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An agency of Industry Canada

CA 2769487 C 2016/10/11

(11)(21) **2 769 487**

(12) **BREVET CANADIEN**
CANADIAN PATENT

(13) **C**

(86) **Date de dépôt PCT/PCT Filing Date:** 2009/08/19
(87) **Date publication PCT/PCT Publication Date:** 2010/02/25
(45) **Date de délivrance/Issue Date:** 2016/10/11
(85) **Entrée phase nationale/National Entry:** 2012/01/27
(86) **N° demande PCT/PCT Application No.:** US 2009/054350
(87) **N° publication PCT/PCT Publication No.:** 2010/022178
(30) **Priorités/Priorities:** 2008/08/19 (US61/090,078); 2009/03/02 (US61/156,654)

(51) **Cl.Int./Int.Cl.** ***B27G 13/08*** (2006.01), ***A01G 23/06*** (2006.01)

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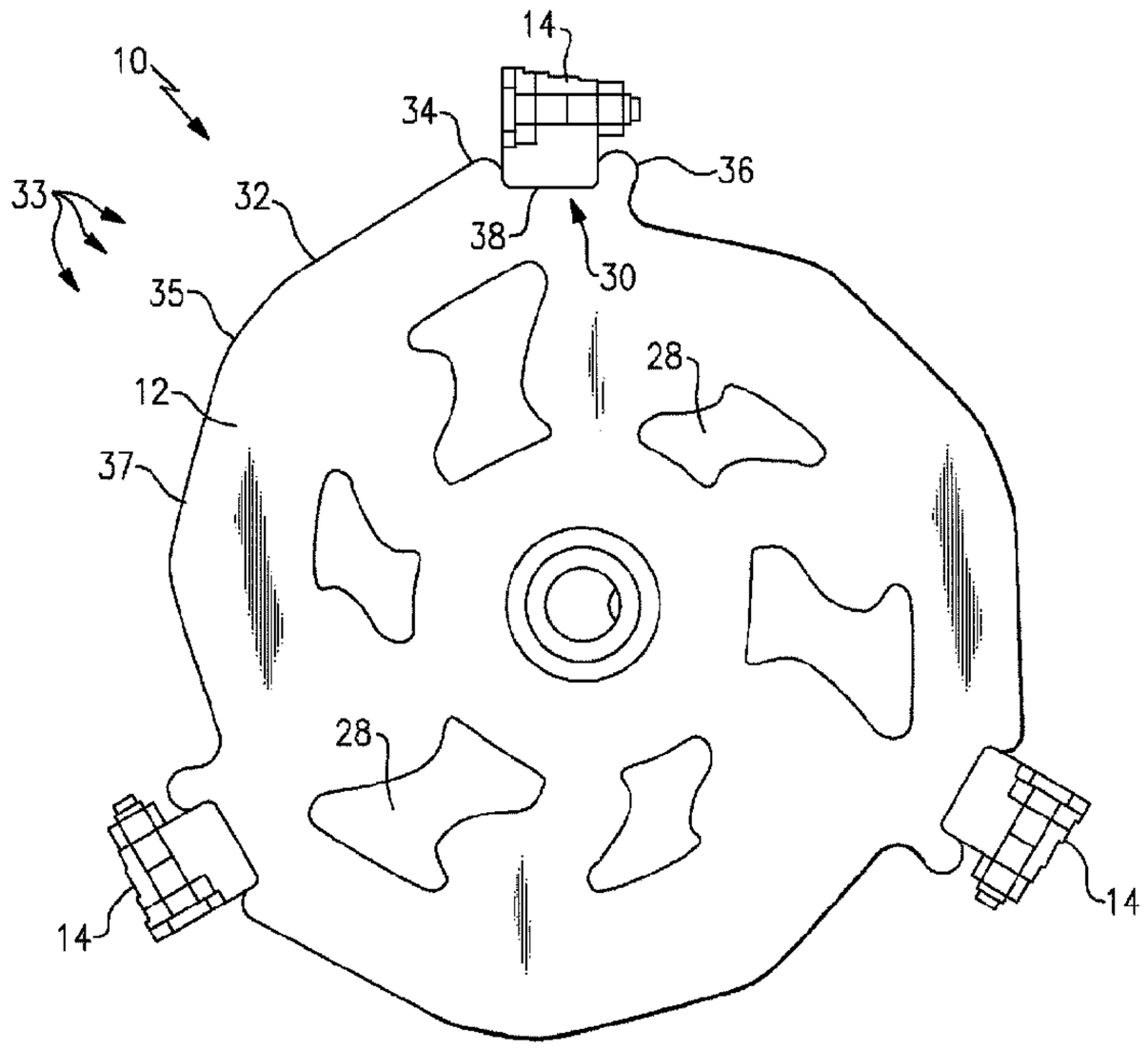
(54) **Titre : ENSEMBLE DENT ET TAILLANTS POUR BROYEUR DE SOUCHE**
(54) **Title: TOOTH ASSEMBLY AND CUTTING BITS FOR STUMP GRINDER**



(57) **Abrégé/Abstract:**
A stump grinding wheel tooth assembly having a mounting block positioned around the periphery of the wheel and a cutting bit attached to the mounting block by a pin passing through a hole in the cutting bit and a corresponding hole in the mounting block and capped by a nut. The mounting block may support multiple cutting bits arranged into a predetermined patterns based on the location of the holes, such as pairs of cutting bits or even a quad formation. The cutting bits may be provided in various geometric configurations, such as round, triangular, square, rectangular, pentagonal, hexagonal, octagonal or decagonal.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 February 2010 (25.02.2010)

PCT

(10) International Publication Number
WO 2010/022178 A3

(51) International Patent Classification:
A61C 3/06 (2006.01) *A61C 3/02* (2006.01)

(21) International Application Number:
PCT/US2009/054350

(22) International Filing Date:
19 August 2009 (19.08.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/090,078 19 August 2008 (19.08.2008) US
61/156,654 2 March 2009 (02.03.2009) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,

[Continued on next page]

(54) Title: TOOTH ASSEMBLY AND CUTTING BITS FOR STUMP GRINDER

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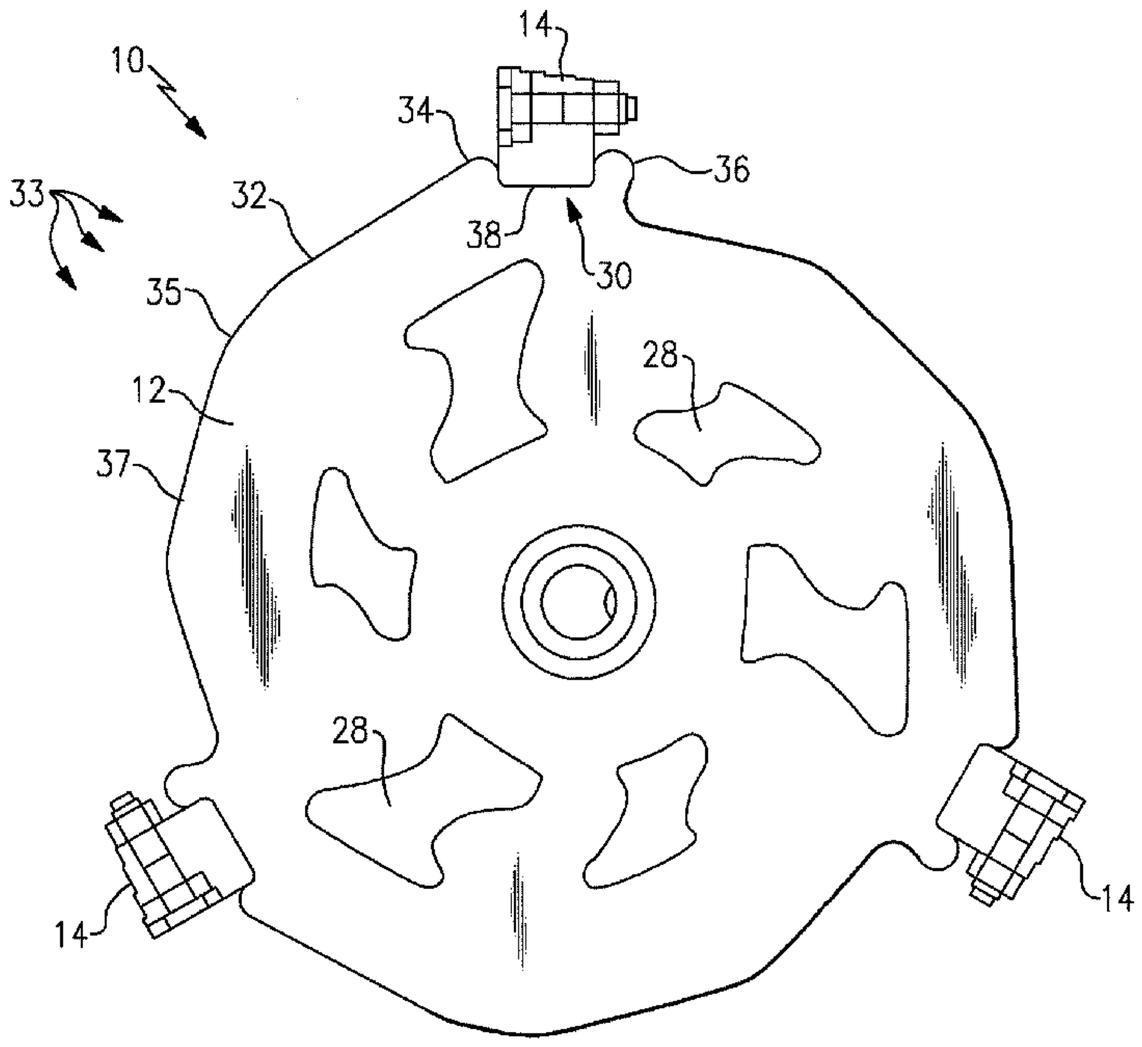

FIG.1

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TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
20 May 2010

Tooth Assembly And Cutting Bits For Stump Grinder

1. FIELD OF THE INVENTION

[0002] The present invention relates to grinding tools (see DEFINITIONS section), more particularly to outdoor grinding tools (see DEFINITIONS section), and also more particularly to rotating disc assemblies (including a disc and bit sub-assembly(ies)) for grinding tools.

2. DESCRIPTION OF THE RELATED ART

[0003] Various types of stump grinders exist in the prior art. These machines typically include: a chassis; a motor; a stump grinding wheel; and teeth. The stump grinding wheel is mechanically connected to the chassis and motor so that the motor rotates the wheel about its central axis. The stump grinding teeth are mounted to the wheel at angular intervals about the central axis. The teeth are mounted either to: (i) the side surfaces of the wheel; or (ii) the peripheral edge of the wheel. A mounting mechanism is used to rigidly mechanically constrain each tooth to the wheel.

[0004] In some prior art stump grinder designs, a pocket clamps a tooth having a cutting bit to the wheel and a pair of bolts fixes the pocket to the wheel. In prior art stump grinder designs where the tooth is mounted around the peripheral edge of the wheel, an O-ring or similar type of fastening mechanism is used to fix the tooth to the mounting block which in turn may be brazed or otherwise affixed to the wheel. Regardless of the type of

mounting mechanism used, it takes a bit of time and tools to detach a worn or broken tooth from a mounting mechanism, and replace it with a new tooth.

[0005] The cutting bit portions of the teeth are worn (or "degrade") by coming into contact with the wood of the stump being ground. Also, the cutting bit portions may come into contact with foreign objects embedded in the wood, such as rock, nails, or other hard substances. The impact with these harder objects greatly increases the degradation of the cutting bits. Once the edge is worn beyond an acceptable limit, the tooth or teeth must be changed.

[0006] Traditionally, changing the teeth required the operator to use a drill or other tool to remove bolts that fasten a pocket to the wheel. The teeth, in turn, are clamped to the wheel by the pockets. This process is laborious and, with conventional teeth, the entire tooth has to be discarded and replaced with a new tooth. Thus, in addition, to the downtime associated with changing the teeth, the teeth themselves raise the expense associated with the grinding operation.

[0007] US patent 5,555,652 ("Ashby") discloses a land clearing apparatus that includes a rotating rasp used to shred trees, brush and debris. More specifically, rasp 20 includes drum 22, guard 26, removable impact structures 34 and adaptors 48. As shown in Figure 2 of Ashby, the removable impact structures and respectively associated are located at regular angular intervals around the rotating drum.

[0008] US patent 5,996,657 ("Riesselman") discloses a stump cutter including a rotatable disk having multiple cutting tool holders. The cutting tool holders each have a cutting tool bit cantilevered therefrom to engage a stump brought into contact with the cutting tool. The cutting tool holder / bit sub-assemblies alternate in the angular direction with sub-assemblies that Riesselman refers to as non-cutting protectors. As shown in Figure 1 of Riesselman, each bit extend in the radial direction beyond the outermost radial edge of the

protectors by a distance of L1. With respect to its protectors and bits Riesselman discloses the following: "In the embodiment shown, the protector 20 is spaced sufficiently far out so that cutting tool bites into an object only to the depth L1 of the hardened cutting tip 16. With traditional stump cutters, no leading protector is provided and the cutter wheel could inadvertently overbite and cause wheel hang-up. I have found that with use of a protector with a massive non-cutting leading edge which is placed ahead of the lead cutting tool a distance denoted by P1, the problem of broken cutting tools is substantially eliminated. That is, the non-cutting leading edge of the protector can be spaced rotationally ahead of the cutting tool to provide protection to the cutting tool. I have found that even with P1 distances of six or seven inches I can still provide protection for the first stage cutter and holder located behind the protector. . . . By having a massive protector that has a greater mass than the cutting tool and is not cantilevered outward as the cutting tool is, the protector can absorb shocks and impacts through gradual abrasion of the protector while the first stage cutting teeth of a row of cutting teeth can be protected." Riesselman does not seem to disclose how large its dimension L1 is supposed to be.

[0009] US patent 6,138,725 ("Leonardi 1") discloses various operating angles and/or angles between components associated with a stump grinding tool rotating disc.

[0010] US patent 6,176,445 ("Shinn") discloses a cutter tooth located on the outer peripheral surface of a rotatable cutter adapted for clearing, mulching and grinding trees.

[0011] Other published documents which may be of interest include: (i) US patent 5,743,314 ("Puch"); (ii) US patent 7,484,541 ("Green"); and (iii) US patent application 2008/0149224 ("Kappel")..

[0012] Description Of the Related Art Section Disclaimer: To the extent that specific publications are discussed above in this Description of the Related Art Section, these discussions should not be taken as an admission that the discussed publications (for example,

published patents) are prior art for patent law purposes. For example, some or all of the discussed publications may not be sufficiently early in time, may not reflect subject matter developed early enough in time and/or may not be sufficiently enabling so as to amount to prior art for patent law purposes.

BRIEF SUMMARY OF THE INVENTION

[0013] Some embodiments of the present invention (see DEFINITIONS section) are directed to a tooth assembly for a stump grinding wheel including a mounting block having a shoulder formed therein, and a cutting bit that may be engaged with shoulder and removably attachable to the mounting block. In a preferred embodiment, the cutting bit is mounted to the mounting block using a bolt that passes through a hole formed through the cutting bit and a corresponding hole formed in mounting block. The bolt is affixed in position through cutting bit and block by a nut. The tooth assembly may optionally include a shock absorber positioned between the cutting bit and the mounting block.

[0014] Some embodiments of the present invention are directed to a stump grinding wheel provided with a series of slits formed entirely through one side of wheel to the opposing side. The mounting block may support multiple cutting bits, such as a two, three, or even four cutting bits. Each bit is attached to the mounting block via a pin and hole. The front face of the cutting bits may be configured into a variety of geometric shapes, such as round, triangular, square, rectangular, pentagonal, hexagonal, octagonal or decagonal, and may have rounded edges. Some preferred cutting bits according to the present invention are generally triangular (for example, triangular with rounded corners) and "indexable." More specifically, in some embodiments of the present invention a triangular bit will wear most quickly in the vicinity of a corner of the triangle positioned to extend from the disc in the

disc's radial or longitudinal direction. By detaching the cutting bit and repositioning it in an orientation displaced 120 degrees, about the central axis of the bit, from its previous position, a different corner is "indexed" to extend from the disc. This indexing extends the life of the bit.

[0015] One aspect of the present invention is a rotating disc assembly where the bit extends past the disc by a relatively small amount in the radial and/or axial directions. Preferably, these extensions are less than 3/16 inch. Even more preferably, they are about 1/8 inch.

[0016] Another aspect of the present invention is a disc that includes a radial direction ramp edge extending along the angular direction of the disc from each bit sub-assembly (see Figure 1 at 32 and 34).

[0017] Various embodiments of the present invention may exhibit one or more of the following objects, features and/or advantages:

[0018] (i) reduction of mechanical shocks due to square impacts between bits and hard debris in the soil (for example rocks);

[0019] (ii) reduction of equipment breakage due to square impacts between bits and hard debris in the soil (for example rocks);

[0020] (iii) reduction of flying debris occasioned by stump grinding due to square impacts between bits and hard debris in the soil (for example rocks);

[0021] (iv) use of rock stop prevents and/or reduces damage caused by physical interference with hard debris;

[0022] (v) use of rock stop prevents and/or reduces groove from being worn into the disc in the vicinity of the leading edge of a well and associated bit assembly;

[0023] (vi) use of rock stop made of a soft / hard material matrix collects dirt in operation and provides a helpful dirt / dirt interface between the disc and the dirt within which it is rotating and grinding;

[0024] (vii) it is a principal object and advantage of the present invention to provide a tooth assembly that allows the cutting bits to be easily replaced;

[0025] (viii) it is another object and advantage of the present invention to provide a tooth assembly that supports multiple cutting bits;

[0026] (ix) it is a further object and advantage of the present invention to provide cutting bits having various applications; and

[0027] (x) other objects and advantages of the present invention may, in part, be readily apparent to those of ordinary skill in the relevant art and, in part, may be explicitly stated hereinafter.

[0028] According to an aspect of the present invention, a disc assembly for a grinder includes a disc, a first bit holder, a first bit and a first connection hardware set. The disc defines a central axis, a radial direction and an angular direction. The disc includes a peripheral edge and has at least one receiving recess defined in its peripheral edge. The first bit holder is mechanically connected to the disc and at least partially received in the at least one receiving recess. The first bit holder defines a first bit holder hole. The first bit defines a first bit hole. The first connection hardware set is structured and located to mechanically connect the first bit to the first bit holder. The first connection hardware set includes an elongated member located to extend at least partially through the first bit holder hole and the first bit hole.

[0029] According to another aspect of the present invention, a disc assembly for a grinder includes a disc, a first bit holder, a first bit and a first connection hardware set. The disc defines a central axis, a radial direction and an angular direction. The first bit holder is

mechanically connected to the disc. The first bit holder includes a front surface generally facing a direction of rotation of the disc. The first bit includes a front surface generally facing a direction of rotation of the disc. The first connection hardware set is structured and located to mechanically connect the first bit to the first bit holder so that the front surface of the first bit holder is at least substantially aligned with the front surface of the first bit holder.

[0030] According to another aspect of the present invention, a disc assembly for a grinder includes a disc, a first bit holder, a first bit and a first connection hardware set. The disc defines a central axis, a radial direction and an angular direction. The first bit holder is mechanically connected to the disc. The first connection hardware set is structured and located to mechanically connect the first bit to the first bit holder. The disc includes a peripheral edge that defines at least one receiving recess. The first bit holder is at least partially received in the receiving recess. The first bit holder is substantially L-shaped in a plane perpendicular to the central axis of the disc, with one arm of the "L" being a received portion of the first bit holder and the other arm of the "L" being a bit securing portion of the first bit holder. The received portion of the first bit holder is at least partially received in the receiving recess. The received portion of the first bit holder includes a bit facing surface that faces the direction of extension of the bit securing portion. The first connection hardware set is structured and located to mechanically connect the first bit to the bit securing portion of the first bit holder in a position so that the bit facing surface of the received portion of the first bit holder at least substantially faces the first bit.

[0031] According to another aspect of the present invention, a disc assembly for a grinder includes a disc, a first bit assembly and a second bit assembly. The disc defines a central axis, a radial direction and an angular direction. The disc includes a peripheral edge and has a first receiving recess and a second receiving recess defined therein. A first ramping portion of the peripheral edge extends along the angular direction from the first receiving

recess to the second receiving recess. The first bit assembly is mechanically connected to the disc and at least partially received in the first receiving recess. The second bit assembly is mechanically connected to the disc and at least partially received in the second receiving recess. The first ramping portion increases in it radial size as it extends from the first receiving recess to the second receiving recess.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0032] The present invention will be more fully understood and appreciated by reading the following Detailed Description in conjunction with the accompanying drawings, in which:

[0033] Figure 1 is a schematic of an embodiment of a stump grinding wheel according to the present invention.

[0034] Figs. 2A-2C are schematics of a tooth assembly according to the present invention.

[0035] Figs. 3A-3D are schematics of various embodiments of tooth assembly according to the present invention.

[0036] Fig. 4 is a perspective view of an alternative tooth assembly according to the present invention.

[0037] Fig. 5 is a schematic of an alternative embodiment of a tooth assembly according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0038] Referring now to the drawings, wherein like reference numerals refer to like parts throughout, there is seen in Figure 1 a stump grinding wheel 10 according to the present invention. Wheel 10 includes a series of tooth assemblies 12 mounted thereon. As seen in Figure 1, tooth assemblies 12 are spaced annularly around the periphery of wheel 10, but those of skill in the art will recognize that tooth assemblies 12 may be positioned on either

side of wheel 10. For example, Applicant's co-pending applications, Serial Nos. 11/926,886 and 11/927,040, hereby incorporated by reference, discloses various tooth assembly configurations.

[0039] Referring to Figures 2A-2C, tooth assembly 12 comprises a mounting block 14 having a shoulder 16 formed therein, and a cutting bit 18 that may be engaged with shoulder (or bit base) 16 and removably attachable to block (or bit holder) 14. In a preferred embodiment, cutting bit 18 is mounted to block 14 using an elongated member in the form of bolt 20 that passes through a hole 22 formed through cutting bit 18 and a corresponding hole 24 formed in block 14. Bolt 20 is affixed in position through cutting bit 18 and block 14 by a nut 26. Bolt 20 may be countersunk or comprise a half-round head so that it could be angled relative to cutting bit 18 to provide the additional clearance needed on large diameter wheels 10. As seen in Figure 2C, cutting bit 18 is triangular in shape (that is, the peripheral edge of the cutting bit has three flat portions) and positioned such that one base of the triangular shape is positioned proximately to wheel 10 and an apex of the triangle extending outwardly. In some embodiments, a flat portion opposite the apex will sit on a blade facing surface 23 of block (or bit holder) 14. Because the bit has multiple flat surfaces, it can be rotated about its central axis and "indexed" between multiple position and the active portion(s) of the bit wears. For example, with a triangular bit, when one apex wears, then the other apexes can be rotated into the high wear position to extend the life of the bit.

[0040] In another embodiment of the present invention, stump grinding wheel 10 may be provided with a series of slits 28 formed entirely through one side of wheel 10 to the opposing side, as seen in Figure 1. Wheel 10 further includes a series of receptacles 30 formed in its peripheral edge 32, where each receptacle 30 includes a forward lip 34 and a rearward lip 36 that define a receiving location 38 therebetween for affixing mounting block

14. As described earlier, mounting blocks 14 are preferably positioned around the periphery of wheel 10 in spaced annular relation to each other.

[0041] Referring to Figures 3A-3D, tooth assembly 12 accordingly to the present invention may comprise a variety of configuration for supporting multiple cutting bits 18. For example, as seen in Figure 3A, tooth assembly 12 includes a mounting block 14 that is configured to support four cutting bits 18, wherein each bit 18 is attached to mounting block 14 via a pin and hole, as described earlier with respect to Figure 1. Alternatively, mounting block 14 may support a pair of cutting bits 18 positioned side-by-side relative to wheel 10, as seen in Figure 3B, or a pair of stacked cutting bits 18, as seen in Figure 3C. As seen in Figure 3D, mounting block (or bit holder) 14 may optionally support three cutting bits 18 positioned into a triangular configuration.

[0042] As seen in Figure 4, the front face of cutting bits 18 may be configured into a variety of geometric shapes, such as round, triangular, square, rectangular, pentagonal, hexagonal, octagonal or decagonal, and may have rounded edges. Referring to Figure 5, tooth assembly 12 may further comprise a shock absorber 40 positioned between cutting bit 18 and shoulder 16 of mounting block 14.

[0043] As shown in Figure 5, bit holder 14 is generally "L" shaped, with one arm of the "L" being a receiving portion 42, and the other arm of the "L" being a bit securing portion 44. The bit holder includes a front surface 46. The bit also includes a front surface 48. As ahown in Figures 1, 2C, 3A, 3B, 3C, 3D and 5, in some preferred embodiments of the invention, the front surface of the bit is at least approximately flush with the front surface of the bit holder.

DEFINITIONS

[0044] Any and all published documents mentioned herein shall be considered to be incorporated by reference, in their respective entireties, herein to the fullest extent of the patent law. The following definitions are provided for claim construction purposes:

[0045] Present invention: means at least some embodiments of the present invention; references to various feature(s) of the "present invention" throughout this document do not mean that all claimed embodiments or methods include the referenced feature(s).

[0046] First, second, third, etc. ("ordinals"): Unless otherwise noted, ordinals only serve to distinguish or identify (e.g., various members of a group); the mere use of ordinals implies neither a consecutive numerical limit nor a serial limitation.

[0047] Mechanically connected: Includes both direct mechanical connections, and indirect mechanical connections made through intermediate components; includes rigid mechanical connections as well as mechanical connection that allows for relative motion between the mechanically connected components; includes, but is not limited, to welded connections, solder connections, connections by fasteners (for example, nails, bolts, screws, nuts, hook-and-loop fasteners, knots, rivets, force fit connections, friction fit connections, connections secured by engagement added by gravitational forces, quick-release connections, pivoting or rotatable connections, slidable mechanical connections, latches and/or magnetic connections).

[0048] Grinding tools: any tool for grinding any type of matter; grinding tools include, but are not necessarily limited to: mowers, mulchers; horizontal grinders; tub grinders and/or stump grinders; electric motor powered grinding tools, internal combustion powered grinding tools; man-portable grinding tools; stationary grinding tools; and/or vehicle portable grinding tools.

[0049] Outdoor grinding tools: any grinding tool designed primary for use in an outdoor environment typically including one or more of the following materials: stumps, live plants, brush, soil, clay, sand, small rocks, large rocks, medium rocks, man-made debris (for example, sidewalk, discarded trash); outdoor grinding tools include, but are not necessarily limited to: mowers, mulchers; outdoor horizontal grinders; outdoor tub grinders and/or stump grinders.

[0050] Disc: any member that defines a central axis and two major surfaces and is shaped to be suitable for being driven into rotation about its central axis, without regard to: (i) whether its shape is particularly circular; (ii) flatness in the axial direction; (iii) whether it is formed as a single piece; and/or (iv) presence or absence of holes or apertures through the disc; it is highly preferable for discs to be rotationally balanced with respect to both angular distribution of mass and axial distribution of mass, but this is not necessarily required; in some embodiments of the present invention, the "disc" may take the form of a drum, having multiple bit sub-assemblies along its relatively long axial dimension.

[0051] Bit: any member suitable for being driven into rotation to grind soil, debris and/or plant matter: (i) material used to make the bit; (ii) number of pieces making up the bit; (iii) number of cutting edges on the bit; (iv) whether the bit is more suitable for grinding stumps, brush or live trees; and/or (v) specific shape of the bit holder.

[0052] received in a recess: if a part is received in a recess, it does not necessarily mean that the received part actually touches the recess; there may intermediate layers or parts between the received part and the receiving surface of the recess.

[0053] between: a first part shall be considered to be in "between" a second part and a third part even if there are intermediate parts between the second part and first part and/or between the first part and third part; for example, in the character string "ABCDE," C is

considered to be "between" A and E (and also between B and E, and also between A and D, and also between B and D).

[0054] surface: not limited to planar surfaces, not limited to surfaces without discontinuities.

[0055] To the extent that the definitions provided above are consistent with ordinary, plain, and accustomed meanings (as generally shown by documents such as dictionaries and/or technical lexicons), the above definitions shall be considered supplemental in nature. To the extent that the definitions provided above are inconsistent with ordinary, plain, and accustomed meanings (as generally shown by documents such as dictionaries and/or technical lexicons), the above definitions shall control.

[0056] Unless otherwise explicitly provided in the claim language, steps in method steps or process claims need only be performed in the same time order as the order the steps are recited in the claim only to the extent that impossibility or extreme feasibility problems dictate that the recited step order be used. This broad interpretation with respect to step order is to be used regardless of whether the alternative time ordering(s) of the claimed steps is particularly mentioned or discussed in this document – in other words, any step order discussed in the above specification shall be considered as required by a method claim only if the step order is explicitly set forth in the words of the method claim itself. Also, if some time ordering is explicitly set forth in a method claim, the time ordering claim language shall not be taken as an implicit limitation on whether claimed steps are immediately consecutive in time, or as an implicit limitation against intervening steps.

What is claimed is:

1. A disc assembly for a grinder, the disc assembly comprising:

a disc defining a central axis, a radial direction and an angular direction, the disc including a peripheral edge and having at least one receiving recess defined in its peripheral edge;

a first bit holder mechanically connected to the disc and at least partially received in the at least one receiving recess, the first bit holder defining a first bit holder hole;

a first bit defining a first bit hole; and

a first connection hardware set structured and located to mechanically connect the first bit to the first bit holder, with the first connection hardware set including an elongated member located to extend at least partially through the first bit holder hole and the first bit hole.

2. The assembly of claim 1 wherein the first bit holder further defines a second bit holder hole, the assembly further comprising:

a second bit defining a second bit hole; and

a second connection hardware set structured and located mechanically connect the second bit to the second bit holder, with the second connection hardware set including an elongated member located to extend at least partially through the second bit holder hole and the second bit hole.

3. The assembly of claim 1 wherein the first bit holder further defines a third bit holder hole, the assembly further comprising:

a third bit defining a third bit hole; and

a third connection hardware set structured and located to mechanically connect the third bit to the third bit holder, with the third connection hardware set including an elongated

member located to extend at least partially through the third bit holder hole and the third bit hole.

4. The assembly of claim 1 wherein the elongated member of the first connection hardware set includes threads structured and located to form a threaded engagement.

5. The assembly of claim 1 wherein:

the elongated member of the first connection hardware set is a bolt and includes a bolt head portion and a threaded portion;

the first connection hardware set further includes a nut; and

threaded engagement between the bolt and nut of the first connection hardware set secure the first bit with respect to the first bit holder.

6. The assembly of claim 5 wherein:

the bolt head of the bolt of the first connection hardware set is located at least partially within the first bit hole; and

the nut of the first connection hardware set is located at an opposite side of the first bit holder relative to the bit.

7. The assembly of claim 1 further comprising a first bit base, wherein:

the first bit base defines a first bit base hole;

the first bit base is located at least substantially between the first bit and the first bit holder;

the elongated member of the first connection hardware set passes through the first bit base hole;

the first connection hardware set is further structured and located to mechanically connect the first bit base to the first bit holder and the first bit; and

the first bit base has a substantially similar profile as the bit taken in a plane perpendicular to a direction of elongation of the elongated member of the first connection hardware set.

8. The assembly of claim 1 further comprising a first shock absorber, wherein:

the first shock absorber defines a first shock absorber hole hole;

the first shock absorber is located at least substantially between the first bit and the first bit holder;

the elongated member of the first connection hardware set passes through the first shock absorber hole; and

the first connection hardware set is further structured and located to mechanically connect the first shock absorber to the first bit holder and the first bit; and

the first shock absorber has a substantially similar profile as the bit taken in a plane perpendicular to a direction of elongation of the elongated member of the first connection hardware set.

9. The assembly of claim 1 further comprising:

a second bit holder mechanically connected to the disc and at least partially received in a receiving recess, the second bit holder defining a second bit holder hole;

a second bit defining a second bit hole;

a second connection hardware set structured and located to mechanically connect the second bit to the second bit holder, with the second connection hardware set including an elongated member located to extend at least partially through the second bit holder hole and the second bit hole;

a third bit holder mechanically connected to the disc and at least partially received in a receiving recess, the third bit holder defining a third bit holder hole;

a third bit defining a third bit hole; and

a third connection hardware set structured and located to mechanically connect the third bit to the third bit holder, with the third connection hardware set including an elongated member located to extend at least partially through the third bit holder hole and the third bit hole; and

wherein the first bit holder, the second bit holder and the third bit holder are substantially equally spaced about the angular direction of the disc.

10. A disc assembly for a grinder, the disc assembly comprising:

a disc defining a central axis, a radial direction and an angular direction;

a first bit holder mechanically connected to the disc, the first bit holder including a front surface generally facing a direction of rotation of the disc;

a first bit including a front surface generally facing a direction of rotation of the disc; and

a first connection hardware set structured and located to mechanically connect the first bit to the first bit holder so that the front surface of the first bit holder is at least substantially aligned with the front surface of the first bit holder.

11. The assembly of claim 10 wherein:

the disc includes a peripheral edge that defines at least one receiving recess; and

the first bit holder is at least partially received in the receiving recess.

12. The assembly of claim 11 wherein:

the first bit holder is substantially L-shaped in a plane perpendicular to the central axis of the disc, with one arm of the "L" being a received portion of the first bit holder and the other arm of the "L" being a bit securing portion of the first bit holder;

the received portion of the first bit holder is at least partially received in the receiving recess;

the received portion of the first bit holder includes a bit facing surface that faces the direction of extension of the bit securing portion; and

a first connection hardware set is structured and located to mechanically connect the first bit to the bit securing portion of the first bit holder in a position so that the bit facing surface of the received portion of the first bit holder at least substantially faces the first bit.

13. The assembly of claim 12 wherein:

the first bit defines a first major surface, a second major surface and a peripheral edge;

the peripheral surface of the first bit includes a first flat portion; and

a first connection hardware set is structured and located to mechanically connect the first bit to the bit securing portion of the first bit holder in a position so that the bit facing surface of the received portion of the first bit holder at least substantially faces the first flat portion of the peripheral surface of the first bit.

14. The assembly of claim 13 wherein the first bit and the first bit holder are sized and shaped so that the bit facing surface of the received portion of the first bit holder at least partially touches the first flat portion of the peripheral surface of the first bit to prevent the first bit from rotating with respect to the first bit holder by physical interference.

15. The assembly of claim 13 wherein:

the peripheral surface of the first bit includes a second flat portion and a third flat portion; and

a first connection hardware set mechanically connects the first bit to the bit securing portion in a detachably attachable manner so that the first bit can be secured in at least the following positions: (i) first flat portion facing the bit facing surface of the first bit holder, (ii) second flat portion facing the bit facing surface of the first bit holder, and (iii) third flat portion facing the bit facing surface of the first bit holder.

16. A disc assembly for a grinder, the disc assembly comprising:

a disc defining a central axis, a radial direction and an angular direction;

a first bit holder mechanically connected to the disc;

a first bit; and

a first connection hardware set structured and located to mechanically connect the first bit to the first bit holder;

wherein:

the disc includes a peripheral edge that defines at least one receiving recess; and

the first bit holder is at least partially received in the receiving recess;

the first bit holder is substantially L-shaped in a plane perpendicular to the central axis of the disc, with one arm of the "L" being a received portion of the first bit holder and the other arm of the "L" being a bit securing portion of the first bit holder;

the received portion of the first bit holder is at least partially received in the receiving recess;

the received portion of the first bit holder includes a bit facing surface that faces the direction of extension of the bit securing portion; and

the first connection hardware set is structured and located to mechanically connect the first bit to the bit securing portion of the first bit holder in a position so that the bit facing surface of the received portion of the first bit holder at least substantially faces the first bit.

17. The assembly of claim 16 wherein:

the first bit defines a first major surface, a second major surface and a peripheral edge;

the peripheral surface of the first bit includes a first flat portion; and

a first connection hardware set is structured and located to mechanically connect the first bit to the bit securing portion of the first bit holder in a position so that the bit facing surface of the received portion of the first bit holder at least substantially faces the first flat portion of the peripheral surface of the first bit.

18. The assembly of claim 17 wherein the first bit and the first bit holder are sized and shaped so that the bit facing surface of the received portion of the first bit holder at least partially touches the first flat portion of the peripheral surface of the first bit to prevent the first bit from rotating with respect to the first bit holder by physical interference.

19. The assembly of claim 17 wherein:

the peripheral surface of the first bit includes a second flat portion and a third flat portion; and

a first connection hardware set mechanically connects the first bit to the bit securing portion in a detachably attachable manner so that the first bit can be secured in at least the following positions: (i) first flat portion facing the bit facing surface of the first bit holder, (ii) second flat portion facing the bit facing surface of the first bit holder, and (iii) third flat portion facing the bit facing surface of the first bit holder.

20. A disc assembly for a grinder, the disc assembly comprising:

a disc defining a central axis, a radial direction and an angular direction, the disc including a peripheral edge and having a first receiving recess and a second receiving recess defined therein, with a first ramping portion of the peripheral edge extending along the angular direction from the first receiving recess to the second receiving recess;

a first bit assembly mechanically connected to the disc and at least partially received in the first receiving recess; and

a second bit assembly mechanically connected to the disc and at least partially received in the second receiving recess;

wherein the first ramping portion increases in it radial size as it extends from the first receiving recess to the second receiving recess.

21. The assembly of claim 20 wherein the peripheral edge of the disc has a third receiving recess defined therein, with a second ramping portion of the peripheral edge

extending along the angular direction from the second receiving recess to the third, and the second ramping portion increases in it radial size as it extends from the first receiving recess to the second receiving recess the assembly further comprising a third bit assembly mechanically connected to the disc and at least partially received in the third receiving recess.

22. The assembly of claim 20 wherein the first ramping portion comprises:

a first portion;

a second flat portion; and

a curved portion extending between the first flat portion and the second flat portion.

23. The assembly of claim 20 wherein:

the first bit assembly comprises a first bit; and

the second bit assembly comprises a second bit.

24. The assembly of claim 23 wherein:

the first bit assembly comprises a first bit holder; and

the second bit assembly comprises a second bit holder.

25. The assembly of claim 24 wherein:

the first bit assembly comprises a first bit base located between the first bit holder and the first bit; and

the second bit assembly comprises a second bit base located between the second bit holder and the second bit.

26. The assembly of claim 24 wherein:

the first bit assembly comprises a first shock absorber located between the first bit holder and the first bit; and

the second bit assembly comprises a second shock absorber located between the second bit holder and the second bit.

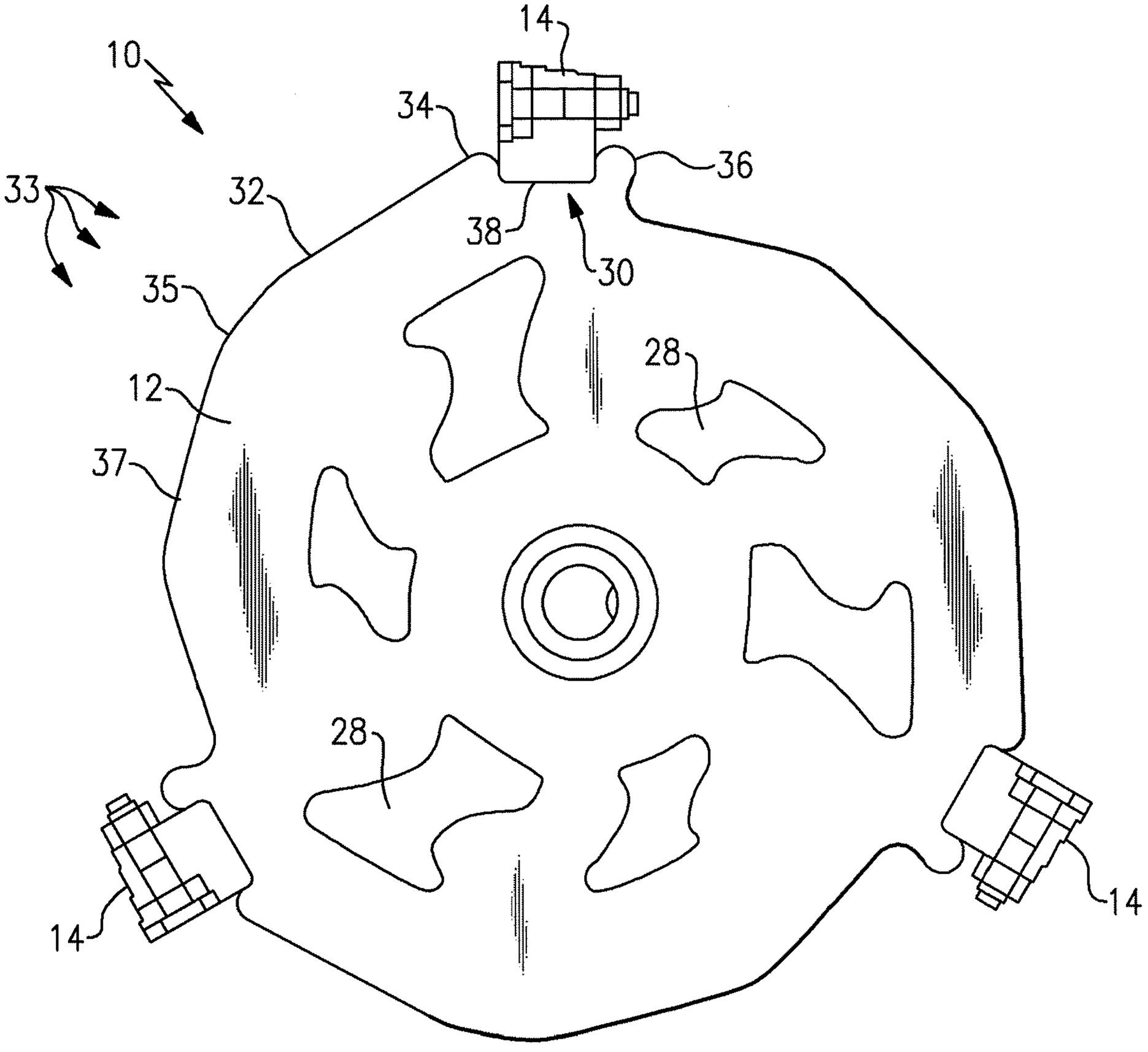


FIG.1

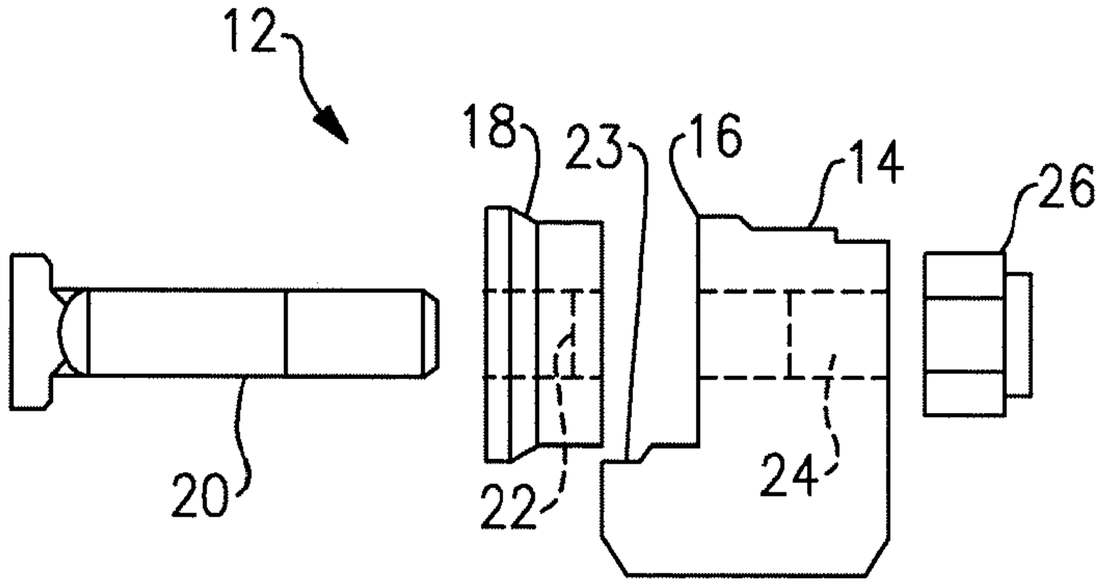


FIG.2A

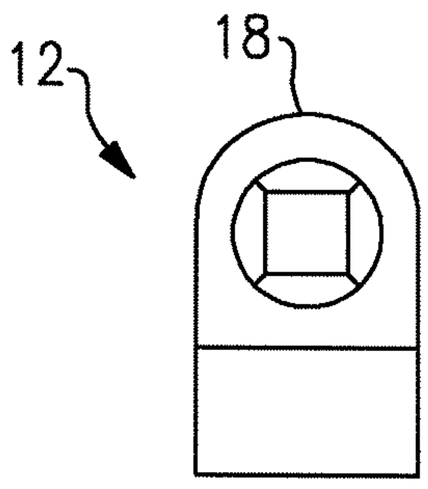


FIG.2B

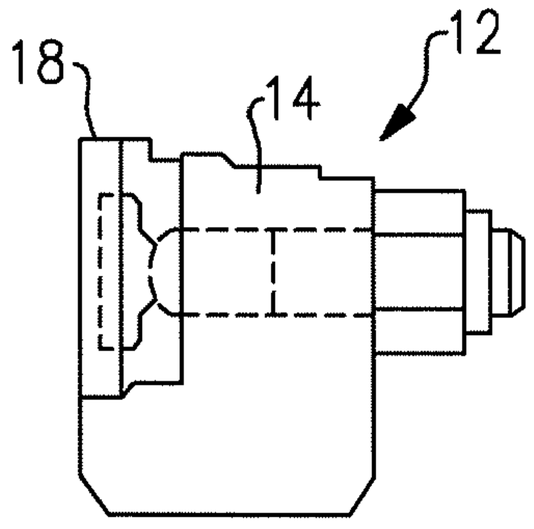


FIG.2C

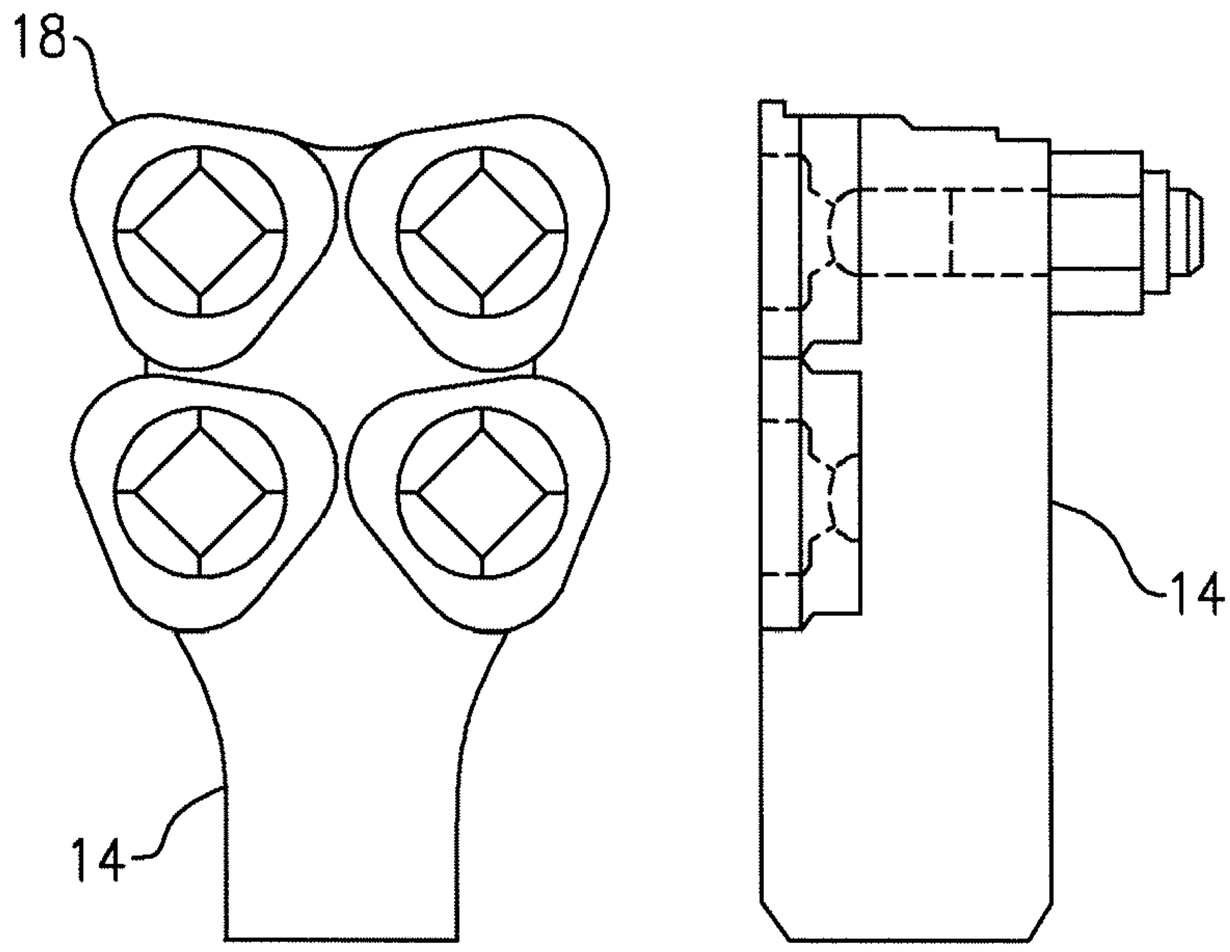


FIG.3A

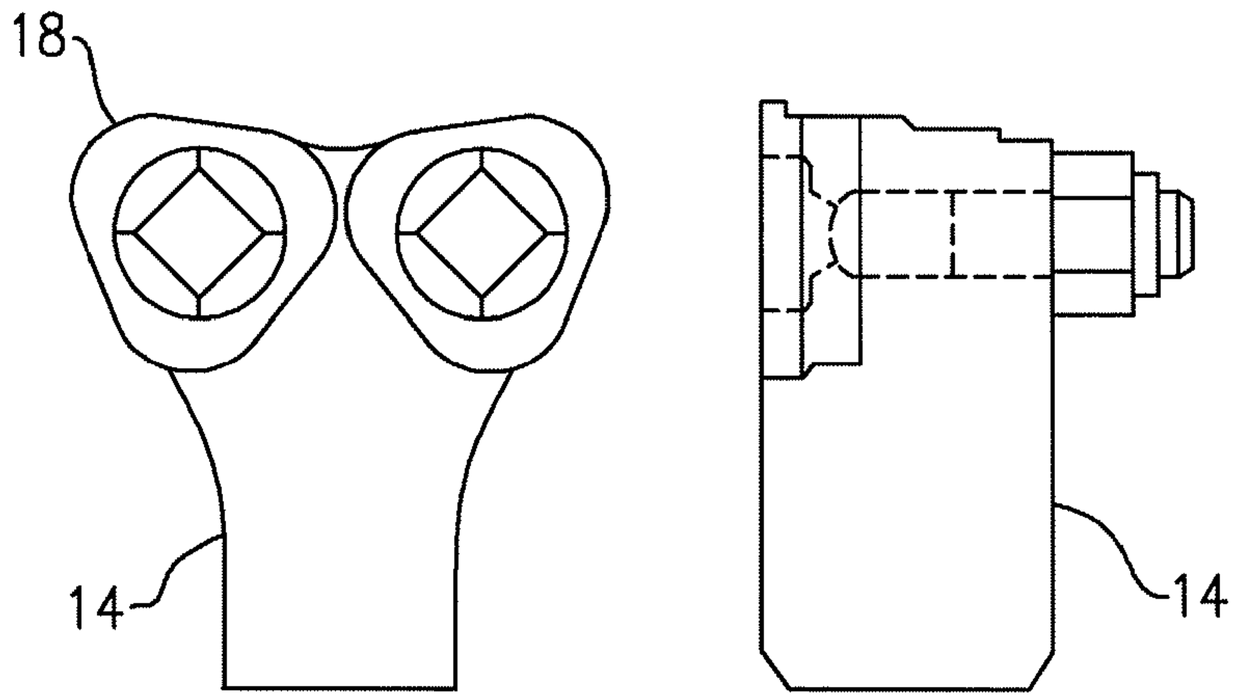


FIG.3B

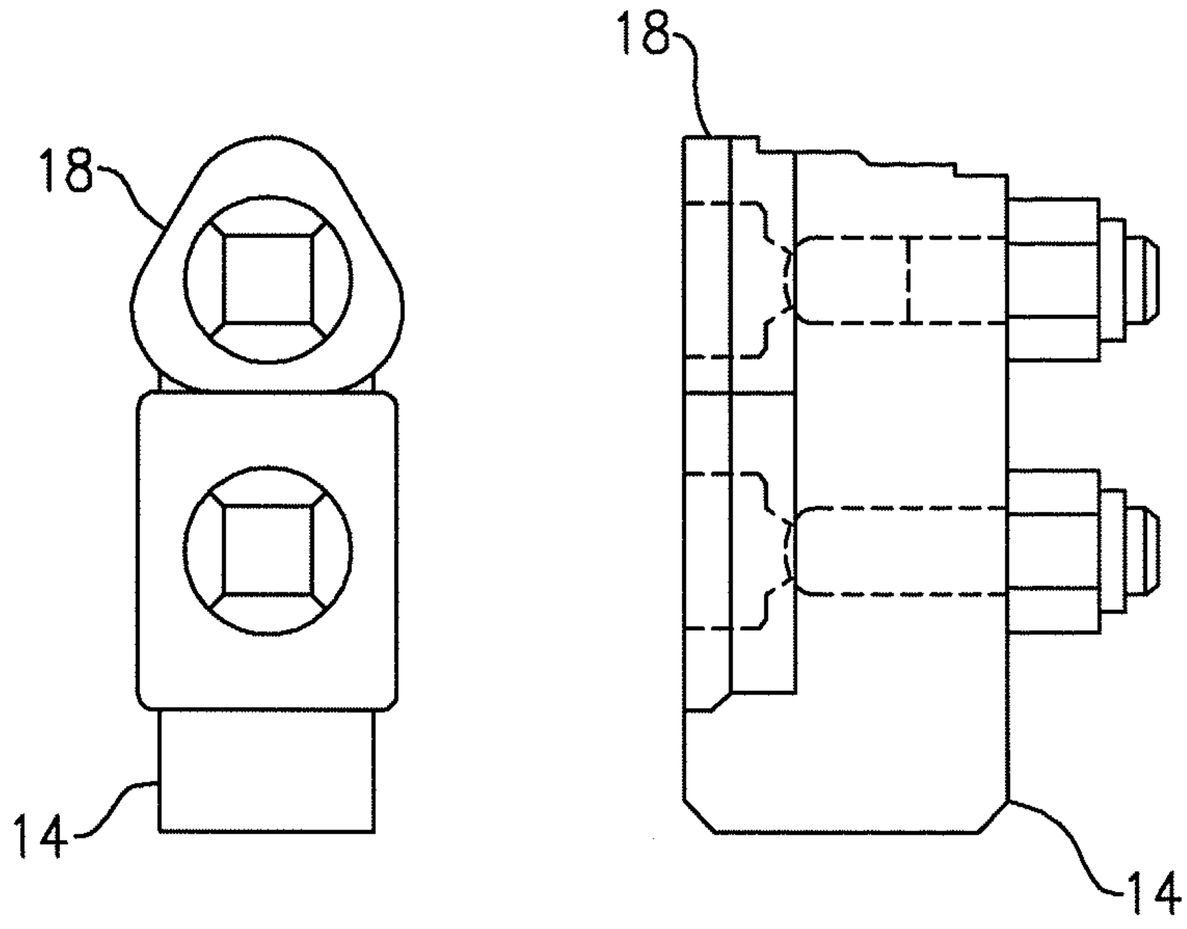


FIG.3C

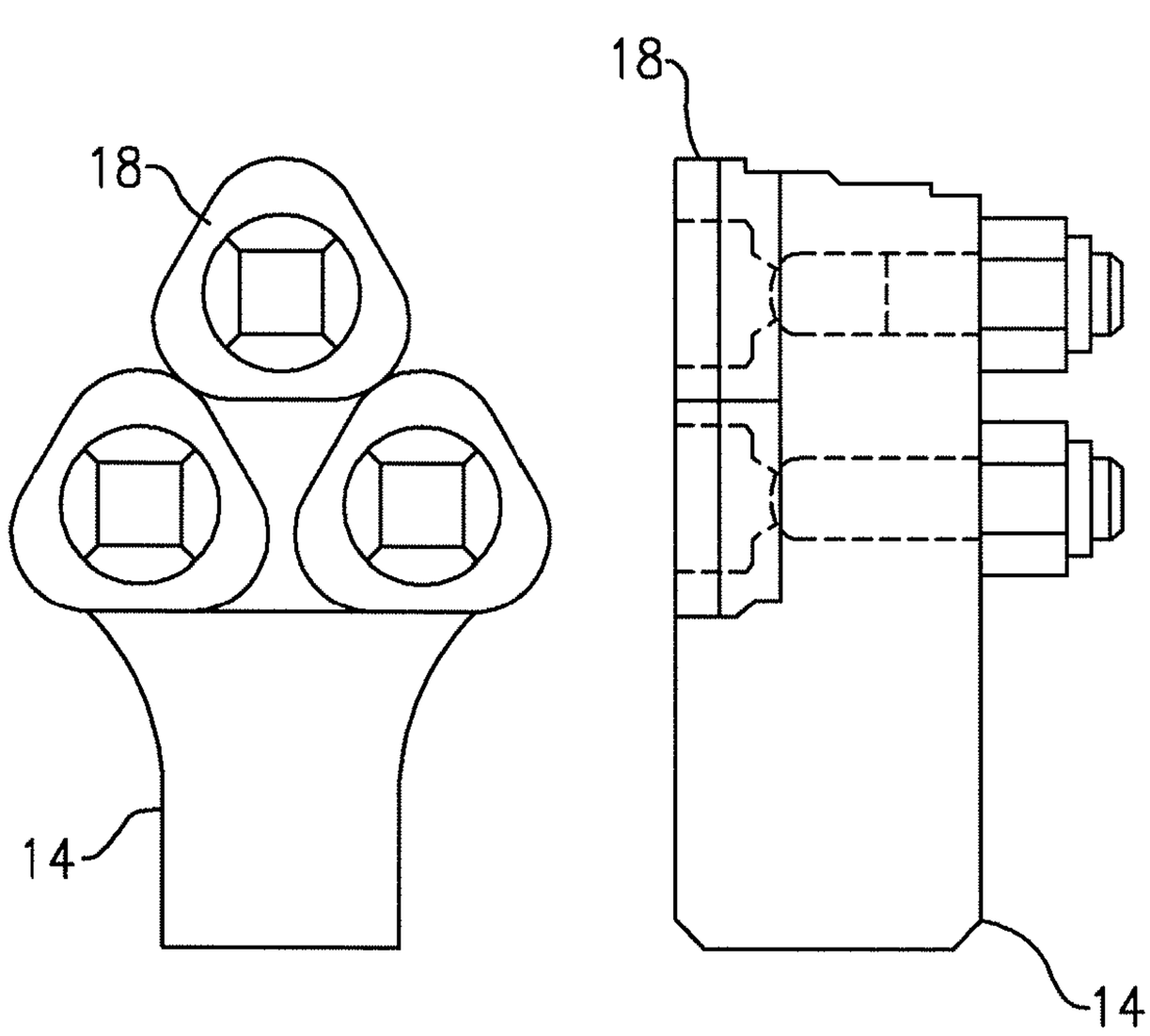


FIG.3D

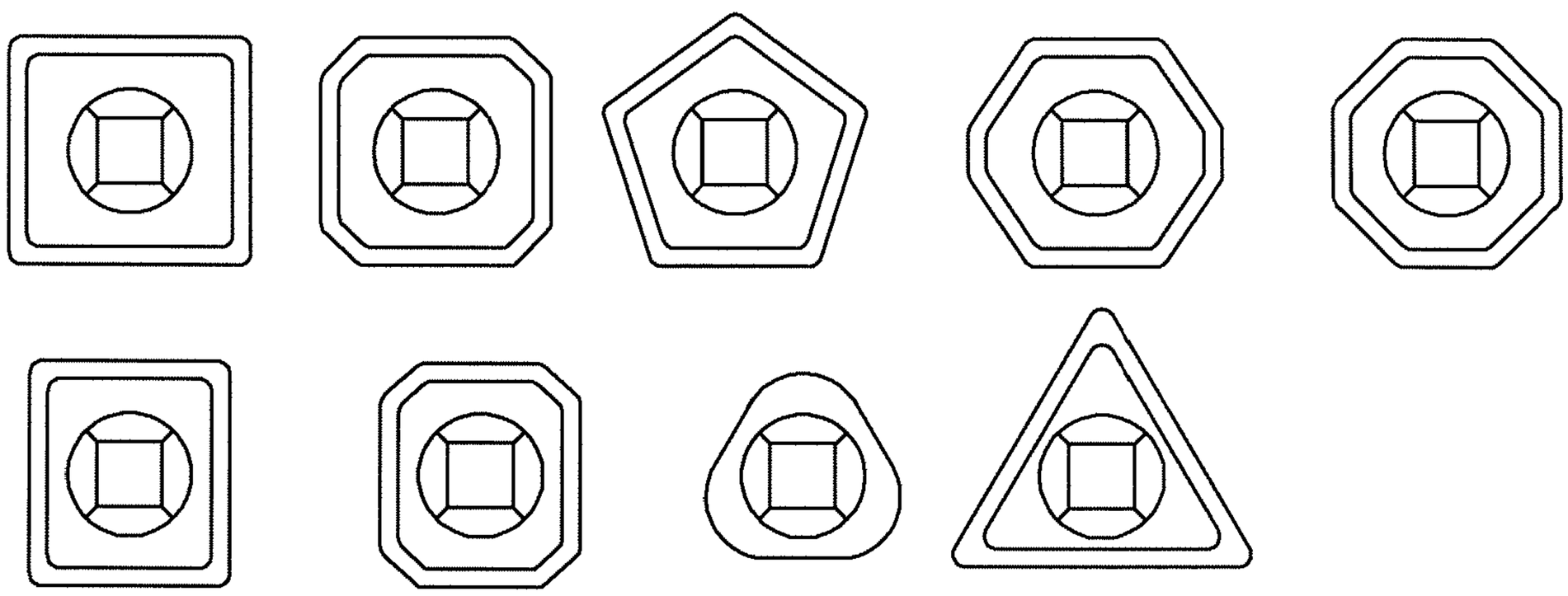


FIG.4

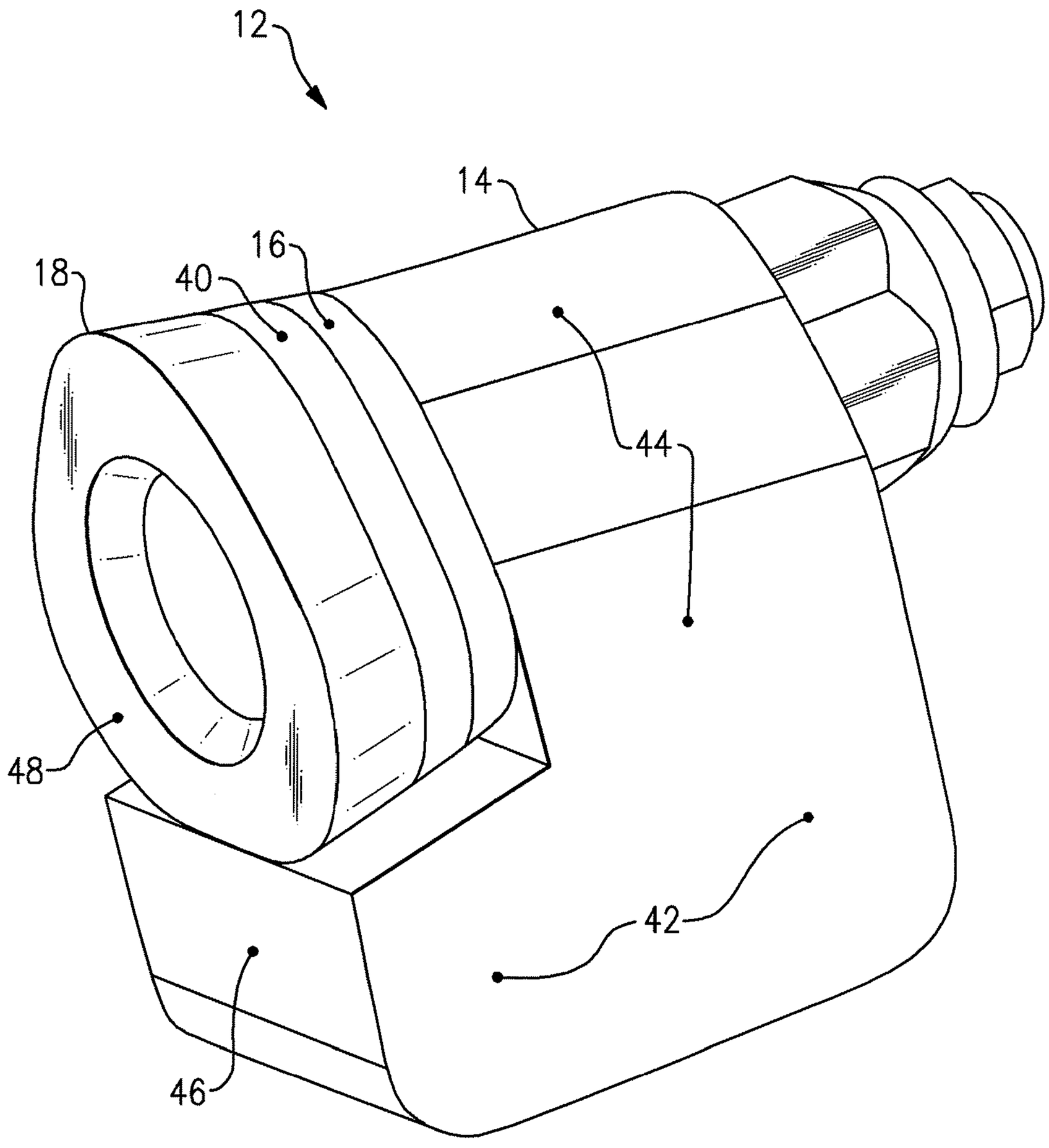
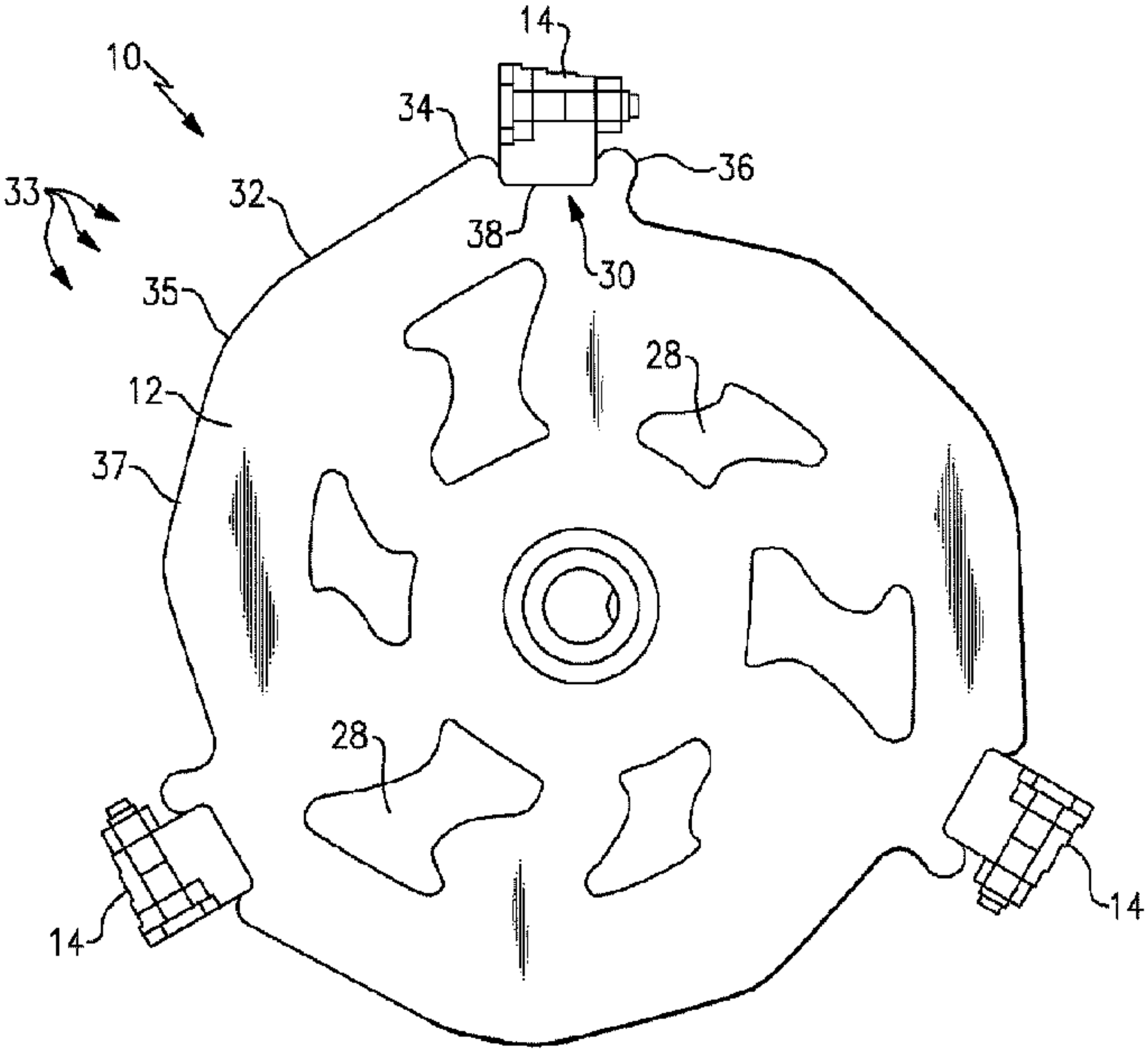


FIG.5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