

(19) AUSTRALIAN PATENT OFFICE

(54) Title
Modular power tool

(51)⁶ International Patent Classification(s)
B23D 47/00 (2006.01) 20060101ALI2006031
B23D 45/16 (2006.01) **OBMJP** **B25F**
B25F 5/02 (2006.01) 5/02
B27B 9/00 (2006.01) 20060101ALI2006031
B23D 47/00 **OBMJP** **B27B**
20060101AFI2006031 9/00
OBMJP **B23D** 20060101ALI2005100
45/16 **8BMEP**
PCT/US03/17703

(21) Application No: 2003243401

(22) Application Date: 2003 .06 .05

(87) WIPO No: W003/103881

(30) Priority Data

(31) Number	(32) Date	(33) Country
10/165,167	2002 .06 .07	US
		20090625

(43) Publication Date : 2003 .12 .22

(43) Publication Journal Date : 2004 .02 .19

(71) Applicant(s)
Black & Decker Inc.

(72) Inventor(s)
Van Wambeke, Weston J., Zemlok, Michael A., Moore, Keith

(74) Agent/Attorney
Davies Collison Cave, 1 Nicholson Street, Melbourne, VIC, 3000

(56) Related Art
US 5023999 A
US 5006740 A
US 4060940 A

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

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 December 2003 (18.12.2003)

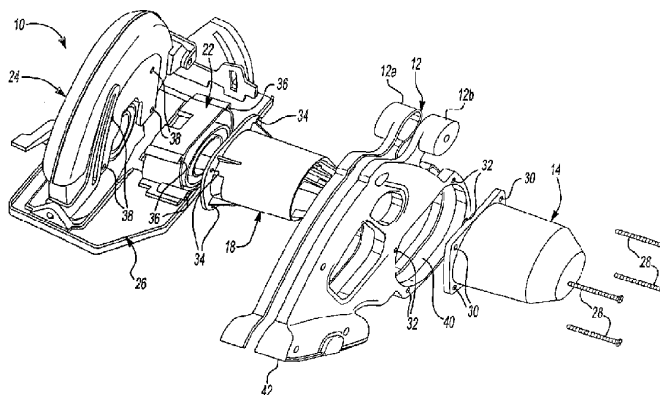
PCT

(10) International Publication Number
WO 03/103881 A1

- (51) International Patent Classification⁷: **B23D 45/16**
- (21) International Application Number: PCT/US03/17703
- (22) International Filing Date: 5 June 2003 (05.06.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
10/165,167 7 June 2002 (07.06.2002) US
- (63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:
US 10/165,167 (CON)
Filed on 7 June 2002 (07.06.2002)
- (71) Applicant (for all designated States except US): **BLACK & DECKER INC.** [US/US]; Drummond Plaza Office Park, 1423 Kirkwood Highway, Newark, DE 19711 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **ZEMLOK, Michael, A.** [US/US]; 15 Hedgecliff Road, Towson, MD 21286 (US). **MOORE, Keith** [US/US]; 3 Birkenhead Court, Owings Mills, MD 21117 (US). **VAN WAMBEKE,**
- Weston, J.** [US/US]; 1119 William Street, Apt. A, Baltimore, MD 21230 (US).
- (74) Agents: **BROCK, Christopher, M.** et al.; Harness, Dickey & Pierce, P.L.C., P.O. Box 828, Bloomfield Hills, MI 48303 (US).
- (81) Designated States (national): AF, AG, AI, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GH, GM, GR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SI, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GI, GM, KI, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IL, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (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)) for the following designations AF, AG, AI, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,

[Continued on next page]

(54) Title: MODULAR POWER TOOL.



(57) Abstract: A modular power tool (10) incorporates a modular drive system (14, 18, 22) and modular handle set (12) that is reversible for use with both a left and right hand configuration. The modular drive system (14, 18, 22) and handle set (12) of the modular power tool (10) of this invention reduces the need for derivative circular saw designs by introducing common components.



CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HN, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW. ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations
- of inventorship (Rule 4.17(iv)) for US only

Published:

- with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

2003243401 20 Mar 2009

MODULAR POWER TOOL

FIELD OF THE INVENTION

[0001] The present invention relates generally to a modular power
5 tool. The present invention has particular, but not exclusive, application to a
modular circular saw.

BACKGROUND OF THE INVENTION

[0002] Circular saws are known in the art. A growth in circular saw
10 applications has created many derivative circular saw designs for each specific
type of use. Many of these applications require changes to motor platforms, blade
guarding and gear cases. Specifically, most circular saw designs do not allow
different motor sizes to fit the same housing. This requires a housing redesign and
a new transmission for each different or new motor size. The transmission or gear
15 case is typically the most complex component to develop and dimensionally
qualify because it has the most stringent tolerances and becomes the foundation
for all the other structure that is mounted to it. Hence, the product development
time for a derivative circular saw is extensive and somewhat prohibitive.

[0003] In addition, there is a need for a left and right hand blade
20 applications with respect to the handle set for many circular saw designs, which
usually requires a handle set redesign. The design of the handle set is
complicated because generally battery applications or power sources fit onto the
handle set. Thus, development of a new handle set for each circular saw product
creates a tremendous amount of design resources, tooling cost and development
25 time.

SUMMARY OF THE INVENTION

[0004] According to a first aspect of the present invention, there is
provided a modular power tool comprising:
30 a drive system;
a housing defining a chamber for said drive system;
a handle defining a through cavity, having a first side and a second side,

2003243401 20 Mar 2009

wherein:

said first side of said handle engages one of said drive system and said housing and said second side of said handle engages the other of said drive system and said housing; and

- 5 said drive system, said housing and said handle are adapted for use in a left hand orientation, in which said housing is mounted on said first side of said handle, and a right hand orientation, in which said housing is mounted on said second side of said handle.

- [0005] A preferred embodiment of the present invention provides a
10 modular power tool for a circular saw application, the modular power tool incorporating a modular drive system that employs a mounting flange portion with a common hole pattern for coupling motors of various sizes to a universal gear case, the handle set of the modular power tool being designed with a cavity, through which the drive system passes, further including a universal mating
15 portion for receipt of a variety of battery and power sources, and being reversible for use with both a left hand and right hand configuration. The modular drive system and handle set of the modular power tool of this embodiment reduces the need for derivative circular saw designs by introducing common components.

- [0006] Preferred embodiments of the invention provide a modular
20 power tool for a circular saw application having the ability to incorporate numerous gear cases, motor platforms and guard designs, with a handle operable in both a left hand and right hand configuration.

- [0007] According to a second aspect of the present invention, there is provided a modular power tool kit, comprising:

- 25 a plurality of different sized motors each including a mounting flange portion having a common mounting hole pattern;

 a gear case adapted to couple to each of said plurality of different sized motors;

- a handle having a motor opening adapted to receive each of said plurality of
30 different sized motors therein; and

 a left hand guard assembly and right hand guard assembly each adapted to be mounted to said gear case,

2003243401 20 Mar 2009

wherein said handle, said gear case and said plurality of different sized motors couple to said left and right hand guard assemblies in both a left and right hand configuration.

- [0008] According to a third aspect of the present invention, there is
- 5 provided a modular power tool kit, comprising;
- a plurality of different sized motors each including a mounting flange portion having a common mounting hole pattern;
- a gear case adapted to couple to each of said plurality of different sized motors;
- 10 a handle having a motor opening adapted to receive each of said plurality of different sized motors therein; and
- a guard assembly adapted to be mounted to said gear case,
- wherein said handle, said gear case and said plurality of different sized motors couple to said guard assembly.

15

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

- [0010] Figure 1 is an exploded perspective view of a modular power
- 20 tool in a left hand orientation according to a preferred embodiment of the present invention;
- [0011] Figure 2 is an exploded view of the modular power tool in a right hand orientation;
- [0012] Figure 3 is a side view of a handle set of the modular power
- 25 tool;
- [0013] Figure 4 is a front view of a gear case of the modular power tool;
- [0014] Figure 5 is a perspective view of the modular circular saw in a left hand configuration;
- 30 [0015] Figure 6 is a perspective view of the right hand configuration of the modular circular saw.

2003243401 20 Mar 2009

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

5 [0017] Referring generally to Figures 1 and 2, an exploded view of a modular power tool 10 according to a first embodiment of the invention is shown. The embodiment is directed towards a circular saw, however, it is to be understood that the principles of the invention are equally applicable to other types of power tools as well.

10 [0018] The modular power tool or power circular saw 10 includes a reversible clam shell handle set 12 with a symmetrical motor housing 14. A universal drive train platform is provided with a motor case 18 which has a flange 20 and mounting hole pattern which is designed for the largest motor, such that smaller motors can be provided with the same flange and hole pattern. The
 15 universal drive train platform also includes a universal gear case 22. Various guards 24 and shoe assemblies 26 can be provided for a specific saw application such as right and left hand blade applications, wood or metal cutting, etc. Fasteners 28 extend through mounting holes 30, provided in the symmetrical motor housing 14, holes 32, provided in the reversible clam shell handle set 12,
 20 holes 34, provided in the flange 20 of the motor case 18, mounting holes 36, provided in the universal gear case 22 and finally into mounting holes 38 provided in guard 24.

[0019] The symmetrical motor housing 14 can be made out of one or two pieces. The symmetrical motor housing 14 is generally made from plastic and
 25 encloses an end of the motor case 18. Different size symmetrical motor housings 14 can be optionally used to reduce the size of the assembly for different motor sizes. This reduces the cost and development time required of an entire new housing tool. The symmetrical motor housing 14 is coupled to the two-piece clam shell handle set 12.

30 [0020] The two-piece clam shell handle set 12 incorporates an identical and symmetrical mounting pattern on both sides of each clam shell portion 12a, 12b. This clam shell handle set 12 has an opening 40 that allows the

2003243401 20 Mar 2009

entire range of desired motor cases 18 to pass through it for mounting onto the universal gear case 22. The clam shell handle set 12 also supports the motor case 18 for coupling to the symmetrical motor housing 14. In addition, clam shell handle set 12 has an open end cavity 42 (best shown in Figure 2) designed so that

5 different mold inserts can be used for different battery and power sources to be connected to the power circular saw 10. Clam shell handle set 12 further includes a trigger 44 and a safety 46 (best shown in Figure 3). Both trigger 44 and safety 46 are generally made from plastic. Safety 46 extends through the clam shell handle set 12, and must be held for the trigger 44 to release.

10 [0021] The modular universal transmission and gear case 22 is symmetrical and has the ability to incorporate numerous gear ratios, motor platforms and guard designs. In addition, as shown in Figure 4, the universal gear case 22 has symmetrical air flow vents 39 with fins and ribbing 48 that can direct air to remove dust and debris from a cutting line in both right and left handed blade

15 applications.

[0022] Referring generally to Figures 1 and 2, the assembly of power circular saw 10 generally involves inserting motor case 18 through the cavity 40 of the clam shell handle set 12. The motor case 18 has a flange 20 with holes 34 which couple the universal gear case 22 to the motor case 18. The universal gear

20 case 22 is further coupled to the guard and shoe assembly 24, 26. Symmetrical motor housing 14 is fixed to the end of the clam shell handle set 12 such that it covers the rest of the motor case 18. The symmetrical motor housing 14 provides the starting point for the fasteners 28, specifically fasteners 28 are threaded through the symmetrical motor housing 14 via holes 30 into the clam shell handle

25 set 12 via holes 32, through motor assembly holes 34, the gear case holes 36 and into the guard 24. The battery 50 (Figures 5 and 6) or other power source are mounted onto cavity 42. The left hand assembly for the power circular saw 10 is shown Figure 5. The right hand assembly for the power circular saw 10 is shown in Figure 6 and is achieved by reversing the orientation of the clam shell handle

30 set 12.

[0023] The design of the present embodiment allows the clam shell handle set 12 to be mounted either to the left or to the right of the blade and gear

2003243401 20 Mar 2009

case. Features that allow this arrangement include the identical and symmetrical mounting fasteners on both sides of each handle clam shell. In addition, the handle set defines an opening that is large enough for the entire range of different sized motor assemblies to pass through it. Furthermore, the motor housing and gear case are symmetrically designed for left hand and right hand use. The blade guard and shoe can be changed for different uses and for left or right hand orientations.

[0024] The description of the invention is merely exemplary in nature and, thus, variations that do not depart from the gist of the invention are intended to be within the scope of the invention. Such variations are not to be regarded as a departure from the spirit and scope of the invention.

[0025] Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

[0026] The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

2003243401 20 Mar 2009

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A modular power tool comprising:
a drive system;
- 5 a housing defining a chamber for said drive system; and
a handle defining a through cavity, having a first side and a second side,
wherein:
said first side of said handle engages one of said drive system and said
housing and said second side of said handle engages the other of said drive
10 system and said housing; and
said drive system, said housing and said handle are adaptable for use in a
left hand orientation, in which said housing is mounted on said first side of said
handle, and a right hand orientation, in which said housing is mounted on said
second side of said handle.
- 15 2. The modular power tool of claim 1 further including:
a guard coupled to said drive system; and
a shoe mounted to said guard.
- 20 3. The modular power tool of claim 1 wherein said drive system further
includes:
a motor; and
a gear case coupled to said motor.
- 25 4. The modular power tool of claim 3, wherein said gear case includes a pair
of substantially symmetrical air flow passages which enables said gear case to
provide ventilation regardless of orientation.
5. The modular power tool of claim 4 wherein said air flow passages have
30 substantially symmetrical fins and ribbing.
6. The modular power tool of claim 1 wherein said handle is adapted to

2003243401 20 Mar 2009

receive a power supply.

7. The modular power tool of claim 1 wherein said handle includes left and right shells.

5

8. The modular power tool of claim 1 wherein said drive system further includes a flange for coupling to said handle.

9. The modular power tool of claim 1 wherein said housing further includes a
10 flange for coupling to said handle.

10. The modular power tool of claim 1 wherein said housing is symmetrical.

11. The modular power tool of claim 1 wherein said handle, said drive system
15 and said housing are connected by a plurality of common fasteners.

12. A modular power tool kit, comprising:

a plurality of different sized motors each including a mounting flange portion
having a common mounting hole pattern;

20 a gear case adapted to couple to each of said plurality of different sized
motors;

a handle having a motor opening adapted to receive each of said plurality of
different sized motors therein; and

25 a left hand guard assembly and right hand guard assembly each adapted to
be mounted to said gear case,

wherein said handle, said gear case and said plurality of different sized
motors couple to said left and right hand guard assemblies in both a left and right
hand configuration.

30 13. The kit of claim 12 wherein said gear case has a pair of substantially
symmetrical air flow passages which enables said gear case to provide ventilation
in both a left hand and right hand configuration.

2003243401 20 Mar 2009

14. The kit of claim 13 wherein said air flow passages have substantially symmetrical fins and ribbing.
15. The kit of claim 12 further comprising a battery adapted to be mounted to said handle.
16. The kit of claim 12 wherein said handle is a clam shell handle.
17. The kit of claim 12 further including a motor housing, including a flange for coupling to said handle.
18. The kit of claim 17 wherein said motor housing is symmetrical.
19. The kit of claim 12 wherein said left and right hand guard assemblies each include a saw guard and a saw shoe assembly coupled to said saw guard.
20. The kit of claim 12 wherein said plurality of different sized motors, said gear case, said handle, and said left and right hand guard assemblies are adapted to be connected by a plurality of common fasteners.
21. A modular power tool kit, comprising;
a plurality of different sized motors each including a mounting flange portion having a common mounting hole pattern;
a gear case adapted to couple to each of said plurality of different sized motors;
a handle having a motor opening adapted to receive each of said plurality of different sized motors therein,
a guard assembly adapted to be mounted to said gear case,
wherein said handle, said gear case and said plurality of different sized motors couple to said guard assembly.
22. A modular paver tool substantially as hereinbefore described with reference

2003243401 20 Mar 2009

to the drawings and/or Examples.

23. A modular paver tool kit substantially as hereinbefore described with reference to the drawings and/or Examples.

1/5

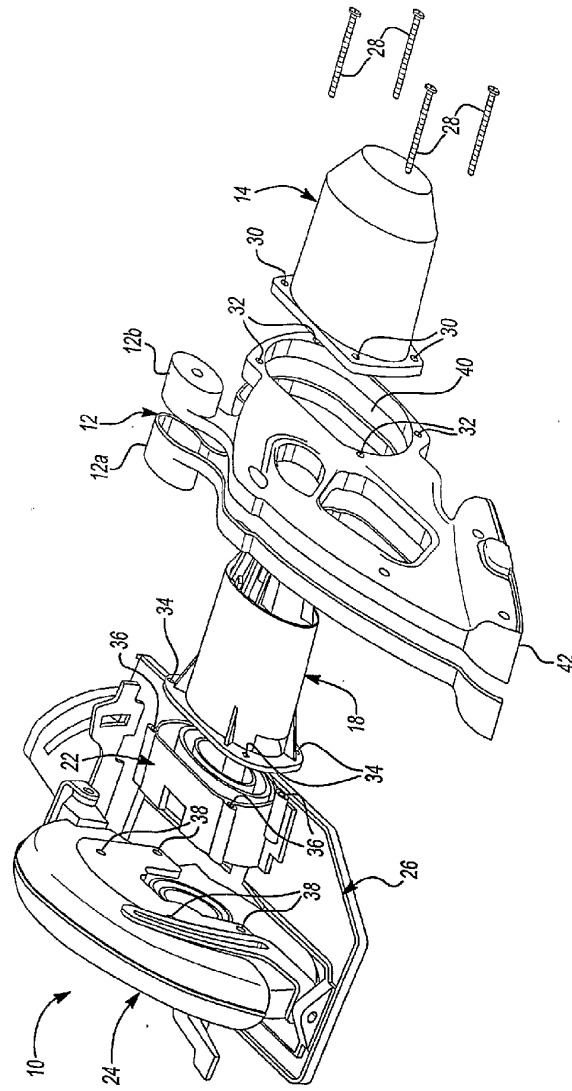


Fig-1

2/5

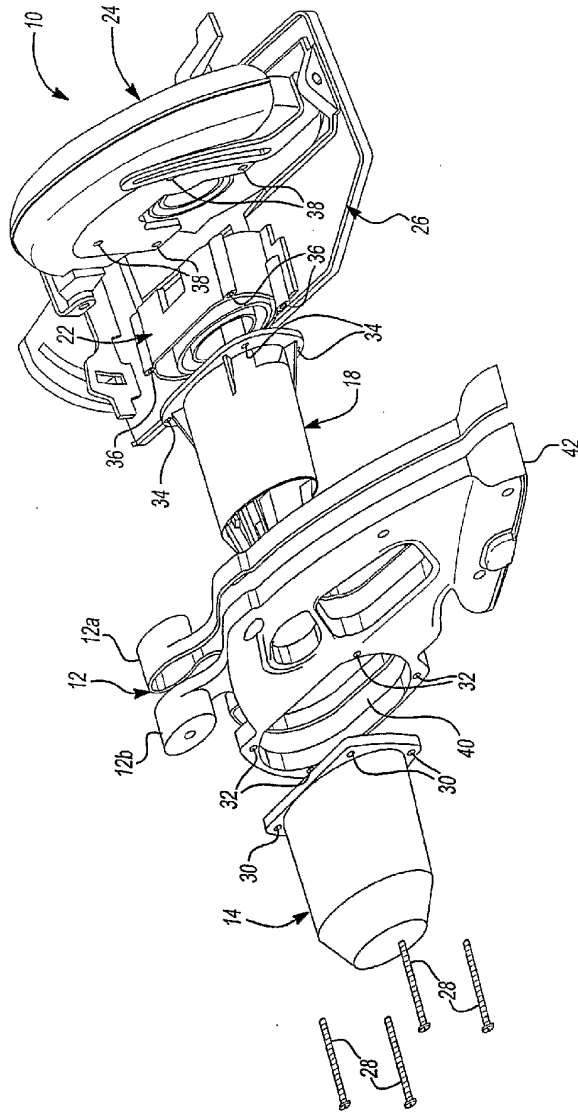
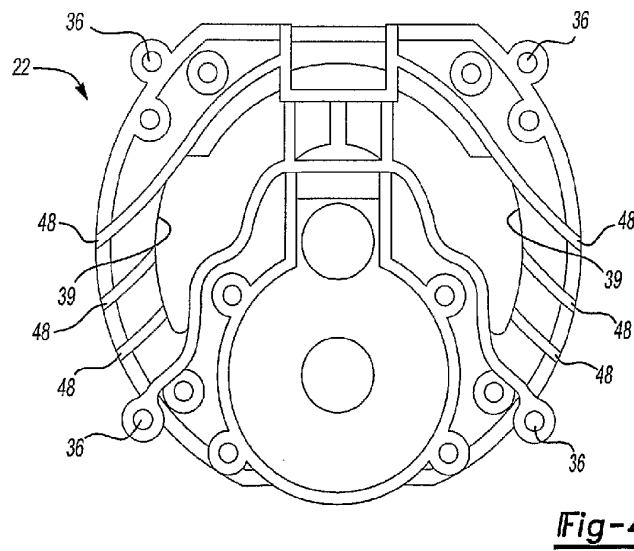
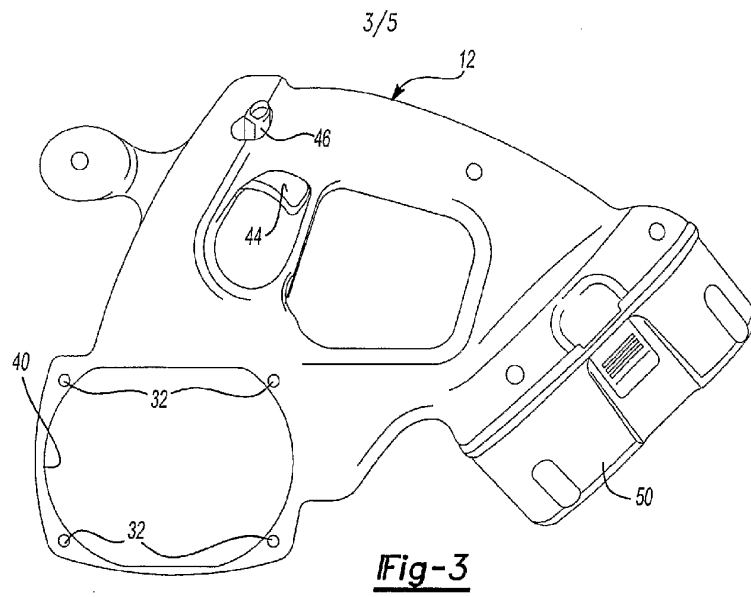


Fig-2



4/5

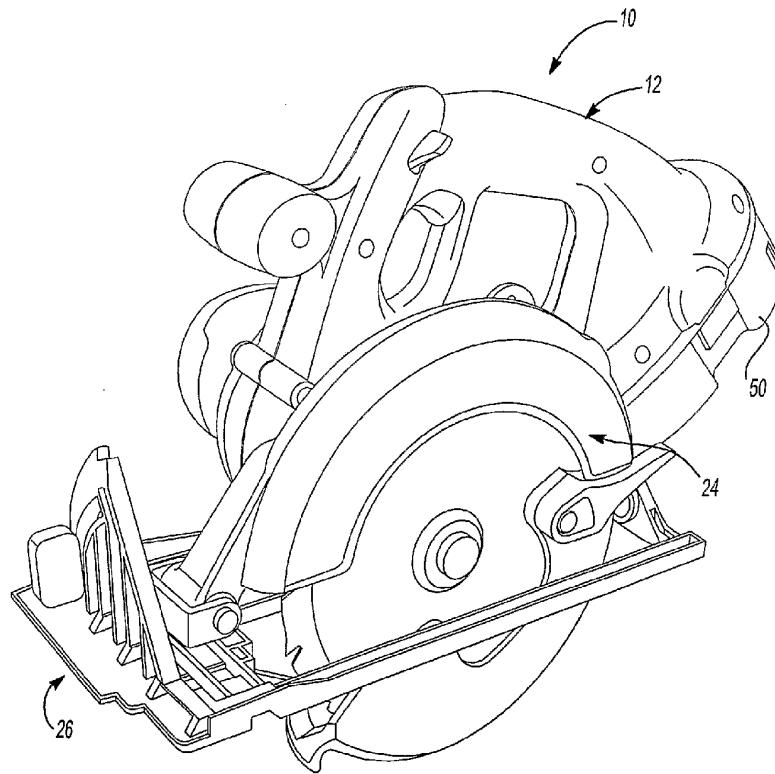


Fig-5

5/5

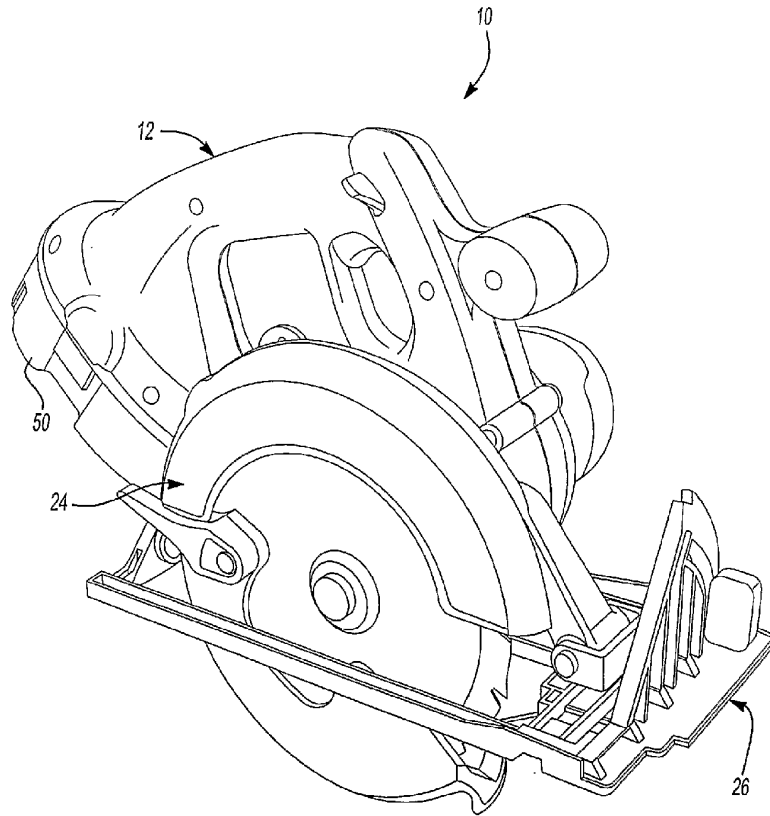


Fig-6