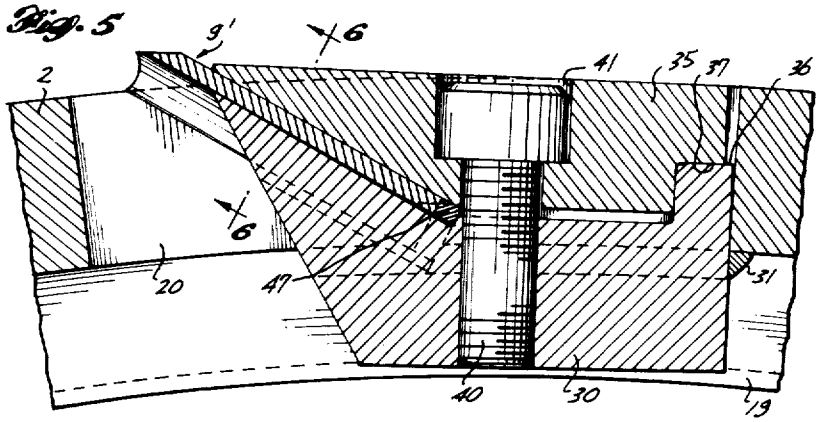


Fig. 2.

Fig. 5



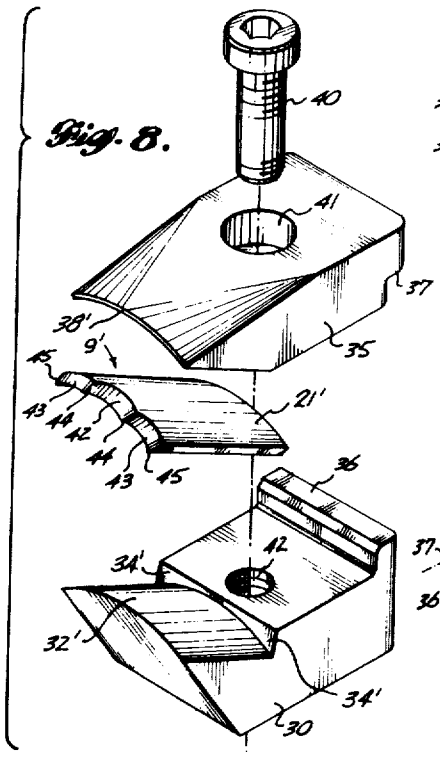


Fig. 8.

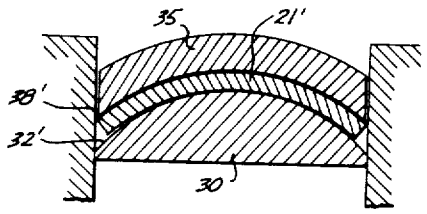


Fig. 6.

Fig. 7.

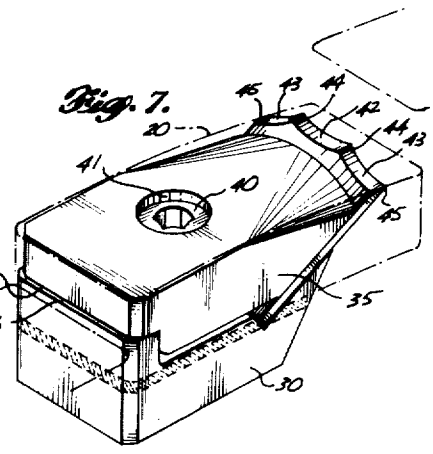


Fig. 9.

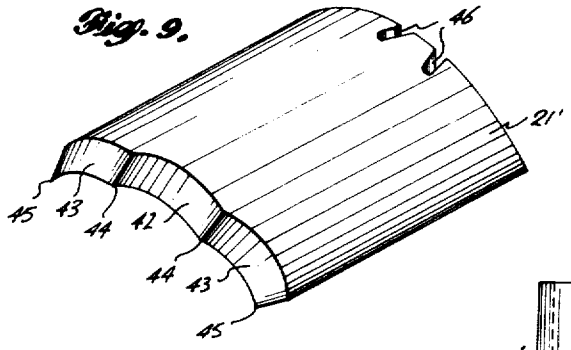
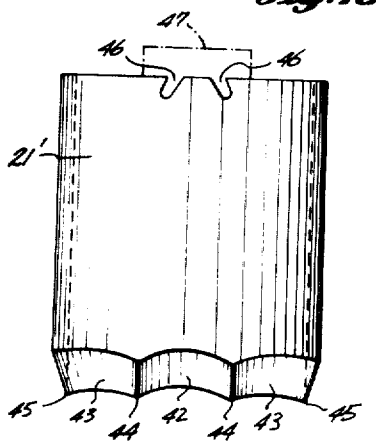


Fig. 10.



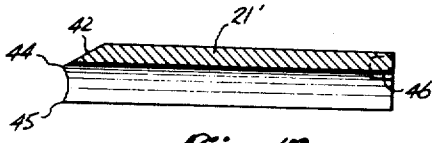


Fig. 12.

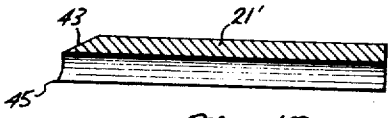


Fig. 13.

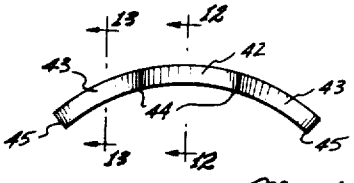


Fig. 11.

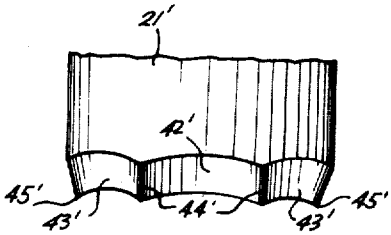


Fig. 14.

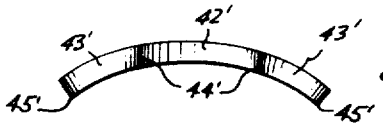


Fig. 15.

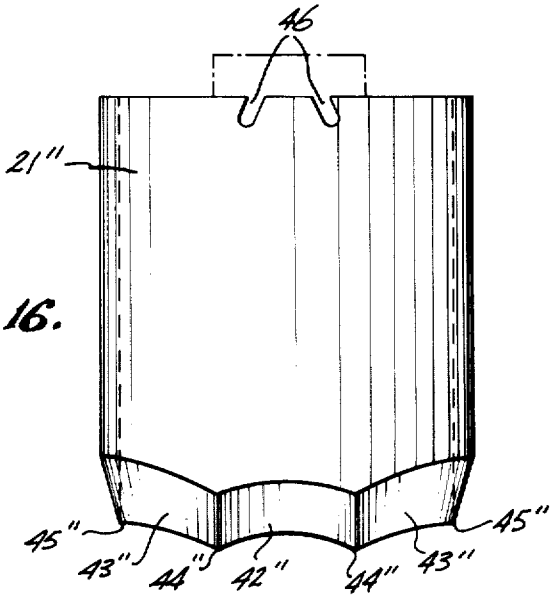


Fig. 16.

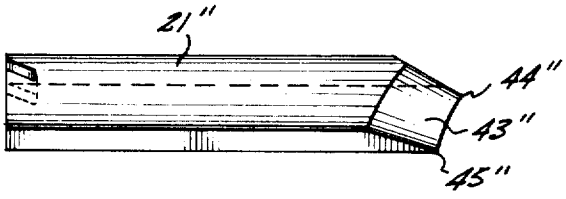


Fig. 17.

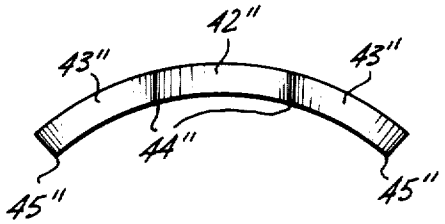


Fig. 18.

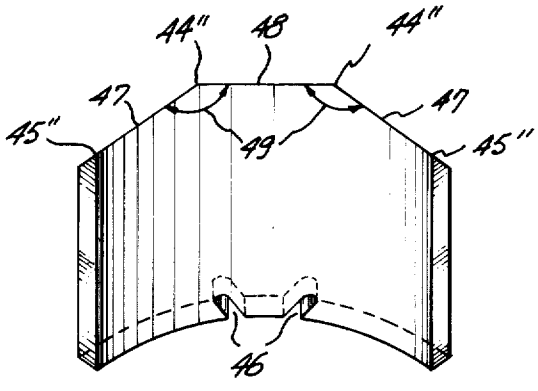


Fig. 19.

CHIPPER BIT AND HOLDER

This application is a continuation-in-part of my application Ser. No. 141,595 filed May 10, 1971, U.S. Pat. No. 3,757,839 which is a continuation-in-part of the application of Thomas W. Nicholson, Ray B. Jorgensen and Stanley Donald Vanek, Ser. No. 883,038, filed Dec. 8, 1969, for Peripheral Chipper for Round Log Sections which resulted in U.S. Pat. No. 3,661,192.

This application relates particularly to cutting bits for hollow rotating chipping drums and structure for holding such bits relative to such a drum including clamping blocks engaging opposite sides of each bit.

A principal object of the present invention is to provide chipper bits which can be held securely in the periphery of a chipping drum, yet which can be removed for sharpening and replaced quickly.

A further object is to provide cooperating blocks to engage opposite faces of a bent cutting bit which can be clamped together readily for securing the bit in place.

Another object is to provide a strong cutting bit which cannot be broken easily, and which will have a very effective cutting edge.

FIG. **1** is a side elevation of a representative form of chipper with parts broken away, and

FIG. **2** is a transverse section through the chipper taken on line **2—2** of FIG. **1.**

FIG. **3** is a detail section on line **3—3** of FIG. **2.**

FIG. **4** is a side elevation of the chipping drum on an enlarged scale.

FIG. **5** is a fragmentary enlarged radial section through a portion of the chipping drum showing a bit installation.

FIG. **6** is a section through such bit installation taken on line **6—6** of FIG. **5.**

FIG. **7** is a top perspective of the bit installation shown in FIG. **5.**

FIG. **8** is an exploded top perspective of such bit installation.

FIG. **9** is a top perspective on a further enlarged scale of the bit shown in FIGS. **5** to **8,** inclusive.

FIG. **10** is a plan of such bit, and

FIG. **11** is an end elevation of the cutting edge of such bit.

FIG. **12** is a longitudinal section through the bit taken on line **12—12** of FIG. **11,** and

FIG. **13** is a longitudinal section through the bit on line **13—13** of FIG. **11.**

FIG. **14** is a fragmentary plan of a somewhat modified bit, and

FIG. **15** is an end elevation of the bit of FIG. **14.**

FIG. **16** is a plan of a further modified form of bit,

FIG. **17** is a side elevation of such bit, and

FIG. **18** is an end elevation of the bit looking at the cutting edge end.

FIG. **19** is an inclined bottom view of the bit, viewing the cutting edge chamfers or bevel planes edgewise.

The present invention is concerned particularly with a cutting bit type and with holders for cutting bits used in a chipper for cutting small log sections into chips. Such chipper includes a hollow body **1** in which a chipping drum **2** is housed. Such drum is mounted for rotation on an axle **3** carrying a pulley **4** which can be rotated by one or more belts **5,** shown in FIGS. **1** and **2,** driven by a motor **6.** Small log sections, and particularly those of short axial length such as the log wheel

L shown in FIG. **2,** can be delivered to the chipper by a supply conveyor **7.**

The supply conveyor **7** will dump the log wheel L into the chipping chamber **8** in the upper portion of the hollow chipper body **1** in an attitude such that the axis of the log section extends generally parallel to the axis of the chipping drum. The axial extent of the log section is less than the corresponding width of the chipping chamber, as indicated in FIG. **1,** in which the log section is shown in broken lines. Consequently, the periphery of the log round will engage the periphery of the chipping drum. As shown in FIG. **1,** the axle **3** may be tilted to incline the axis of the drum **2** so that movement of the drum periphery in contact with the periphery of the log round will tend to urge the log round to move down to the broken line position shown in FIG. **1** in which it is supported by the lower end wall of the chipping chamber, and consequently cannot tip over.

The chip-cutting bits **9** are arranged in a spiral row around the chipping drum **2,** as shown best in FIGS. **1** and **4.** Adjacent bits are arranged in sufficiently overlapping relationship so that as the drum turns chips are cut from the log round in successive layers. As shown in FIG. **4,** each bit overlaps circumferentially the major portion of the width of each adjacent bit in an axial direction.

As shown best in FIGS. **3, 5** and **6,** the cutting bits **9'** are received in apertures in the periphery of the drum **2,** and the cutting ends of the bits project outward beyond the periphery of the drum and are spaced from the adjacent walls of the apertures to provide passages through the circumferential drum wall for chips cut from a log section. Consequently, it is necessary to remove the chips from the interior of the drum. For this purpose chip-removing means are disposed within the drum which in the chipper shown in FIGS. **1** and **2** is a chip-deflector plate **10,** shown best in FIG. **2** as being inclined axially of the chipping drum for scooping the chips endwise out of the drum during its rotation. Such deflector plate is supported and positioned by struts **11** and **12** secured to the chipper body.

As shown best in FIG. **2,** the left wall of the chipping chamber **8** toward which the periphery of drum **2** turns is disposed in convergent relationship to the adjacent portion of the drum periphery. Rotation of the upper portion of such drum toward such wall, in the direction indicated by the arrow, tends to move the log section in the direction of rotation of the drum periphery and to press the log section against such wall. Continued rotation of the drum engaging one location of the log section will cut successive layers of such location into chips so that such location of the log section will become concave complemental in curvature to the curvature of the chipping drum periphery. As more layers are removed from the log section, such section will move farther into the angle between the converging chipping chamber wall and the chipping drum periphery. If the log section initially is round, it eventually will assume a crescent shape in cross section, as shown in broken lines in FIG. **2.**

Because of the direction of rotation of the chipping drum and the effect of such direction of rotation on the movement of the log section, any chips and debris which do not pass through the apertures in the drum periphery will tend to accumulate in the angle between the converging chipping chamber wall and the drum periphery. If excessive material collects in such angle,

it can be removed through an opening closed by an access door **13** pivotally mounted on the hollow body by a pivot **14** to swing open from the solid-line closed position shown in FIG. **2**. Such clean-out door can be held in closed position by securing the lug or tongue **15** carried by its swinging edge to the adjacent wall of the body **1** by a bolt **16**. Such bolt can be removed and the lug or tongue pulled outward to swing the door open.

During operation of the chipper the edge **17** of a plate secured to the body **1** adjacent to the clean-out door **13** serves as an anvil. The anvil edge **17** is preferably in the form of fingers, as shown in FIG. **3**, between which are notches **18** that will enable small pieces of debris and small stones to escape from the space between the converging chipping chamber wall and the drum periphery.

The spiral path around the drum **2** in which the bits **9'** are mounted is delineated by a spiral groove **19** in the drum wall and opening into the interior of the drum, as shown best in FIGS. **3** and **5**. The apertures **20** in the wall of the drum in which the bits are mounted are located in the bottom of this groove. The bits **9'** received in these apertures are bent transversely of circumferential lines of the drum periphery and are disposed at an angle to the drum periphery so that the cutting ends of the bits project outward beyond the drum wall as shown best in FIG. **5**.

The pair of bit-holding blocks between which each bit is clamped fits into an aperture **20** in the drum periphery. The bit-clamping blocks shown in FIGS. **5, 6** and **7** include the inner block **30** which is anchored in the inner portion of a drum aperture **20** by welding **31**. Such block has an outwardly inclined end portion, as shown in FIG. **5**, which is complemental to the hollow inner side of the bit **9'**. The slope of the bearing surface **32'** provides shoulders **34'** at the root ends of such faces against which the inner end of the bit **9'** can abut to prevent such bit from being driven inward by engagement of its cutting edges with a log being chipped.

The cooperating outer block **35** is also received in the aperture **20** in registration with the inner block. The inner block **30** has a lug **36** over which the recess **37** in one end of the outer block **35** can fit. The opposite end of the outer block has a curved face **38'** complemental to the inner block face **32'**. The outer block **35** can be held in clamping relationship to the inner block **30** by a bolt **40** extending through an aperture **41** in the outer block and screwed into a tapped aperture **42** in the inner block. The aperture **41** is counterbored to provide a shoulder against which the head of the bolt **40** can bear to press the loose block **35** toward the fixed block **30**.

As shown best in FIG. **5**, the height of lug **36** is greater than the depth of the recess **37**, so that the outer surface of the lug will engage the corresponding surface of the recess when the mating surfaces of the two blocks are spaced apart to provide a recess for reception of the bit **9'** between them. The lug **36** and recess **37** are proportioned to serve as a fulcrum at one side of bolt **40** for providing clearance between the root portions of the surfaces between which the bit is engaged at the opposite side of the bolt **40**, so that as the bolt is tightened the tips of the blocks **30** and **35** will clamp the opposite sides of the bit adjacent to its cutting edges, as shown best in FIG. **5**.

The type of bit shown in FIGS. **5, 6** and **7** has a plate body **21'** substantially smoothly curved between opposite edges. The body is of substantially uniform thickness over at least most of its area. Such bit is substantially cylindrically curved transversely of a circumferential line of the chipping drum, and the curvature of the bit shown in FIGS. **5** to **13**, inclusive, and in FIGS. **16** to **19**, inclusive, is of the circular arcuate type. Its cutting end, extending between its opposite edges, is engrailed, being shown in FIGS. **7** to **11**, inclusive, as having a central chamfer or flat bevel **42** and side chamfers or flat bevels **43** meeting in inclined ridges **44**. As shown in FIGS. **7** to **13**, inclusive, the resulting cutting edges are concave and meet in cusps formed at the ends of the inclined ridges **44**. The ends of the cutting edges formed by the side chamfers or bevels **43** constitute points **45**. The cusps and end points of the engrailed cutting edge effect an initial penetration of the wood followed by a slicing action of the concave cutting edges which produces a very smooth cutting action rather than a chopping action.

For holding such a curved bit **9'** between the clamping blocks **30** and **35** the inner block **30** convex surface **32'** substantially complemental to the concave surface **38'** of the outer block **35** formed so that the clamping effect on the curved bit **9'** will occur principally at a location adjacent to the cutting end of the bit as shown in FIG. **5**, and also principally on the central portion of the bit rather than on the bit edge portions, as shown in FIG. **6**, to avoid application of pressure to the bit which might tend to break it.

The end of a new bit can abut the shoulders **34'** at the root of the convex bit-engaging surface **32'** of block **30**. As the bit is shortened by sharpening its cutting edge, it is desirable to compensate for such shortening by building onto the inner end of the bit. For this purpose the inner end of the bit may have notches **46** in it as shown in FIGS. **9** and **10**, in which a babbitt lug **47** can be cast to abut the shoulders **34'** of the block **30** to deter inward slippage of the bit.

While the curved cutter bit can be of circular arcuate cross section, the bit curvature may be modified, such as shown in FIGS. **14** and **15**, so that the curvature of the side portions of the bit body is somewhat sharper than the central portions. Such sharper curvature can be effected by making the bit cross section of compound curvature, or of elliptical, parabolic, or hyperbolic arcuate curvature. In the case of an elliptical curvature the central plane of the bit body would substantially coincide with the minor diametral plane of the elliptical arc. All such curvatures are intended to be embraced within the designation of a substantially cylindrically curved bit, the definition of a cylindrically curved surface being one traced by a straight line moving parallel to a fixed straight line and intersecting a fixed curve. It is preferred that the curvature of the bit be such that its cross section is symmetrical about a central longitudinal plane of the bit.

In the bit of FIGS. **14** and **15** the cutting end again is engrailed, being formed by a central flat bevel **42'** meeting side flat bevels **43'** in ridges **44'**. Again the resulting engrailed cutting edge includes central and side concave cutting edges meeting at cusps and having end points **45'**. The cutting action of the engrailed cutting edge of the bit shown in FIGS. **14** and **15** is similar to that of the bit shown in FIGS. **9** to **13**, inclusive, but the chip cut will be of slightly different shape.

In both the bits of FIGS. **9** to **13** and of FIGS. **14** and **15** it is preferred that the cusps and end points of the

cutting edges be disposed in a plane substantially perpendicular to the body of the bit, and consequently substantially perpendicular to the fixed straight line and to the generating straight lines which generate the opposite concave and convex faces of the curved bit body. In some instances it may, however, be preferable for the ends of the two side cutting edge sections adjacent to the edges of the curved plate body, respectively, to be displaced lengthwise of the body back from the ends of the central cutting edge section. Such a bit is shown in FIGS. **16** to **19**, inclusive.

The bit shown in FIGS. **16** to **19**, inclusive, has a curved plate body **21''** which is shown as being of cylindrically curved shape. The cutting end of such body has a central chamfer or flat bevel **42''** and side chamfers or flat bevels **43''** meeting in inclined ridges **44''**. The resulting cutting edges are concave as in the previous bits and meet in cusps at the ends of the inclined ridges **44''**. The outer ends of the side cutting edges form points **45''**.

The distance between the cutting edge cusps **44, 44'** or **44''** determines the length of the chip cut. Such distance may be from three-quarters of an inch to one and one-quarter inches, for example. The greater the distance between the cusps, the longer will be the chip cut.

I claim:

1. A bit for mounting in an aperture of a rotary chipping drum comprising an arcuate plate body approximately 90° in extent, of substantially uniform thickness over at least most of its area, having substantially parallel opposite edges, being substantially smoothly curved throughout its width between said opposite edges and having a cutting edge extending transversely of said opposite body edges and between said opposite body edges, said cutting edge having two bevels meeting in a ridge and forming adjoining concave cutting edges meeting in a cusp, and said plate body being discontinuous between said opposite edges opposite said cutting edge, enabling chips cut by said cutting edge to pass directly radially of said arcuate plate body through the aperture in the chipping drum.

2. The bit defined in claim **1**, in which each bevel is flat.

3. The bit defined in claim **1**, in which the cutting edge of the bit plate body has three sections including a central section and two side sections, each of said sections having a bevel, the bevels of said side sections meeting the bevel of said central section in a ridge, each of said bevels defining a concave cutting edge section, and each of said side cutting edge sections meeting said central cutting edge section in a cusp.

4. The bit defined in claim **3**, the ends of the side cutting edge sections and the cusps at the junctions of the two side cutting edge sections with the central cutting edge section being substantially in a plane perpendicular to the parallel opposite edges of the curved plate body.

5. The bit defined in claim **3**, the ends of the two side cutting edge sections adjacent to the parallel opposite edges of the curved plate body, respectively, being displaced lengthwise of the parallel opposite edges of the body back from the cusps at the junctions of the two side cutting edge sections with the central cutting edge section.

6. The bit defined in claim **1**, in which the cross section of the bit plate body is a compound curve.

7. The bit defined in claim **6**, in which the opposite edge portions of the bit plate body are curved more sharply than the central portion of the bit plate body.

8. The bit defined in claim **1**, in which the bit plate body is an elliptical arc.

9. The bit defined in claim **8**, in which the central plane of the bit plate body substantially coincides with the minor diametral plane of the elliptical arc.

10. In a peripheral chipper including a rotary chipping drum having apertures therein arranged around its periphery, a plurality of bits, and means for mounting the bits in such respective apertures of the drum with their ends leading in the direction the bits are moved by rotation of the chipping drum forming cutting edge portions projecting beyond the drum periphery, the improvement comprising each bit being an arcuate plate body approximately 90° in extent, curved relative to a straight line extending transversely of the direction of bit movement, of substantially uniform thickness over at least most of its area, having substantially parallel opposite edges, being substantially smoothly curved throughout its width between said opposite edges and having a cutting edge extending transversely of said opposite body edges and between said opposite body edges, said cutting edge having two bevels meeting in a ridge and forming adjoining concave cutting edges meeting in a cusp, and said plate body being discontinuous between said opposite edges opposite said cutting edge, enabling chips cut by said cutting edge to pass directly radially of said arcuate plate body through the aperture in the chipping drum.

11. In the chipper defined in claim **10**, the cross section of a bit being a plate having a compound curve.

12. In the chipper defined in claim **11**, the opposite edge portions of the bit plate being curved more sharply than the central portion of the bit plate.

13. In the chipper defined in claim **10**, the bit being a plate curved in an elliptical arc.

14. In the chipper defined in claim **13**, the central plane of the bit plate substantially coinciding with the minor diametral plane of the elliptical arc.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,892,265 Dated July 1, 1975

Inventor(s) Stanley Donald Vanek

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Title page, Section 63, line 2, change "1973" to --1971--;
Section 57,
line 6, change "edges" to --edge--.

Signed and Sealed this

sixth Day of *January 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks