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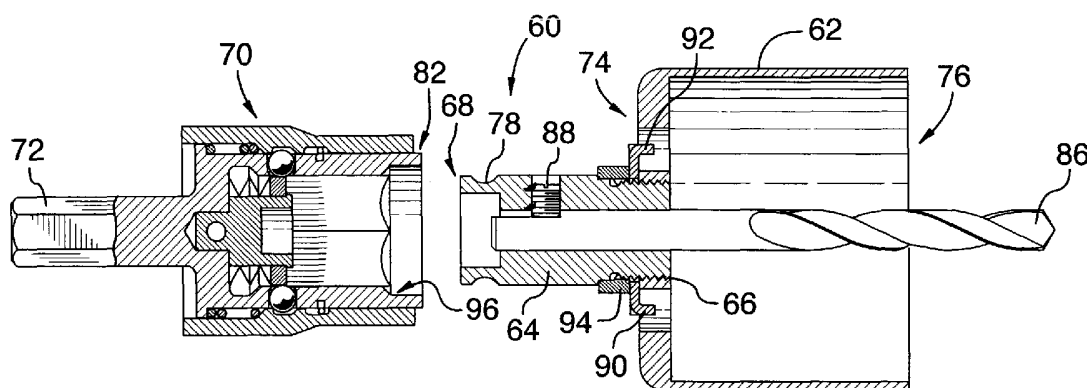
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(54) Title: UNIVERSAL QUICK CONNECT SYSTEM FOR A HOLE SAW



(57) Abstract: The invention is directed at a quick connect mechanism for mounting a hole saw to a tool comprising a hole saw; a mandrel having a first end for mounting to the hole saw and a second end for mounting to the tool; and a drill bit, assembled within the mandrel such that when the mandrel is connected to the hole saw, the drill bit being concentrically centred within the hole saw; a holder, mounted to the tool, for receiving the second end of the mandrel; wherein the second end of the mandrel includes quick connect means for easily mounting the mandrel to and releasing the mandrel from the holder.

UNIVERSAL QUICK CONNECT SYSTEM FOR A HOLE SAW

FIELD OF THE INVENTION

[0001] The present invention relates generally to tools. More particularly, the
5 present invention relates to a universal quick connect system for a hole saw.

BACKGROUND OF THE INVENTION

[0002] Hole saws are well known in the art and are generally used to assist a user
in cutting a hole in a construction material such as wood or metal. In general, two types
of hole saws are known. One is known as a carbon hole saw which is formed of carbon
10 steel and generally used to cut a hole in a softer construction material such as wood. The
other type of hole saw is known as a bi-metal hole saw which is generally manufactured
as a combination of a carbon steel body and high speed steel teeth and used to cut a
hole in a construction material such as metal.

[0003] Hole saws are connected to a drill via a hole saw mounting apparatus with
15 many variations in construction ranging from rudimentary mechanisms well known in the
art to more recent mechanisms newer in the art.

[0004] With some conventional hole saws, the hole saw, mandrel and drill bit are
manufactured and assembled as a complete system. When a user wishes to cut a hole
using this type of conventional hole saw, the user simply mounts the system on to the drill
20 and proceeds to cut their hole. When the user wishes to cut another sized hole, the user
is then required to disengage the entire hole saw system from the drill and then replace it
with another hole saw on, and re-engage the entire hole saw system. This is quite time
consuming and may contribute to the delay of the completion of a project.

[0005] In some other conventional hole saws, the hole saws include quick
25 connect means so that the hole saw may be quickly disengaged from the drill after use.
However, in these hole saws, quick connect means, although quicker than previously
mentioned hole saws have shortcomings to their quickness. For example, one hole saw
with such quick connect mean includes the drill bit mounted directly into the quick connect
means thereby requiring the user to initially install the drill bit into the quick connect
30 means, align the drill bit through the mandrel and into the hole saw and locking with the
quick connect in preparation for use. This requires steps that are time consuming and
require particular visual alignment. Furthermore, the assemble results in a drill bit with

more than desired play to pilot the hole saw cutting operation. An example of such a system is schematically shown in Figure 1.

[0006] It is, therefore, desirable to provide a universal quick connect system for a hole saw which overcomes the disadvantages of the prior art.

5 SUMMARY OF THE INVENTION

[0007] It is an object of the present invention to obviate or mitigate at least one disadvantage of previous hole saw mounting apparatus.

[0008] In a first aspect of the invention, there is provided a quick connect mechanism for mounting a hole saw to a tool comprising a hole saw; a mandrel having a first end for mounting to the hole saw and a second end for mounting to the tool; and a drill bit, assembled within the mandrel such that when the mandrel is connected to the hole saw, the drill bit being concentrically centred within the hole saw; a holder, mounted to the tool, for receiving the second end of the mandrel; wherein the second end of the mandrel includes quick connect means for easily mounting the mandrel to and releasing the mandrel from the holder.

[0009] In another aspect of the invention., there is provided a quick connect system for mounting a hole saw to a tool comprising a housing including a plurality of docking stations for housing multiple hole saw and mandrel combinations; the hole saw and mandrel combinations including a hole saw; a mandrel having a first end for mounting to the hole saw and a second end for mounting to the tool; and a drill bit, assembled within the mandrel such that when the mandrel is connected to the hole saw, the drill bit being concentrically centred within the hole saw; and a holder, mounted to the tool, for receiving the second end of the mandrel wherein the second end of the mandrel includes quick connect means for easily mounting the mandrel to and releasing the mandrel from the holder.

[0010] As is understood, the manufacture of hole saws are guided by industry standards so that a universal quick connect system may be of great advantage in the field of hole saws. By providing a universal quick connect system, a user is able to select mate any conventional hole saw with any tool without having to rely on unique hole saw apparatus for specific holes saws and tools .

[0011] Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described, by way of example only, with reference to the attached Figures, wherein:

5 Figure 1 is a perspective view of a prior art hole saw and hole saw adapter system;

 Figure 2 is a perspective view of a universal quick connect system for a hole saw;

10 Figure 3a is a cut away view of a first embodiment of a universal quick connect system in a release position;

 Figure 3b is a cut away view of the embodiment of Figure 3a in a locked position;

 Figure 4 is a cut away view of a mandrel;

 Figure 5a is a front view of a saw plate;

15 Figure 5b is a view taken along line 5b-5b of Figure 5a;

 Figure 6a is a cut away view of a second embodiment of a universal quick connect system in a release position;

 Figure 6b is a cut away view of the embodiment of Figure 6a in a locked position;

20 Figure 6c is an exploded view of the embodiment of Figure 6a;

 Figure 7 is a perspective view of another embodiment of a hole saw and mandrel portion of a universal quick connect system;

 Figure 7a is a side view of the embodiment of Figure 7 in use;

25 Figure 8 is a perspective view of yet a further embodiment of a hole saw and mandrel portion of a universal quick connect system;

 Figure 9 is a perspective view of a plurality of hole saw and mandrel portions stored in a docking station;

 Figure 10 is a cut away side view of the docking station; and

30 Figure 11 is an exploded view of a portion of the quick connect system.

DETAILED DESCRIPTION

[0012] Generally, the present invention provides apparatus for a universal quick connect system for a hole saw.

[0013] Turning to Figure 2, a perspective exploded view of a universal quick connect system for use with a bi-metal hole saw is shown. The universal quick connect system **10** comprises a mandrel **12** (which is connected to a (partially cut away) hole saw **14**) and a holder **16**. The hole saw **14** includes a base end **18** for receiving the mandrel **12** and a cutting end **20** which comprises a set of cutting teeth **22**. As shown, the base end **18** of the hole saw **14** comprises a central hole **24** for receiving the mandrel **12** and a pair of radially opposed holes **26** adjacent the central hole **24**. The central hole **24** generally includes threaded means for mating with the mandrel **12** although other methods of mating the mandrel **12** with the hole saw **14** are contemplated.

[0014] The mandrel **12** comprises a hole saw end **36** which is mounted to the hole saw **14**. The hole saw end **36** preferably comprises the threaded portion **35** which is complementary to threaded means (not shown) in the central hole **24** of the hole saw **14**. The mandrel also comprises a holder end **38** which mates with the holder **16**.

[0015] The universal quick connect system **10** preferably comprises a plate **28**, such as a saw plate or a washer located around the mandrel **12** and the base end **18** of the hole saw **14**. In this embodiment, the plate **28** is a saw plate **30** including tangs **32** which are used to assist in driving the hole saw **14** by providing a further driving force as the hole saw is cutting a hole. The plate **28** may also serve to provide a means to prevent the holder **16** from disengaging from the mandrel **12** while the hole saw **14** is in operation. The saw plate **30** includes a hole **34**, allowing a threaded portion **35** of the mandrel **12** to pass therethrough to mate with the hole saw so that the plate **30** abuts the hole saw **14** around while located around the mandrel **12**. In order to mount the saw plate **30** to the hole saw **14**, the tangs **32** of the plate **30** are inserted into the radially opposed holes **26**, or notches on the surface of the hole saw depending on the size of the hole saw. The saw plate **30** is more clearly shown in Figures 5a and 5b.

[0016] The holder **16** comprises a tool end **40** which comprises means **41** for connecting the holder **16** to a tool (such as a drill) and a mandrel end **42** for receiving the mandrel **12**. Different types of tool end connecting means **41** will be well known to one skilled in that art. In the present embodiment, the connecting means **41** of the tool end **40** is easily inserted and locked into the mouth of the tool. In operation, the tool provides the necessary rotational power for a hole to be cut by the hole saw **14**. The mandrel end **42** include means for quickly connecting and releasing the holder to and from the mandrel **12**. Various quick connect means will be well understood by one skilled in the art.

[0017] In order to create an initial hole to assist the hole saw **14** in the cutting the hole, a drill bit **46** is inserted through a central bore **44** (as more clearly shown in Figure 4) of the mandrel **12** and is locked in place when the holder **16** is connected to the mandrel **12**. The drill bit **46** forms a part of the universal quick connect system **10**. The connection between the holder **16**, mandrel **12** and the drill bit **46** will be described herein below.

[0018] Figure 3a is a cut-away view of the universal quick connect system in a released position while Figure 3b is a cut-away view of the universal quick connect system in a locked position.

[0019] The tangs **32** of the saw plate **30** are inserted into the radially opposed holes **26** of the hole saw **14** and the mandrel **12** mounted to the hole saw **14** and the drill bit **46** is inserted into the central bore **44** of the mandrel **12**. In order to locate the drill bit **46** within the mandrel **12** (prior to being locked by the holder), the mandrel **12** includes a drill bit locating means **48**, seen in the present embodiment as a pair of steel balls **50** which mate with a small groove, or indent, **52** in the drill bit **46**. The holder **16** is then quickly connected to the mandrel **12** by inserting the mandrel into the holder **16** which locks the drill bit **46** and mandrel **12** in place for operation. Although the holder may be inserted into the mouth of the tool after receiving the mandrel **12**, the holder **16** is preferably attached to the tool, prior to receiving the mandrel, so that when after the holder **16** is quickly connected to the mandrel **12**, the hole saw **14** is ready for immediate use (with the provision of power).

[0020] The central bore **44** for the mandrel **12** is preferably manufactured by known means and finished by broaching which allows a tighter fit to be provided between the drill bit **46** and the mandrel **12** so that there is little movement of the drill bit **46** during operation.

[0021] As will be understood, by having the drill bit **46** form a part of the quick connect system, the drill bit **46** is centred within the entire system which allows the hole saw to be more quickly and easily connected to the tool.

[0022] The quick connect means for connecting the holder **16** and the mandrel **12** are generally conventional and it will be understood that there are numerous means for providing quick connect means between the holder and the mandrel. However, unlike some conventional quick connect means, the mandrel **12** also comprises means for locating and supporting **54** from the holder when the holder and the mandrel are

connected. The holder **16** also comprises complementary housing **56** for receiving one of the means for locating and supporting **54** the mandrel.

[0023] As more clearly shown in Figure 4, one of the means for locating and supporting **54** is located at the hole saw end **36** of the mandrel **12** while a second means for locating and supporting **54** is located at the holder end **38**. The locating and supporting means **54** provide further support to the quick connect system **10** so that there is little movement of the hole saw during operation and to improve the accuracy of concentricity of the holder **16** (and therefore the hole saw **14**) when the hole saw is in use. If play exists in the pilot bit, the hole drilled by the hole saw is inaccurate thereby causing the hole saw to be less accurate. By reducing or eliminating play in the drill bit, the hole saw experiences improved accuracy.

[0024] Turning to Figures 6a to 6c, various views of an embodiment of a universal quick connect apparatus for mounting a hole saw to a tool, such as a drill, is shown. The quick connect apparatus **60** comprises a hole saw **62**, a mandrel **64** having a first, preferably threaded, end **66** for mating with the hole saw **62** and a second end **68** for mating with a holder **70**. The holder **70** includes means for mounting **72** the holder to the tool. In this embodiment, the means for mounting is a hex-shaped shaft which is shaped to fit in a standard tool, or drill.

[0025] The first end **66** of the mandrel **64** mates with complementary threading in a hole in the base end **74** of the hole saw **62**. A cutting end **76** of the hole saw **62** includes a set of teeth (not shown) for cutting the hole. The second end **68** of the mandrel **64** includes a groove or detent **78**.

[0026] The hole saw **62** preferably includes at least one slot **80** allowing a user to access the inside of the hole saw to remove a slug (the material remaining after a hole has been cut) without having to remove the hole saw.

[0027] The holder **70** includes a mandrel receiving end **82** for receiving the second end **68** of the mandrel **64**. The mandrel **64** and the holder **70** include complementary quick connect means so that the quick connect apparatus **60** (such as the hole saw and mandrel) may be easily and quickly removed from the drill when necessary. Various types of quick connect means are known and are contemplated for providing the mating between the mandrel **64** and the holder **70**. In the present embodiment, the holder includes a set of balls **84** which mate with the groove **78** of the second end **68** to lock the mandrel **64** in place so that the hole saw **62** is connected to the drill.

[0028] The mandrel **64** includes a central bore, allowing for a drill, or pilot, bit, **86** to be inserted therethrough and be concentrically spaced within the mandrel **64**. In this embodiment, the drill bit **86** is locked in place by a set screw **88** which is manually rotated into place by a user. This allows the drill bit **86** to be easily replaced when necessary.

5 The use of the set screw reduces or eliminates the amount of play experienced by the drill bit **86** when the hole saw **62** is in use since the drill bit **86** is preassembled and centred within the mandrel prior to being mounted to the drill. When the mandrel **64** is mounted to the hole saw **62**, the drill bit **86** protrudes through the hole saw **62** and is also concentrically located within the hole saw **62**. By including the drill bit **86** as part of the
10 quick connect system, there is less time required to mount the hole saw **62** to the tool and the drill bit is pre-centred within the overall system rather than requiring the user to centre the drill bit within the quick connect system as described above with respect to Figure 1.

[0029] A plate **90** is preferably located between the mandrel **64** and the hole saw **62**, the plate **90** having a pair of tangs **92** for mating with holes in the hole saw **62**. As
15 described above, the plate **90** is used to provide further assistance in driving the hole saw **62** during operation and to assist in preventing accidental disengagement between the holder **70** and the mandrel **64** when the hole saw is in use. Depending on the size of the hole saw **62**, the plate **90** may either be a washer or a saw plate as discussed in more detail below with respect to Figures 7 and 8. The diameter of the plate **90** is preferably
20 larger than the diameter of the hole saw **62** to reduce the likelihood of the holder **70** becoming inadvertently disconnected/disengaged from the quick connect apparatus **60** during operation. This is more clearly shown in Figure 7a. As the hole is being cut by the hole saw, the plate **90** prevents the mandrel from entering the hole thereby reducing or eliminating the chance that the mandrel and holder being disengaged during use.

25 **[0030]** A locating ring **94** is mounted around the mandrel **64** to assist in locating the holder **70** when it is connected. The locating ring **94** preferably rests within a complementary housing **96** in the mandrel receiving end **82** of the holder **70**.

[0031] One advantage of the current quick connect system is that, unlike hole saw connectors in the prior art, the drill bit **86** is preassembled to the mandrel **64** and forms
30 part of the quick connect apparatus **60**. This allows a user to quickly connect the holder **70** to the mandrel without having to worry about centring the drill bit within the mandrel. There is no need to firstly insert a drill bit into the drill before carefully centring the drill bit within the hole saw apparatus.

[0032] Turning to Figures 7 and 8, further embodiments of a mandrel and hole saw combination are shown. In Figure 7, the hole saw and mandrel combination **100** comprises a small diametered hole saw **102** and a mandrel **104**. A drill bit **106** is also preassembled to the mandrel **104** and preferably locked in place by a set screw (not shown). In this small diametered hole saw embodiment, the plate **108** is a washer. In this embodiment, the washer **108** simply serves as further assistance in preventing the disengagement between the holder and the mandrel during use. However, it will be understood that the plate **108** may include tangs if so desired.

[0033] In Figure 8, the hole saw and mandrel combination **110** comprises a large diametered hole saw **112** and a mandrel **114**. Although not shown, a drill bit is preassembled to the mandrel. Due to the diameter of the hole saw, a saw plate **116** having a pair of tangs **118** in order to provide a further torque to the hole saw when in use. As indicated above, a flat washer or a bevelled washer or the like may also be used if the extra drive force is not required.

[0034] Turning to Figure 9, a perspective view of a set of mandrel and hole saw combinations **119** are shown stored in a container **120** including multiple docking stations **122** (more clearly shown in Figure 10) along with a drill **124**. In order to connect one of the mandrel and hole saw combinations **119** to the drill **124**, the user is simply required to snap the drill **124** (having a holder **16** or **70** previously mounted thereon) down over the second end of the mandrel. As the mandrel is assembled with the drill bit, the docking station houses, or erects, the mandrel assembly in a position that permits a wide angle approach of the holder onto the mandrel for direct and easy connection from the docking station. As illustrated in the enlarged Figure 11, the angling of the hole saw and mandrel combination **119** allows the holder **16** to approach the mandrel at any angle to be quickly connected. As the drill bit is already pre-assembled, this connection process is very quick and easy to use. After use, the hole saw and mandrel combination **119** may simply be placed back into its associated the docking station and then quickly disengaged from the holder and, if necessary, replaced by another hole saw and mandrel combination. As can be seen in Figure 10, each docking station **122** includes a pole **124** with a central hollowed out portion **126** for receiving the drill bit.

[0035] As the hole saw and drill bit are typically both very hot after use, the space (as indicated by arrows **125**) between pole **124** and the hole saw allows for the hole saw to cool while resting in its docking station **122**. The contact between the pole, or post, and the drill bit is at a less hot portion of the drill bit thereby allowing various plastics to be

used in the manufacture of the docking stations. In this embodiment, the cooling is preferably achieved by convection cooling.

5 [0036] In an alternative embodiment, the poles are sized to rest within and contacting the internal surface of the hole saw such that there is no space between the pole and the hole saw. The poles are manufactured from aluminium or similar material which will conduct heat away from hole saw. An advantage of including the storage case as a part of the quick connect system is that the docking stations do not require the user to come in contact with the hand saw and mandrel combination 119 to engage and disengage the mandrel from the holder to avoid the user from burning their hands on the
10 hot saw after operation.

[0037] In an alternative embodiment, the docking stations include means for receiving the mandrel and hole saw alone.

[0038] Although the above-described embodiments are directed at bi-metal hole saws, it will be understood that a universal quick connect system for carbon hole saws is
15 also contemplated.

[0039] Furthermore, the mandrel may be either one or two-piece construction.

[0040] In an alternative embodiment, the drill bit may have one or more flats, or ovaloids, to assist in providing the necessary drive to cut a hole. For cutting applications where accuracy is necessary, round to round mating may be used thereby providing
20 multiple support sections between the mandrel and the drill bit to provide further accuracy of concentricity during use. As will be understood by one skilled in the art, the manufacture of round to round mating parts is generally more accurate than the manufacture for hexagonal shaped parts.

[0041] The above-described embodiments of the present invention are intended
25 to be examples only. Alterations, modifications and variations may be effected to the particular embodiments by those of skill in the art without departing from the scope of the invention, which is defined solely by the claims appended hereto.

What is claimed is:

1. A quick connect mechanism for mounting a hole saw to a tool comprising:
a hole saw;
5 a mandrel having a first end for mounting to said hole saw and a second end for mounting to said tool; and
a drill bit, assembled within said mandrel such that when said mandrel is connected to said hole saw, said drill bit being concentrically centred within said hole saw;
10 a holder, mounted to said tool, for receiving said second end of said mandrel; wherein said second end of said mandrel includes quick connect means for easily mounting said mandrel to and releasing said mandrel from said holder.
2. The quick connect mechanism of Claim 1 wherein said drill bit is assembled to
15 said mandrel via a set screw.
3. The quick connect mechanism of Claim 1 further comprising a plate between said mandrel and a bottom surface of the hole saw
- 20 4. The quick connect mechanism of Claim 3 wherein said plate being slightly larger in diameter than said hole saw.
5. The quick connect mechanism of Claim 3 wherein said plate is a saw plate.
- 25 6. The quick connect mechanism of Claim 5 wherein said saw plate includes tangs for mating with corresponding notches in said hole saw.
7. The quick connect mechanism of Claim 1 wherein said mandrel further comprises a locator for locating said mandrel within said holder when connected.
- 30 8. The quick connect mechanism of Claim 1 wherein said mandrel further comprises means for receiving and locating said drill bit in place.

9. The quick connect mechanism of Claim 8 wherein said locking means is a ball which mates with a groove in said drill bit.
10. The quick connect mechanism of Claim 1 wherein drill bit is assembled at said
5 first end of said mandrel.
11. The quick connect mechanism of Claim 1 wherein said holder includes a tool end for mounting to said drill.
- 10 12. The quick connect mechanism of Claim 11 wherein said tool end comprises a hex shaped bit representing an end of a drill bit.
13. The quick connect mechanism of Claim 1 wherein said tool is a drill.
- 15 14. The quick connect mechanism of Claim 1 wherein said drill bit is concentrically spaced within said mandrel.
15. A quick connect system for mounting a hole saw to a tool comprising:
a quick connect holder;
20 a storage case including a plurality of docking stations for housing multiple hole saw and mandrel combinations; said hole saw and mandrel combinations including at least two of the following]:
a hole saw;
a mandrel having a first end for mounting to said hole saw and a second
25 end for mounting to said tool; and
a drill bit, assembled within said mandrel such that when said mandrel is connected to said hole saw, said drill bit being concentrically centred within said hole saw.
- 30 16. The quick connect system of Claim 15 wherein said docking stations provide a cooling area for said hole saw and mandrel combination.
17. The quick connect system of Claim 16 wherein each of said docking stations include a post for receiving said drill bit to allow for convection cooling.

18. The quick connect system of Claim 16 wherein contact between said post and said drill bit occurs at a cooler portion of said drill bit.
- 5 19. The quick connect system of Claim 17 wherein said docking stations are manufactured from a material which is capable of conducting heat.
20. The quick connect system of Claim 15 wherein said docking stations [houses said hole saw and mandrel combination permitting easy access of the mandrel when
10 approached by the holder.]

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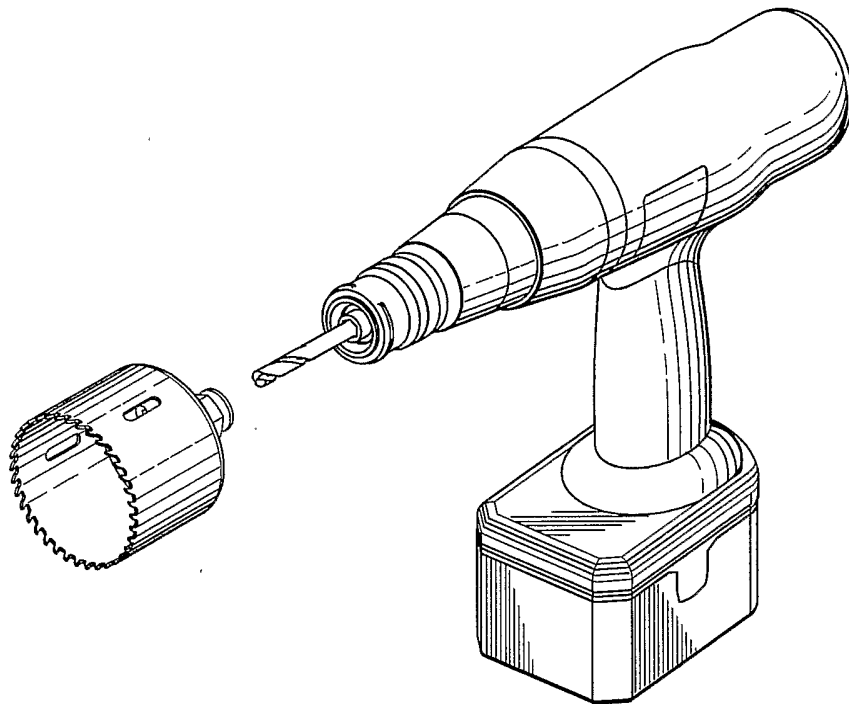


FIG.1 (PRIOR ART)

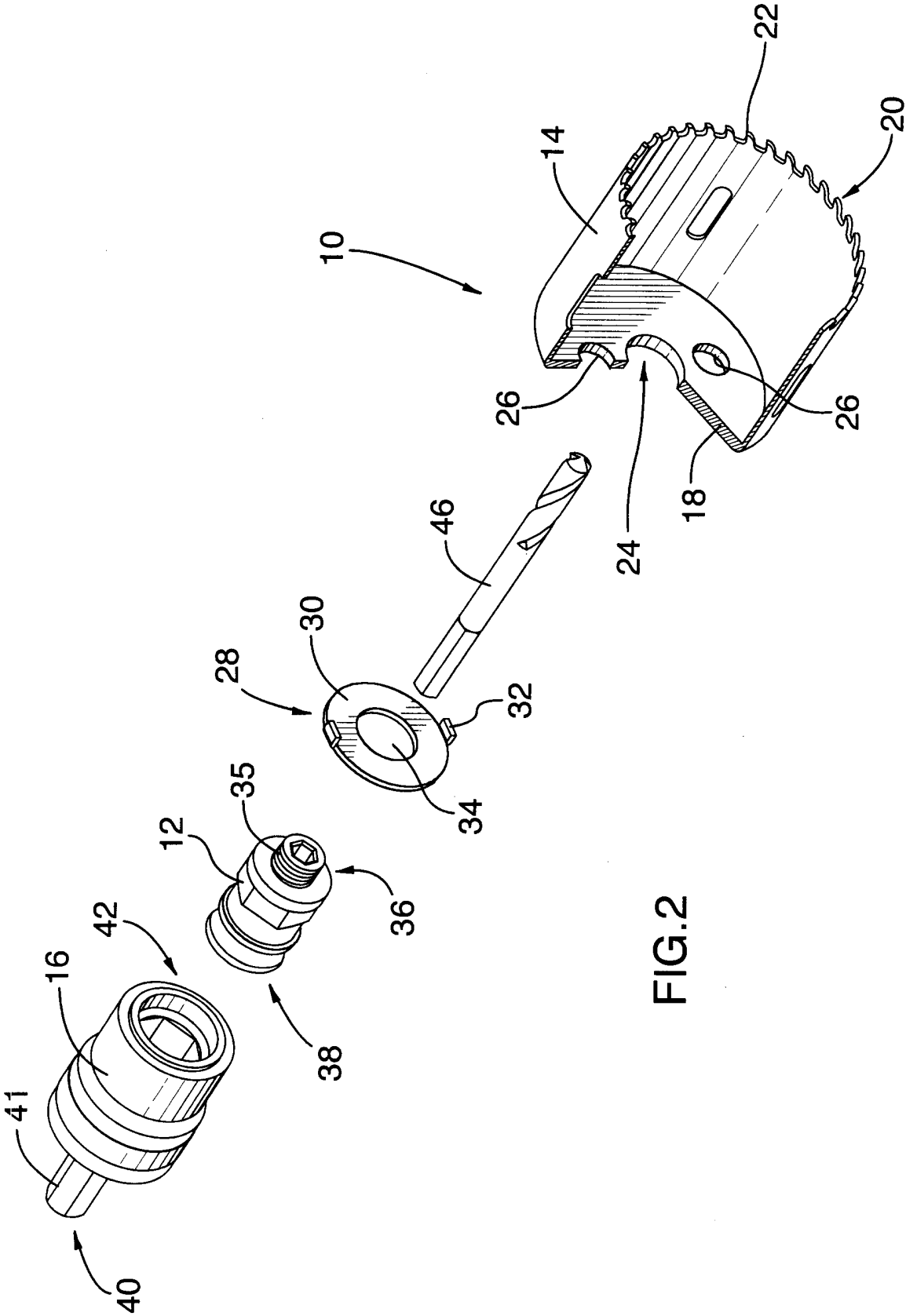


FIG.2

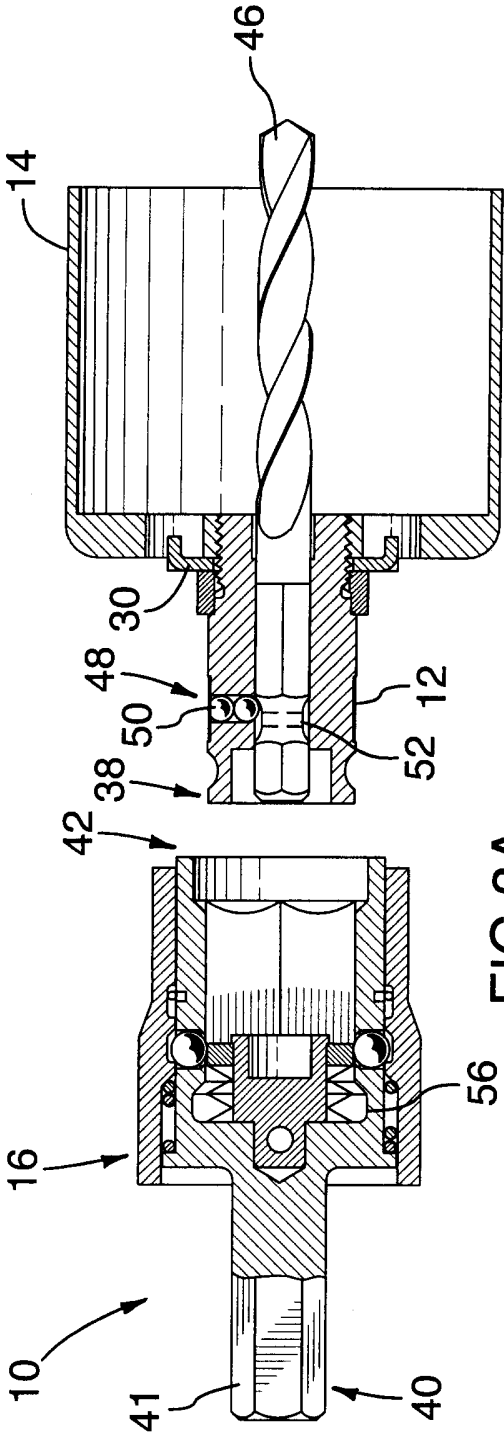


FIG. 3A

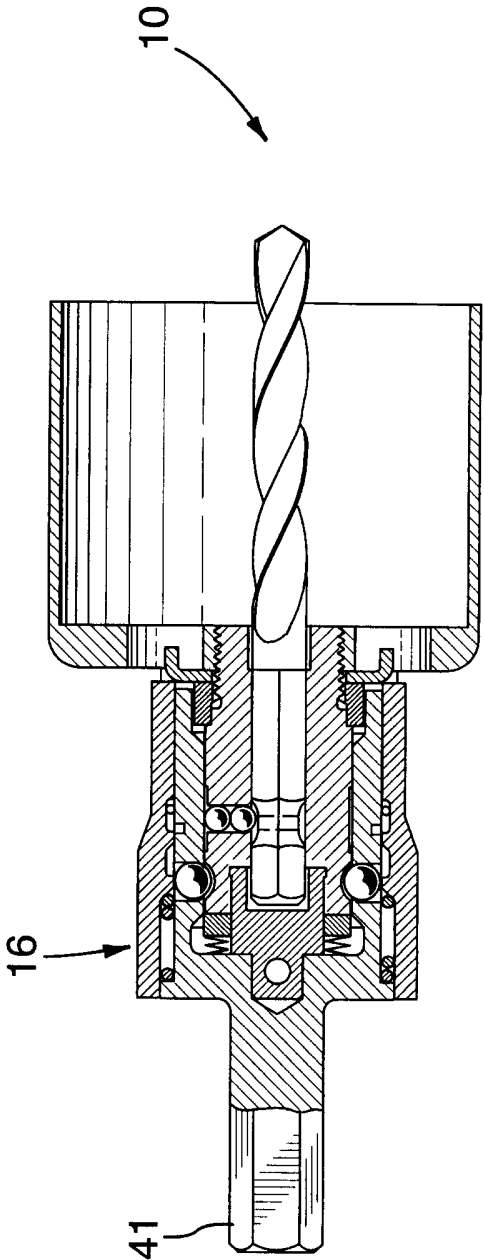


FIG. 3B

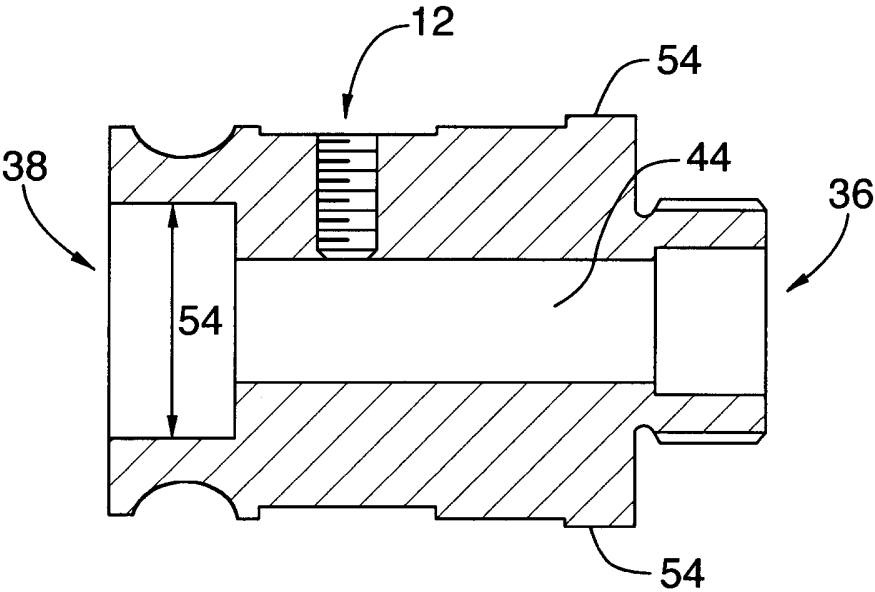


FIG.4

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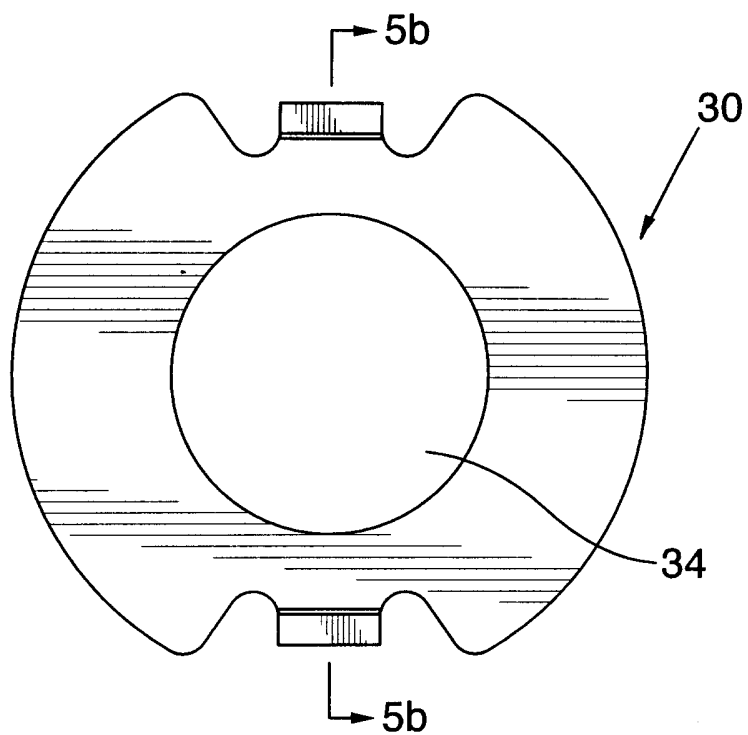


FIG. 5A

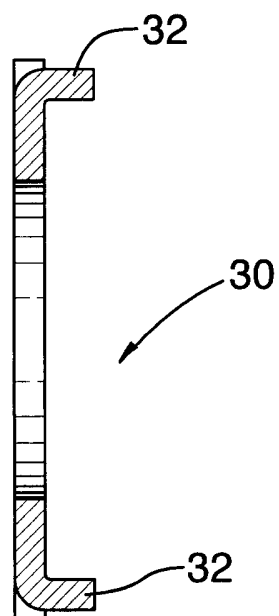


FIG. 5B

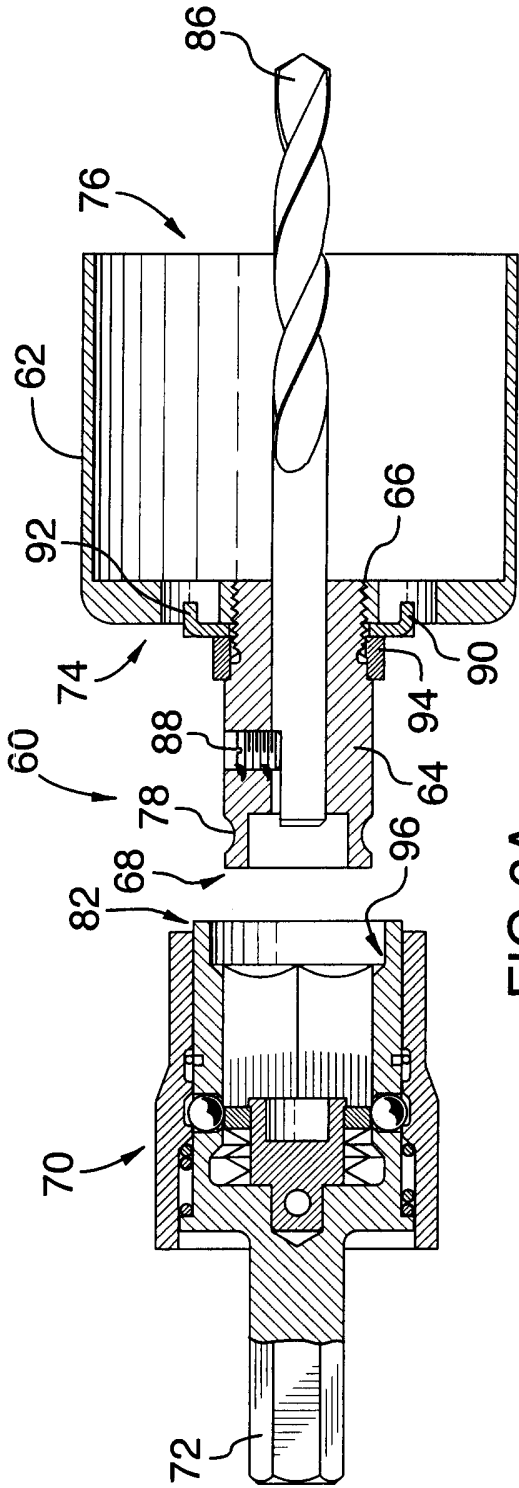


FIG. 6A

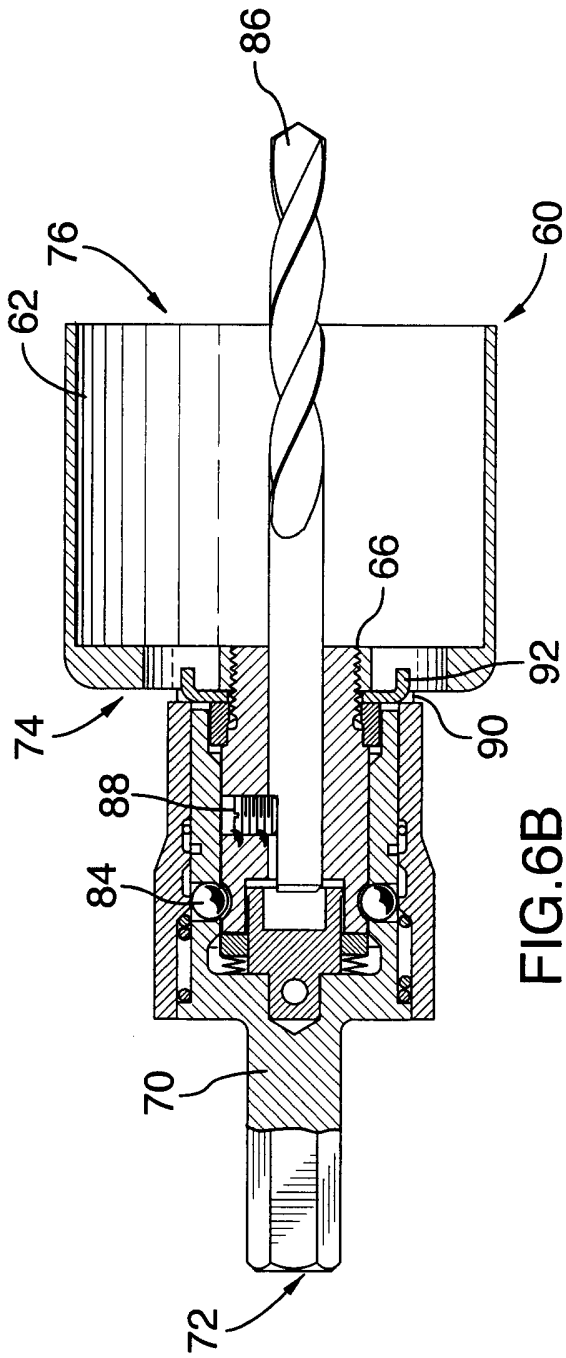


FIG. 6B

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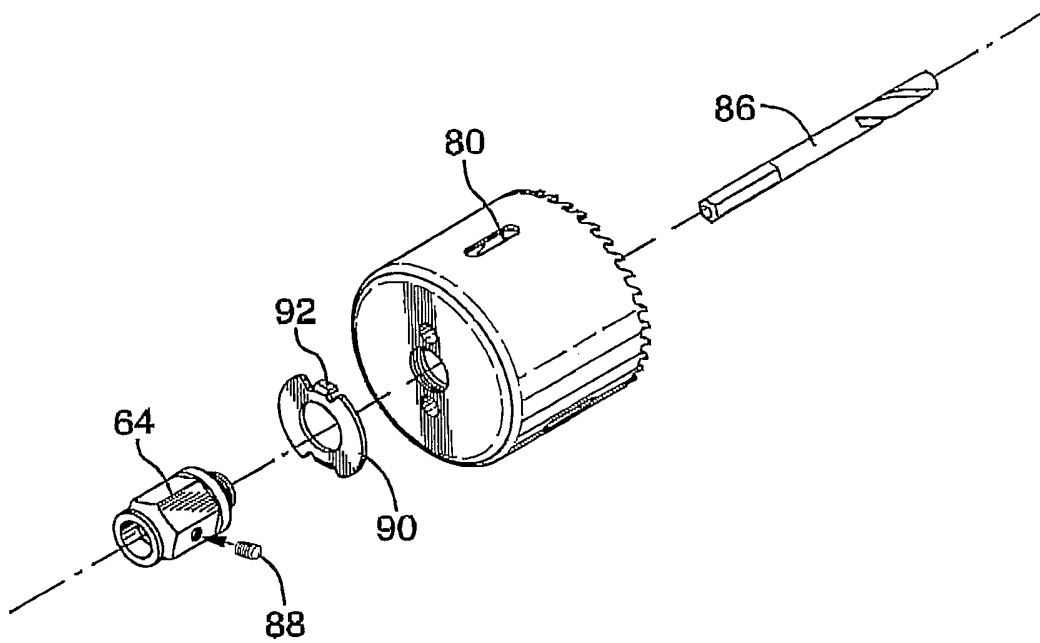
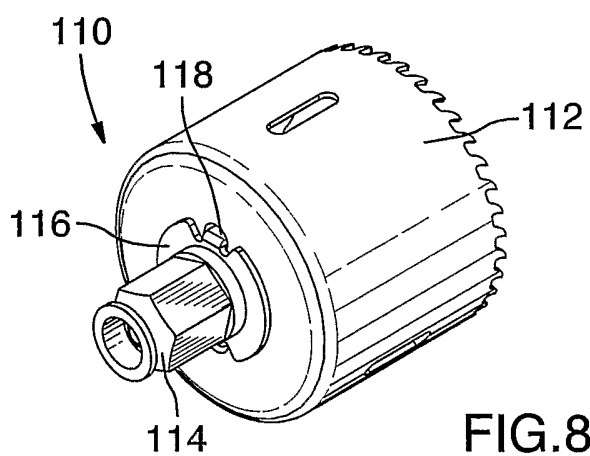
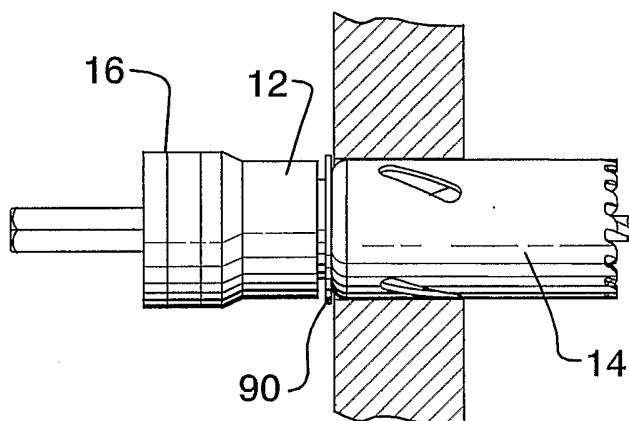
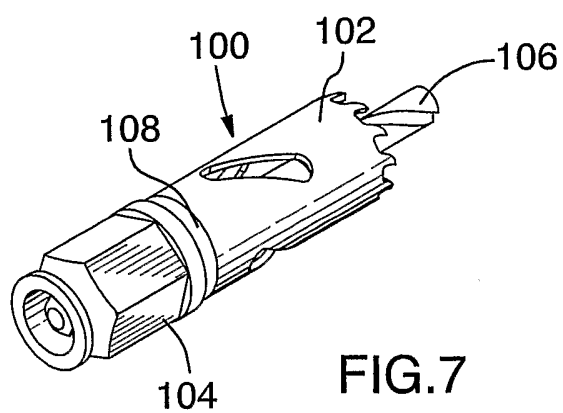


FIG.6C

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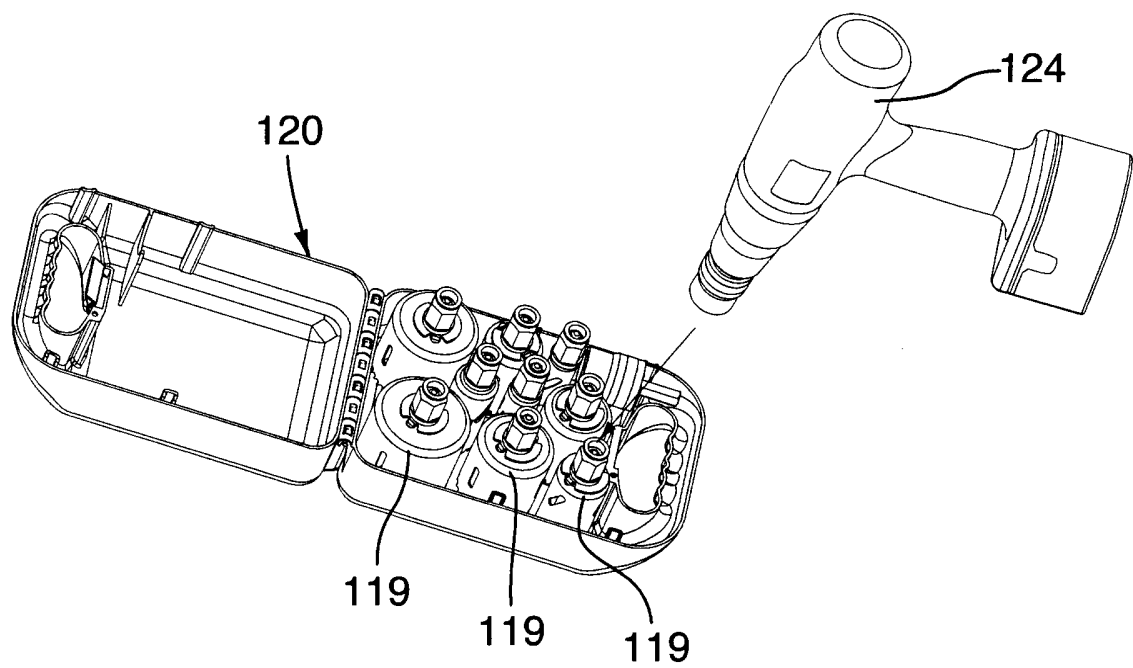


FIG.9

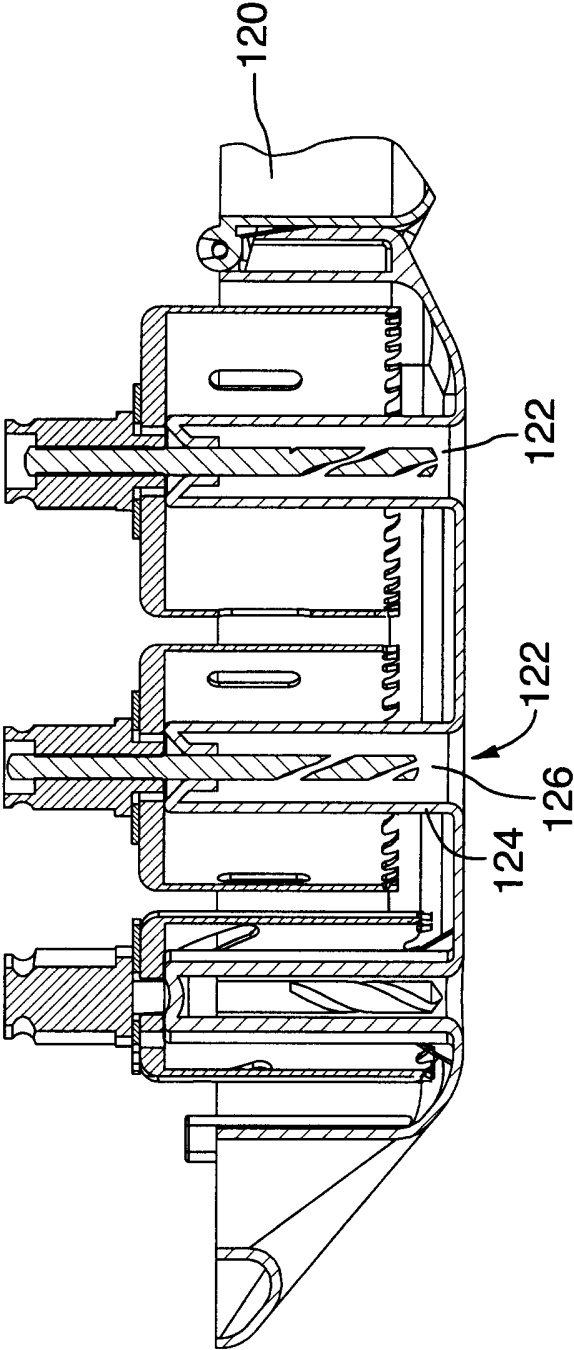


FIG.10

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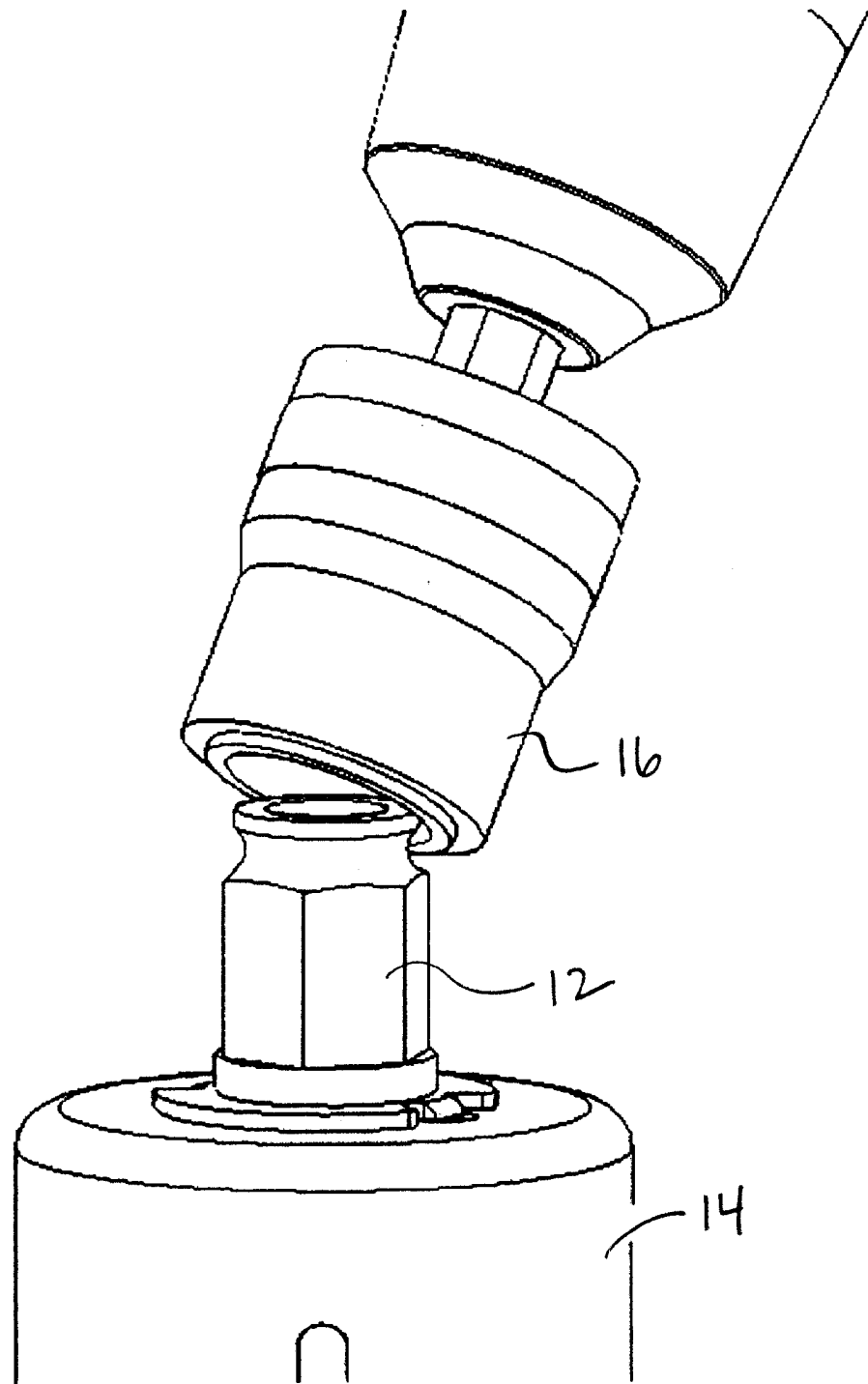


Figure 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2006/000813

A. CLASSIFICATION OF SUBJECT MATTER

IPC: **B23Q 3/14** (2006.01) , **B23B 51/04** (2006.01) , **B23B 47/00** (2006.01) , **B23Q 13/00** (2006.01)

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)

IPC: **B23Q 3/14** (2006.01) , **B23B 51/04** (2006.01) , **B23B 47/00** (2006.01) , **B23Q 13/00** (2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)
Delphion (hole saw, mandrel, arbor, chuck)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, Y, A	CA 2356808 B2 (CREDO TOOL COMPANY) 1 March 2002 (01-03-2002) **see entire document**	1,7-14 2-6 15-20
X, A	US 5171111 A (KANSAI KOGU MANUFACTURING CO. LTD) 15 December 1992 (15-12-1992) **see entire document**	15-20 2-14
Y, A	US 2002/0122703 A1 (CZYZEWSKI, P. et al.) 5 September 2002 (05-09-2002) **see entire document**	2-6, 7-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

14 July 2006 (14-07-2006)

Date of mailing of the international search report

11 September 2006 (11-09-2006)

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Authorized officer

Heather Cardamore (819)-934-3470

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2006/000813

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CA2356808 C	01-03-2002	AT270599T T	15-07-2004
		BR0103855 A	30-07-2002
		DE60104177D D1	12-08-2004
		DE60104177T T2	11-08-2005
		EP1193014 A1	03-04-2002
		EP1462198 A1	29-09-2004
		ES2223732T T3	01-03-2005
		JP2002137111 A	14-05-2002
		US6623220 B2	23-09-2003
US5171111 A	15-12-1992	DE69108019D D1	13-04-1995
		DE69108019T T2	06-07-1995
		EP0522202 A1	13-01-1993
		ES2069187T T3	01-05-1995
		JP1970045C C	18-09-1995
US2002122703 A1	05-09-2002	NONE	