



(51) International Patent Classification:
B23B 51/04 (2006.01)

(21) International Application Number:
PCT/US2011/000748

(22) International Filing Date:
26 April 2011 (26.04.2011)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): **WEST-ERN SAW, INC.** [US/US]; 3200 Camino Del Sol, Oxnard, CA 93030 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **BARATTA, Anthony** [US/US]; 175 Saint Thomas Dr., Oak Park, CA 91377 (US).

(74) Agent: **LIPKIN, Sandra, Lee**; Sandra Lee Lipkin, A Law Corporation, P.O. Box 3518, Ventura, CA 93006-3518 (US).

(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, TH, 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, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

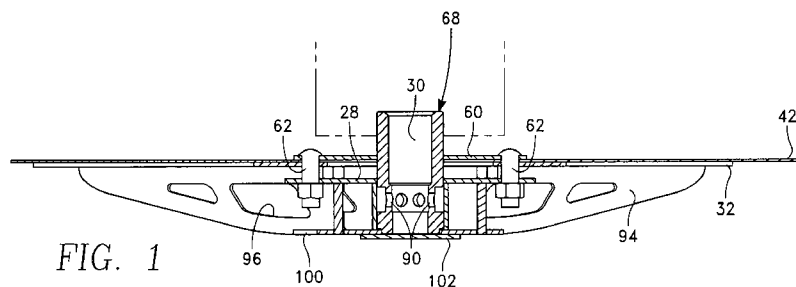
Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

(54) Title: BOLT ON DRIVE ASSEMBLY FOR A CORE DRILL WITH HIGH STRENGTH SPOKED REINFORCER WITH ADAPTER



(57) Abstract: A bolt on drive assembly for a core drill which utilizes an improved high strength spoked reinforcer mounted beneath a disc. The disc and high strength spoke reinforcer are removably mounted on the tube by bolt fasteners. A drive connection is removably mounted and centrally located on a outer disc of the pair of discs. The drive connection is adapted to connect with a drive shaft to cause rotation of the tube. The system can also include a split in the disc when the high strength spoked reinforcer is not welded thereto thereby providing a means of water control. The high strength spoked reinforcer can be a separate piece that is bolted to the disc or can be integrally formed as one piece therewith. An adapter is provided that allows for standard drilling that fits into a recess in the center hub and is removable to expose the recess for attachment to a specialized drill motor, such as an A-flange.

**BOLT ON DRIVE ASSEMBLY FOR A CORE DRILL WITH HIGH
STRENGTH SPOKED REINFORCER WITH ADAPTER**

Background of the Invention

Field of the Invention

[001] The field of this invention relates generally toward cutting implements and more particularly to the construction of a core drill.

Description of the Prior Art

[002] Core drills are commonly used for drilling holes in hard materials, such as concrete and masonry. These holes are then used to support a structural member, such as a post, which is used on a support member for a building structure or for forming a large diameter borehole with the borehole being used for the passage of pipe lines or conduits. A typical core drill is constructed of hard metal, such as steel, and takes the shape of a tube with hardened cutting segments mounted at one end of the tube. The opposite end of the tube is closed generally by a solid steel plate with there being a drive connection mounted on this steel plate. The drive connection is to be connected to a rotating shaft of a drive machine which will cause the tube to be rotated and affect the cutting operation. The cutting segments at one end normally comprise diamonds but also it has been known to use silicon carbide. The diamonds are held together by a suitable resin adhesive.

[003] The plate at the closed end of the tube is of substantial thickness, generally one half to one and a half inch thick. These core drills are frequently designed to be from six inches to thirty-six inches and more in diameter. The steel plate at the closed end is of substantial weight. It is important to have an extremely strong member at this closed end because all the force from the driving machine is being transferred to this member to the tube. The force encountered by the tube in cutting the hole in masonry and concrete is substantial so it is important that the plate at the closed end of the tube establish an extremely strong

connection. However, most often these core drills are carried by a human from one location to another. The plate member at the closed end of a sixteen inch core drill is substantially heavier than the core drill constructed in accordance with this invention. That extra weight can make the difference as to whether a core drill can be carried by a single human from one location to another. It is readily apparent that the greater the diameter of the core drill the greater of the additional amount of weight. It would be desirable to design some type of closed end structure for a core drill which would be substantially lighter in weight than if a solid plate is used. Furthermore, there is a certain amount of deflection associated with the use of the core drill.

[004] At times, when operating of a core drill, a plug of material, which would be normally masonry or cement, gets caught within the hollow chamber of the core drill adjacent the closed end plate. At the present time, access into this area is only provided through the open end of a core drill which means some kind of an elongated member has to be extended up through the hollow chamber of the core drill and this member wedged against the caught material and somehow loosen it to dislodge it. It would be desirable to construct a core drill so that the closed end portion of the core drill could be removed from the tube which would provide immediate local access to any wedged material that is caught within the hollow chamber and located directly adjacent the closed end.

[005] The instant invention is an improvement over U.S. Pat. App. No. 12/799,615 in that the apparatus is modified to accommodate large drilling operations that utilize an A-flange motor attachment. The A-flange motor is the second most common drill motor standard in the construction drilling industry. The A-flange use a Ø6" flange with a Ø5" boss that slips into the A-flange receptacle, and (4) 3/8"-16THD bolts to attach to the A-flange. The instant invention allows the operator to adapt to whichever drill motor is required for the job within minutes.

Appl. No. 12/799,615 provides a drive plate that requires a drill motor with a 1-1/4"-7 shaft. The drive plate is attached to the drilling apparatus using 6 1/2"-13THD button head cap screws. Once the drive plate is removed, it reveals the A-flange pocket and (4) 3/8"-16THD bolts to attach the A-flange motor.

Summary of the Invention

[006] The instant invention teaches a bolt on drive assembly for a core drill comprising: a cylindrical tube having a cutting edge at one longitudinal end and an open end at an opposite longitudinal end; a mounting means mounted at said open end; a high strength spoked reinforcer, said spoked reinforcer having a center hub from which extends radially a plurality of spoked members, said spoked members having a strengthening member extending perpendicularly therefrom in the direction of the Z-axis and wherein said spoked members being attached to said mounting means wherein said center hub has a recessed portion that is substantially circular in shape on the side directly opposing said spoked members; a disc mounted onto said high strength spoked reinforcer and also onto said mounting means wherein said disc includes a center aperture corresponding to said recessed portion in said center hub; a drive connection centrally mounted on said disc, said drive connection adapted to connect to a drive shaft to cause rotation of said tube; and a series of removable fasteners to secure said disc and said high strength spoked reinforcer to said mounting means.

[007] The above embodiment can be further modified by defining that the tube has a hollow chamber, said mounting means comprising a mounting ring, said mounting ring being located within said hollow chamber.

[008] The above embodiment can be further modified by defining that a water stop disc is mounted to said high strength spoked reinforcer, said water stop disc to function to prevent the passage of water from within said hollow chamber through said open end.

[009] The above embodiment can be further modified by defining that the drive connection comprises a coupler adapted to be threadably secured to a drive shaft.

[010] The above embodiment can be further modified by defining that the coupler is removably mounted with bolt fasteners to said high strength spoked reinforcer.

[011] The above embodiment can be further modified by defining that the high strength spoked reinforcer is integrally formed as one piece with said disc.

[012] The above embodiment can be further modified by defining that each of said plurality of spoke members is offset from said center hub.

[013] The above embodiment can be further modified by defining that each of said plurality of spoke members includes one or more supports along the length of each of said plurality of spoke members.

[014] The above embodiment can be further modified by defining that said recessed portion has a diameter to correspond to a specific drilling drive motor.

[015] The above embodiment can be further modified by defining that an adapter corresponding to the diameter of said specific drilling motor is fitted through said aperture in said disc and into said recessed portion and attached thereto.

[016] The above embodiment can be further modified by defining that a drive nut is attached to said adapter.

BRIEF DESCRIPTION OF THE DRAWINGS

[017] FIG. 1 is a side view of the bolt on drive assembly of the instant invention with the drive nut for a standard drill attached thereto.

[018] FIG. 2 is a side view of the bolt on drive assembly of the instant invention without the drive nut attachment shown in FIG. 1 and for use with an A-flange drill motor.

[019] FIG. 3 is an exploded view of the invention.

[020] FIG. 4 is an exploded view of the disc with the adapter with drive nut for use with standard drill motors.

[021] FIG. 5 is an exploded view of the disc for use with direct attachment to an A-flange drill motor.

[022] FIG. 6 is a side view of the entire system in place, including the adapter in the recess for use with a standard drill motor.

[023] FIG. 7 is a top view of the system with the drive nut adapter in place.

Detailed Description of a Preferred Embodiment

[024] The principle of the instant invention involves thin support spars 90 degrees to the top plate and water plate. Since sheet steel is rolled, it is anisotropic because it has slightly different stiffness properties that vary from the direction of roll. For this reason, simply cutting the spars perpendicular to the direction of roll and rotating them on end increases the stiffness in the direction of the applied load. Once the spars are interlapped and welded to both the drive and water plate, the structure acts similarly to several I-beams radiating from the axis of rotation to the periphery of the tube. For this reason, the material can be much thinner than the thick plate used in prior art systems, thus giving the entire apparatus a strongly desired lighter weight.

[025] The neutral axis is an axis in the cross section of a beam or shaft along which there are no longitudinal stresses or strains. If the section is symmetric and is not curved before a bend occurs, then the neutral axis is at the geometric centroid. All material on one side of the neutral axis is in a state of tension, while those on the opposite side are in compression. Therefore, while under drilling conditions, the drive plate and the shear plate see compressive and tensional loads, respectively, and the spars only see compression. In the event of lifting the tube out of the hole with a concrete plug stuck inside, the drive plate and the shear plate see tensional and compressive loads, respectively, and the support spars see tensional loads only.

[026] In the instant invention, an A-flange motor attachment is utilized that applies the load over a larger area than the standard drive nut. Because of this, it can handle even larger loads with less deflection.

[027] Turning to the drawings, the preferred embodiment is illustrated and described by reference characters that denote similar elements throughout the several views of the instant invention.

[028] Referring particular to FIG. 6, there is shown a complete illustration viewed from the side of the invention. The core drill 10 has a body that is in the shape of a tube 12. This tube 12 will have variable diameter. The tube 12 has a through hollow chamber 14. At one longitudinal end 16 of the core drill 10, there is adhesively or otherwise permanently affixed a series of cutting segments 18. Generally, the cutting segments 18 will comprise diamonds. The cutting segments 18 are what produce the cut within the material, which is generally cement or masonry. This cut is produced by rotation of the tube 12.

[029] At the opposite longitudinal end of the tube 12 from one longitudinal end 16 there is located a mounting ring 20. The mounting ring 20 is generally no more than one-half to three-quarters of an inch wide and is to be fixedly mounted to the wall of the hollow chamber 14 a slight distance spaced from the outer edge 24 of the tube 12. Normally, this spacing of the mounting ring 20 will be no more than one-half inch. The mounting ring 20 is generally fixedly secured to the tube 12 by welding.

[030] Mounted within the hollow chamber 14 is a disc 42. The disc 42 functions as a cover. The disc 42 has a series of through holes 44 located directly adjacent the peripheral edge of the disc 42 (See FIGS 3-5, 7). The through holes 44 align with through holes 40 for each of the radial arms 38 of a high strength spoked reinforcer 32 (See FIG. 3). A bolt fastener (not shown) is to be placed through each of the aligned holes 44, 40 and then be threadably tightened within the threaded hole 22. This will secure in place the drive assembly which is composed

minimally of the high strength spoked reinforcer 32 and the disc 42. Water is frequently used when drilling of cement and masonry in order to minimize the creation of heat. Water control can also be achieved by an optional split 26 in the disc 42 as well as one or more apertures 92 found thereon. The drive assembly, which is composed of the high strength spoked reinforcer 32 and the disc 42 is exceedingly strong but is much lighter in weight than if it were a completely solid steel plate. This has an advantage in that the overall core drill is lessened in weight therefore facilitating its carryability by a human.

[031] In the center of the disc 42 is an aperture 48 with a diameter that corresponds to a specific drill motor, size, i.e., an A-flange type drill motor. An A-flange type drive motor can be attached directly to the high strength spoked reinforce 32 through this aperture 48 and into a recess 50 in the center of the high strength spoked reinforce 32. The A-flange motor is secured in place through a series of apertures 52 surrounding the center aperture 48. Attachment points are easily seen in FIG. 5.

[032] FIG. 2 shows a side view of the A-flange motor drill in use. To use a standard drill, an adapter 60 is attached to the disc 42 and secured in place through bolts 62 (See FIG. 7) through holes 64 (See FIG. 4) in the adapter 60 that corresponds to a series of holes 66 surrounding the center aperture 48 in the disc. 42

[033] For use with a standard drill, this adapter 60 has a drive nut 68 welded thereto that will fit a standard drill. The drive nut 68 is shown to fit into an aperture 70 in the shape of a hexagonal nut. The driving machinery is to affect rotation of the drive connection 68 and the entire core drill 10.

[034] The high strength spoked reinforcer 32 is situated either as a separate part (See FIG. 3) or as an integral welded piece to the disc 42 (See FIGS. 1-2). The high strength spoked reinforcer 32 has a centrally located hub 50 which is the recessed aperture for use with an A-flange

drill motor directly or for the attachment of an adapter 60. Extending radially outward from the hub 50 is a plurality of spaced apart radial arms 38. There are shown six in numbers of the arms 38. Typically, there will only be used six in number of the arms 38 when the diameter of the tube 12 is thirty inches and less. As the diameter increases, the number of arms 38 may be increased. Directly adjacent the outer end of each of the arms 38 is a through hole 40. A through hole 40 is to be in alignment with a through hole 44 on the plate 42. A water stop base 28 sandwiches the high strength spoked reinforce 32 and the disc 42.

[035] As can be seen in FIGS. 1-2 and 6, the high strength spoked reinforcer 32 extends along the Z-axis and is 3-dimensional. It is this 3-dimensional structure that provides for the increased performance at high weights with reduced deflection vs. weight ratios. The deflection vs. weight ratio mimics a solid plate's performance whereas a 2-dimensional spoked reinforcer sees significant deflection at higher weights. The high strength spoked reinforcer 32 serves the two fold purpose of reduced weight for larger diameter cores and reduced deflection at said large diameters.

[036] FIGs. 1-2 show a cross-sectional side view of two different modes of operation. FIG. 1 shows the method with the adapter 60 with the standard drill nut 68 in place. FIG. 2 shows a side view where there is no adapter for use with an A-flange drill motor. The A-flange motor is bolted on directly with four bolts 72. Drill fluid, usually water, enters through the cavity 30 in the drive nut 68. There are apertures 90 to allow for drainage of the fluid. Control of the fluid flow is also achieved by holes 92 in the disc 42. (See FIGS. 3-5, 7).

[037] The arms 38 of the high strength spoked reinforce 32 include corresponding arms 94 in a downward direction perpendicular from the plate 42. These arms 94 can be solid or contain apertures 96 as shown, for weight reduction. The shape in the z-axis can be

substantially rectangular, triangular or any shape that helps to add strength in this direction.

[038] In FIG. 3, nuts 98 secure bolts (not shown) holding the entire system together, including bottom plates 100 and 102. Note that the entire system can also be welded into one integral piece, save the adapter 60, which needs to remain removable for the versatility afforded by the invention. The penultimate bottom plate 100 includes grooves 104 for placement therein of corresponding z-axis arms 94. The bottom plate 102 provides added support for the entire system.

[039] The discussion included in this patent is intended to serve as a basic description. The reader should be aware that the specific discussion may not explicitly describe all embodiments possible and alternatives that are implicit. Also, this discussion may not fully explain the generic nature of the invention and may not explicitly show how each feature or element can actually be representative or equivalent elements. Again, these are implicitly included in this disclosure. Where the invention is described in device-oriented terminology, each element of the device implicitly performs a function. It should also be understood that a variety of changes may be made without departing from the essence of the invention. Such changes are also implicitly included in the description. These changes still fall within the scope of this invention.

[040] Further, each of the various elements of the invention and claims may also be achieved in a variety of manners. This disclosure should be understood to encompass each such variation, be it a variation of any apparatus embodiment, a method embodiment, or even merely a variation of any element of these. Particularly, it should be understood that as the disclosure relates to elements of the invention, the words for each element may be expressed by equivalent apparatus terms even if only the function or result is the same. Such equivalent, broader, or even more generic terms should be considered to be encompassed in the description of each element or action. Such terms can be substituted

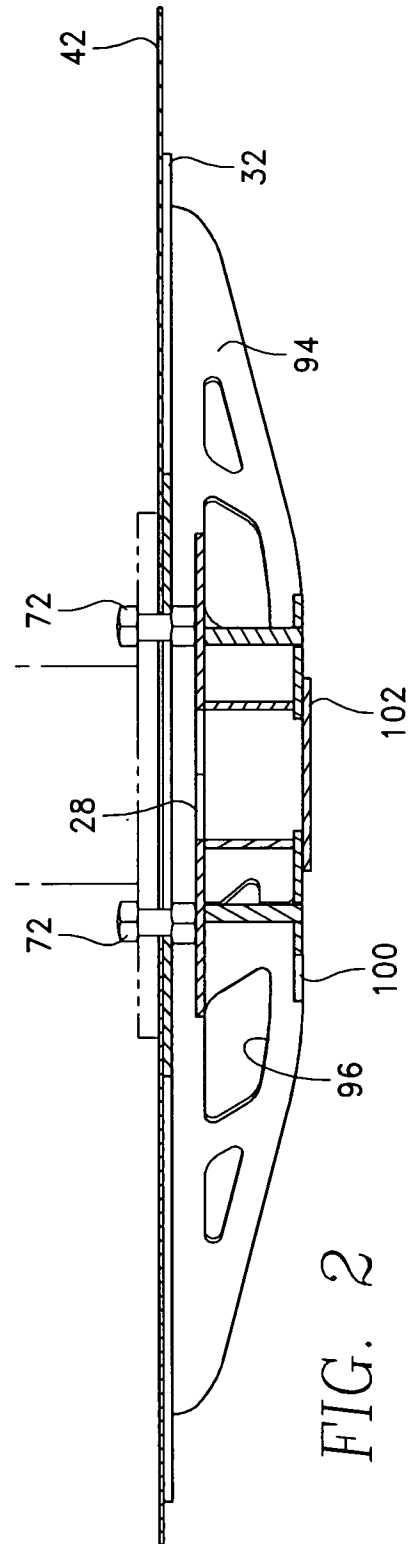
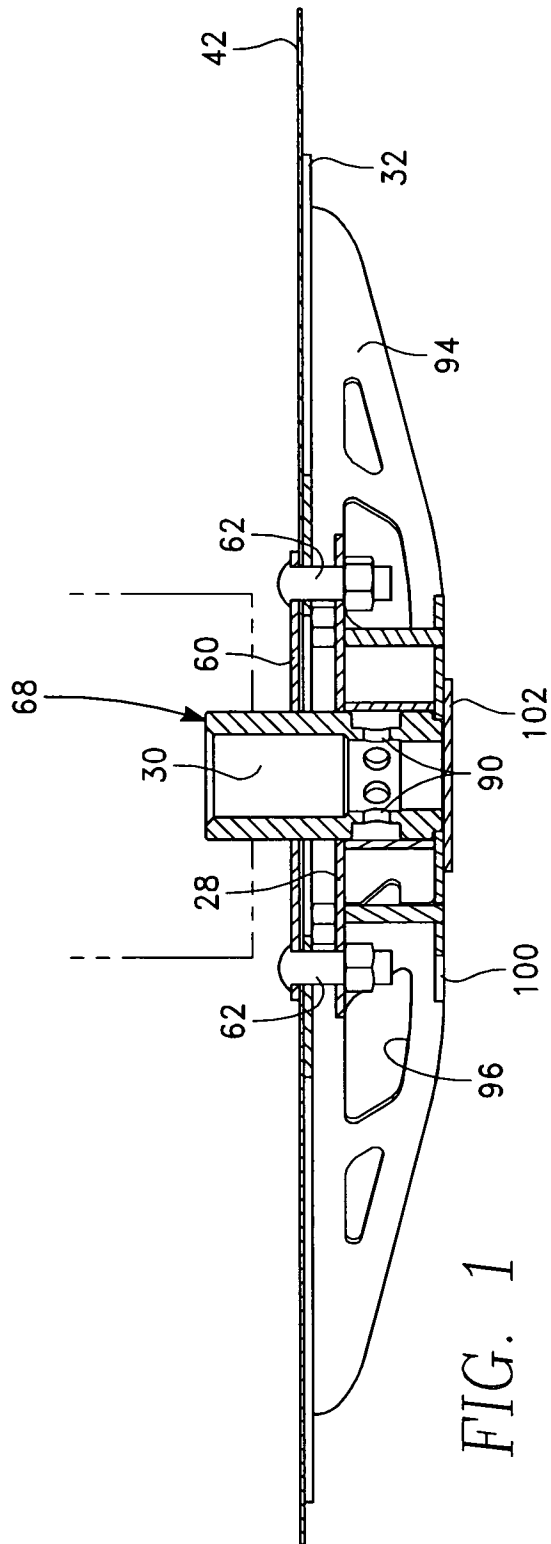
where desired to make explicit the implicitly broad coverage to which this invention is entitled. It should be understood that all actions may be expressed as a means for taking that action or as an element which causes that action. Similarly, each physical element disclosed should be understood to encompass a disclosure of the action which that physical element facilitates. Such changes and alternative terms are to be understood to be explicitly included in the description.

What is claimed is:

1. A bolt on drive assembly for a core drill comprising:
 - a cylindrical tube having a cutting edge at one longitudinal end and an open end at an opposite longitudinal end;
 - a mounting means mounted at said open end;
 - a high strength spoked reinforcer, said spoked reinforcer having a center hub from which extends radially a plurality of spoked members, said spoked members having a strengthening member extending perpendicularly therefrom in the direction of the Z-axis and wherein said spoked members being attached to said mounting means wherein said center hub has a recessed portion that is substantially circular in shape on the side directly opposing said spoked members;
 - a disc mounted onto said high strength spoked reinforcer and also onto said mounting means wherein said disc includes a center aperture corresponding to said recessed portion in said center hub;
 - a drive connection centrally mounted on said disc, said drive connection adapted to connect to a drive shaft to cause rotation of said tube; and
 - a series of removable fasteners to secure said disc and said high strength spoked reinforcer to said mounting means.
2. The bolt on drive assembly as defined in claim 1 wherein said tube having a hollow chamber, said mounting means comprising a mounting ring, said mounting ring being located within said hollow chamber.

3. The bolt on drive assembly as defined in claim 1 wherein a water stop disc is mounted to said high strength spoked reinforcer, said water stop disc to function to prevent the passage of water from within said hollow chamber through said open end.
4. The bolt on drive assembly as defined in claim 1 wherein said drive connection comprising a coupler adapted to be threadably secured to a drive shaft.
5. The bolt on drive assembly as defined in claim 4 wherein said coupler being removably mounted with bolt fasteners to said high strength spoked reinforcer.
6. The bolt on drive assembly as defined in claim 1 wherein said high strength spoked reinforcer is integrally formed as one piece with said disc.
7. The bolt on drive assembly as defined in claim 1 wherein each of said plurality of spoke members is offset from said center hub.
8. The bolt on drive assembly as defined in claim 1 wherein each of said plurality of spoke members includes one or more supports along the length of each of said plurality of spoke members.
9. The bolt on drive assembly as defined in claim 1 wherein said recessed portion has a diameter to correspond to a specific drilling drive motor.
10. The bolt on drive assembly as defined in claim 9 wherein an adapter corresponding to the diameter of said specific drilling motor is fitted through said aperture in said disc and into said recessed portion and attached thereto.

11. The bolt on drive assembly as defined in claim 10 wherein a drive nut is attached to said adapter.



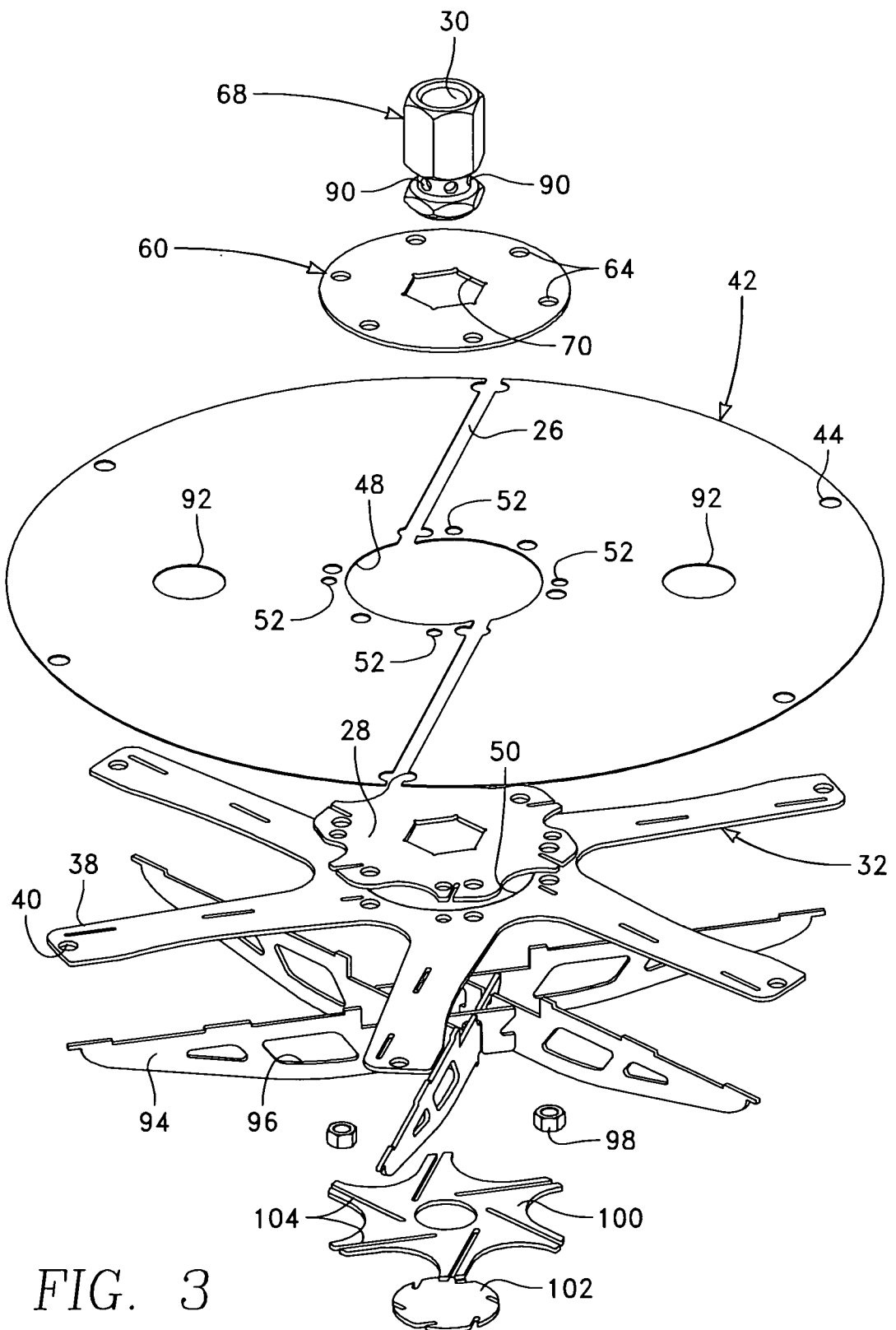
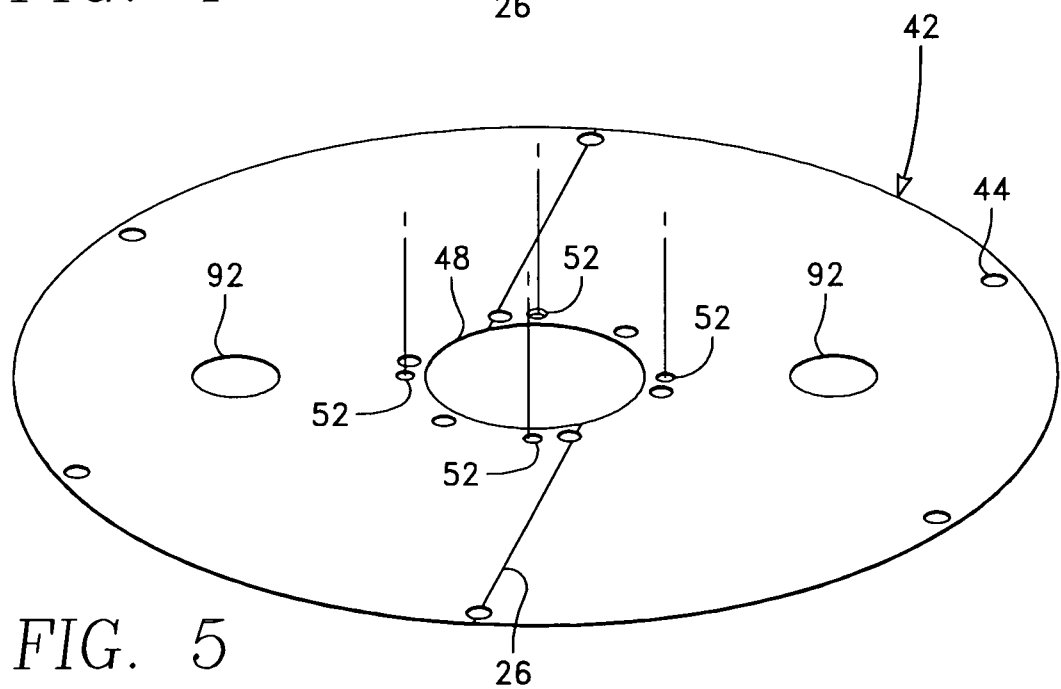
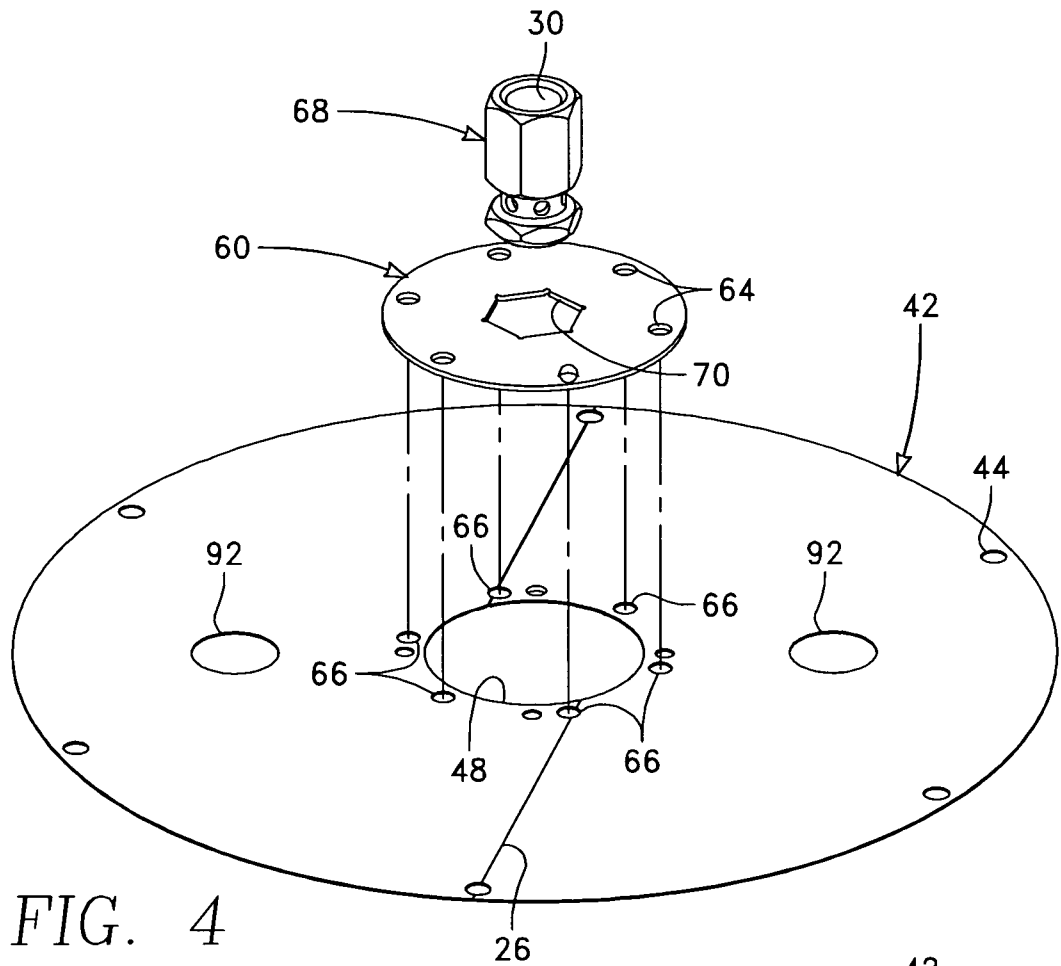


FIG. 3



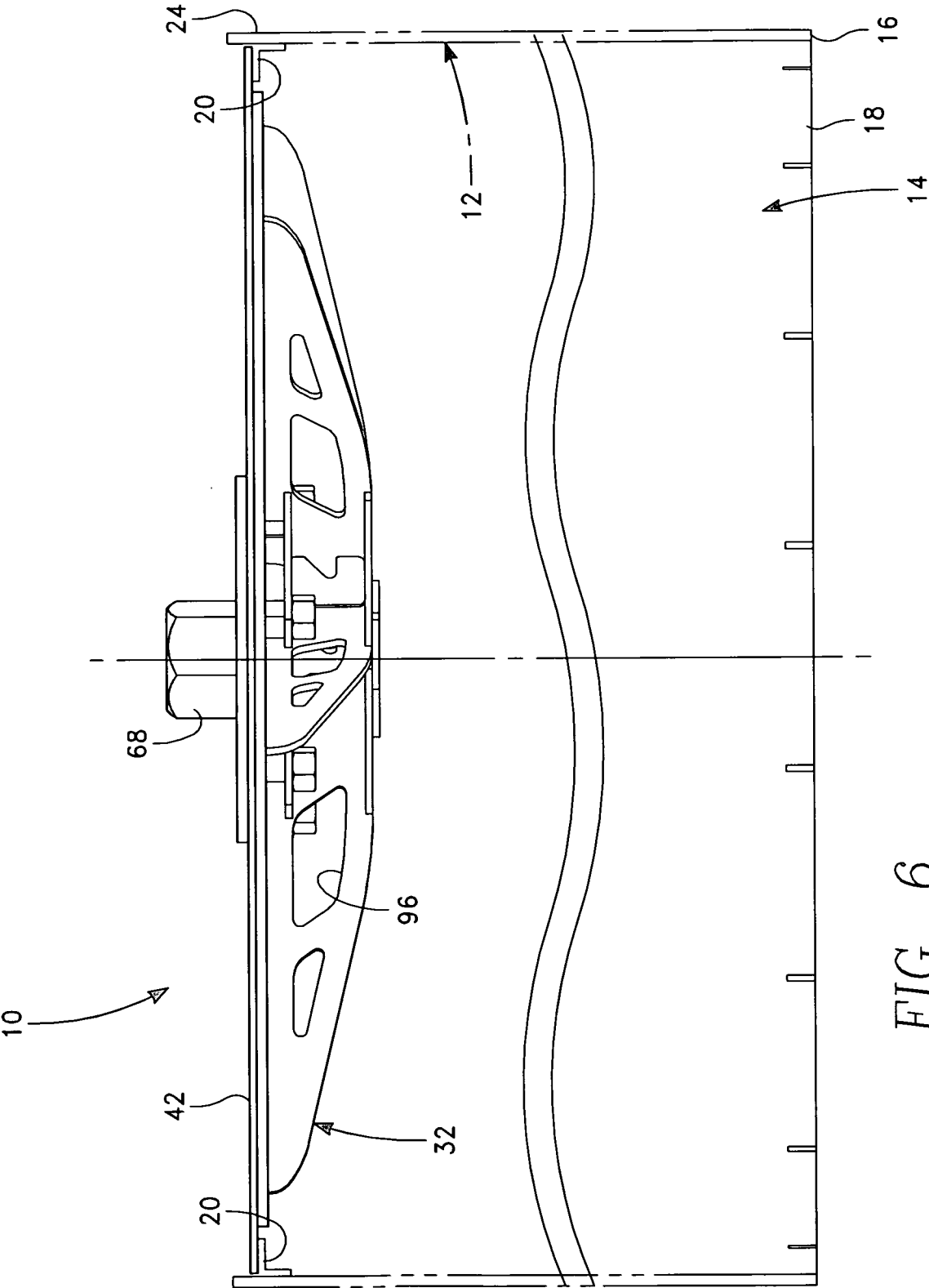


FIG. 6

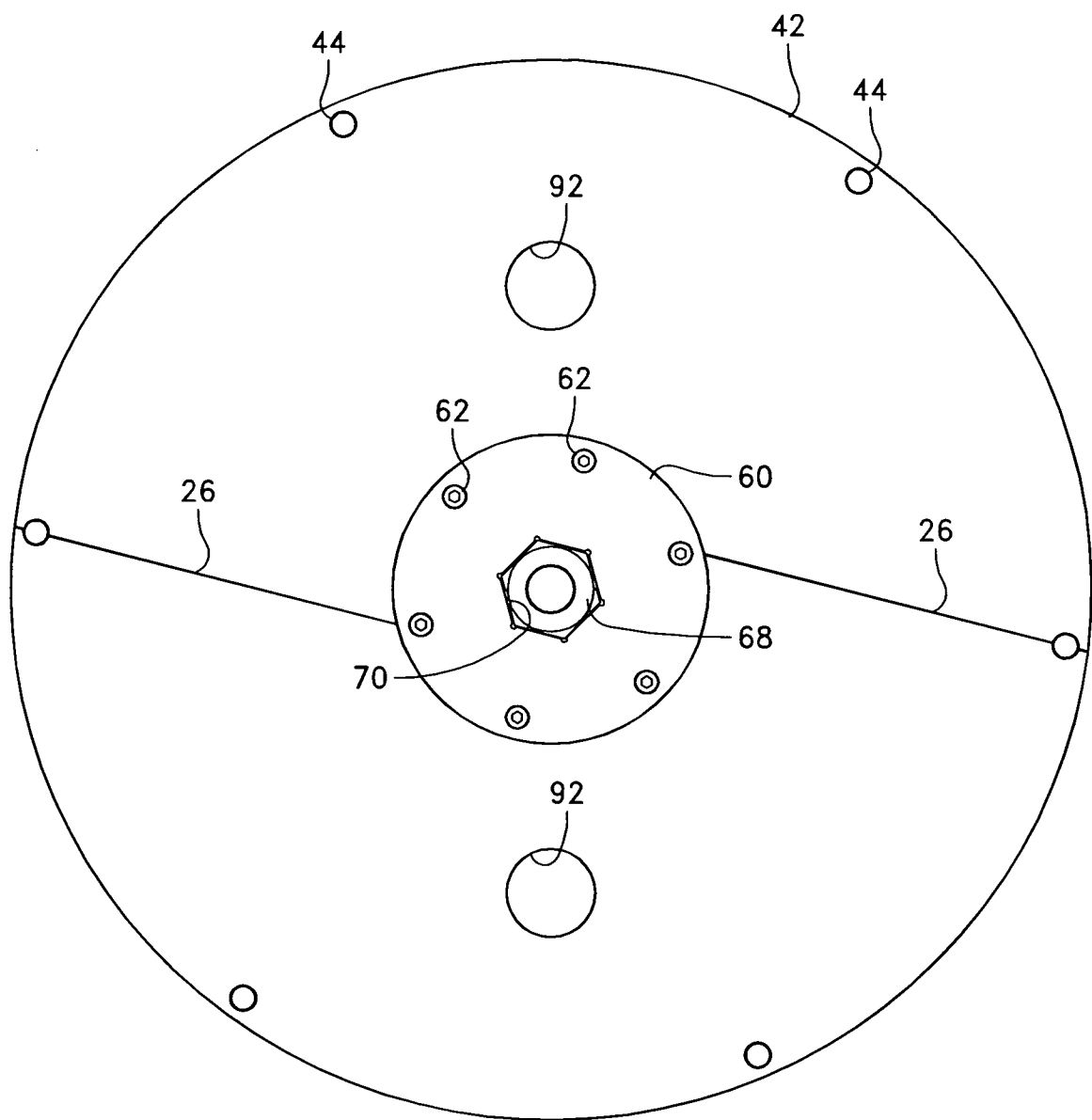


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2011/000748

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B23B 51/04 (2011.01)

USPC - 408/204

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(8) - B23B 41/02, 51/04 (2011.01)

USPC - 76/109.1, 115; 408/192, 204, 206, 207, 209, 224, 226, 703, 713

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

USPTO EAST System (US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT), PatBase, Google.com

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,890,132 B1 (BARON et al) 10 May 2005 (10.05.2005) entire document	1-2, 4-6, 8, 9
Y		7
Y	BARATTA. Diamond Tooling Journal. Ultra lightweight core bit from Western Saw [online]. Created: 21 June 2010, Modified: 22 June 2010. [retrieved on 21 July 2011]. Retrieved from the internet <URL: http://www.dtj-online.com/userfiles/file/Vol70Num624_14-15.pdf>.	7
A	US 1,503,716 A (SEYFERTH) 05 August 1924 (05.08.1924) entire document	1-11
A	US 2005/0105980 A1 (DAVIS) 19 May 2005 (19.05.2005) entire document	1-11
A	US 2009/0035082 A1 (SINGH) 05 February 2009 (05.02.2009) entire document	1-11

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


* Special categories of cited documents:

"A" document defining the general state of the art which is not considered

to be of particular relevance

"E" earlier application or patent but published on or after the international

filing date

"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)

"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

"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

"X" document of particular relevance; the claimed invention cannot be

considered novel or cannot be considered to involve an inventive

step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be

considered to involve an inventive step when the document is

combined with one or more other such documents, such combination

being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

22 July 2011

Date of mailing of the international search report

01 AUG 2011

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774