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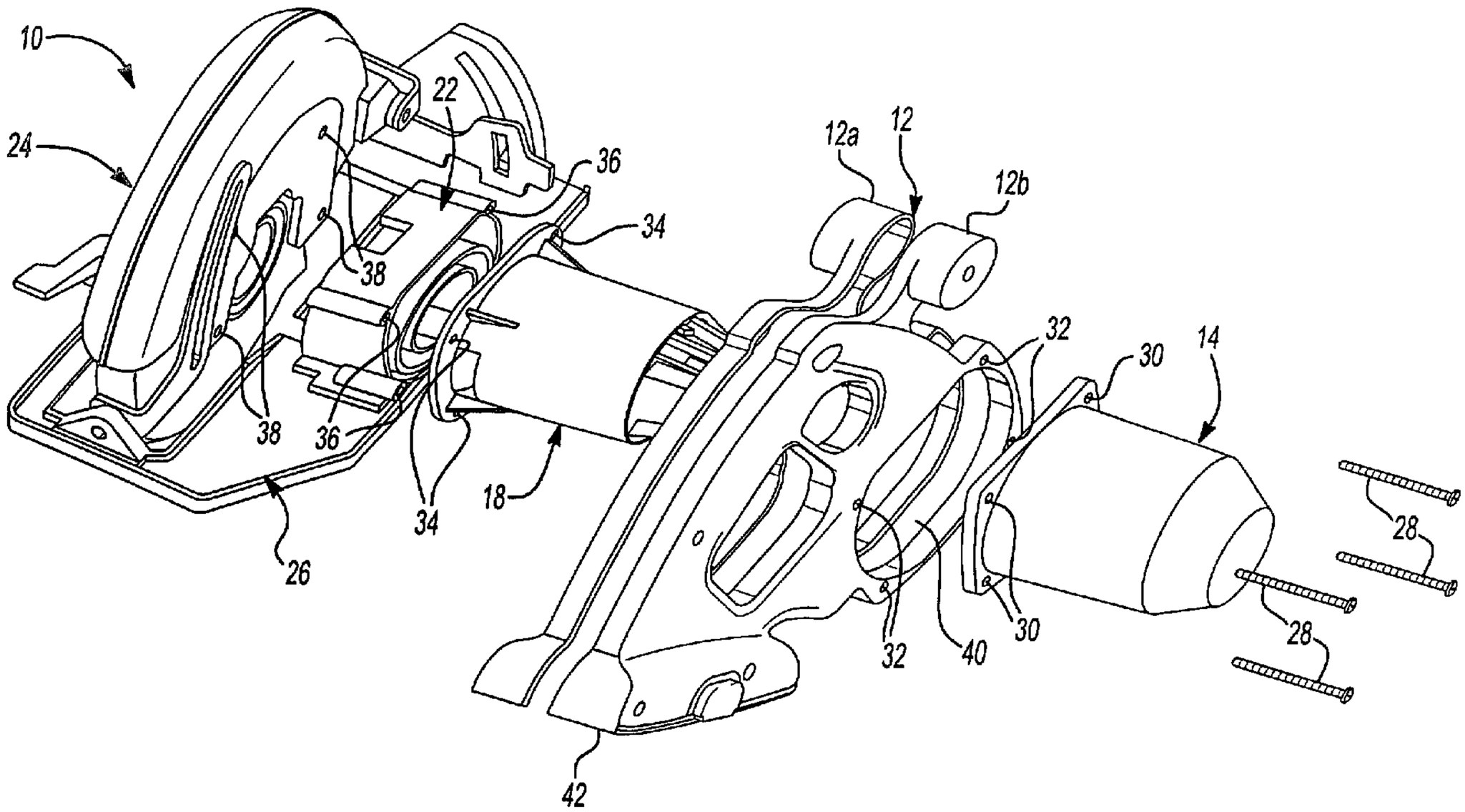
(54) Title: MODULAR POWER TOOL



(57) Abrégé/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.

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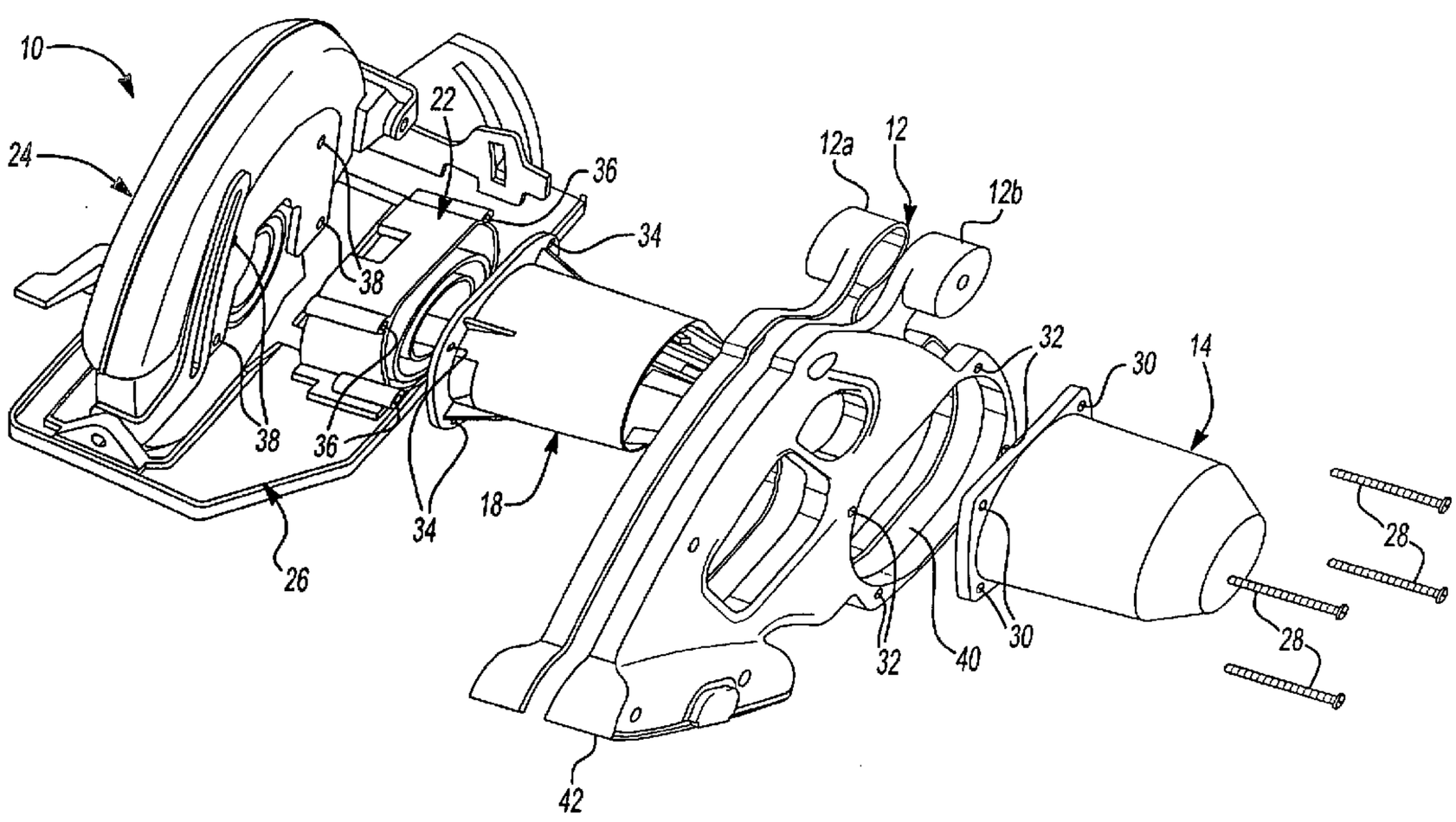

(57) Abstract: A modular power tool (10) incorporates a modular drive system (14, 18, 22) and modular handle set (12) that is reversible for use with both a left and right hand configuration. The modular drive system (14, 18, 22) and handle set (12) of the modular power tool (10) of this invention reduces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

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MODULAR POWER TOOL

FIELD OF THE INVENTION

[0001] The present invention relates generally to a modular power tool. In particular, the present invention relates to a modular circular saw wherein the handle supports the drive assembly and is adaptable to be fastened on either side of the saw blade, providing a right hand and left hand assembly.

BACKGROUND OF THE INVENTION

[0002] Circular saws are known in the art. A growth in circular saw 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 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 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 time.

[0004] Accordingly, a need exists for a modular 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.

SUMMARY OF THE INVENTION

[0005] The present invention provides a modular power tool for a circular saw application. The modular power tool incorporates 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 is designed with a cavity through which the drive system passes. The handle set further includes a universal mating portion for receipt of a variety of battery and power sources. The handle set is also 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 invention reduces the need for derivative circular saw designs by introducing common components.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

[0007] Figure 1 is an exploded perspective view of a modular power tool in a left hand orientation according to the principles of the present invention;

[0008] Figure 2 is an exploded view of the modular power tool in a right hand orientation;

[0009] Figure 3 is a side view of a handle set according to the principles of the present invention;

[0010] Figure 4 is a front view of a gear case according to the principles of the present invention;

[0011] Figure 5 is a perspective view of the modular circular saw in a left hand configuration;

[0012] Figure 6 is a perspective view of the right hand configuration of the modular circular saw according to the principles of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] 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.

[0014] Referring generally to Figures 1 and 2, an exploded view of a first embodiment of a modular power tool 10 is shown. The present invention is directed towards a circular saw, however, it is to be understood that the principles embodied herein are equally applicable to other types of power tools as well.

[0015] 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 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, 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.

[0016] 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 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 set12.

[0017] 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 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 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.

[0018] 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 applications.

[0019] 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 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 though the symmetrical motor housing 14 via holes 30 into the clam shell handle 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 set 12.

[0020] The design of the present invention allows the clam shell handle set 12 to be mounted either to the left or to the right of the blade and gear 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.

[0021] 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.

CLAIMS

What is claimed is:

1. A modular power tool comprising:

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, 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

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

2. The modular power tool of claim 1 further including:

a guard coupled to said drive system; and

a shoe mounted to said guard.

3. The modular power tool of claim 1 wherein said drive system further includes:

a motor; and

a gear case coupled to said motor.

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 substantially symmetrical fins and ribbing.

6. The modular power tool of claim 1 wherein said handle is adaptable to receive a power supply.

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

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 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 and said housing are connected by a plurality of common fasteners.

12. A modular power tool comprising:

a motor;

a motor housing defining a chamber for said motor;

a handle including a first side and a second side and defining a through cavity extending from said first side to said second side;

a gear case coupled to said motor;

a guard assembly coupled to said gear case; and

wherein, said handle and said gear case are adaptable for use in a left and a right hand orientation, wherein in said left hand orientation, said housing is mounted on said first side of said handle and in said right hand orientation, said housing is mounted on said second side of said handle.

13. The modular power tool of claim 12 wherein said guard assembly includes a guard and a shoe assembly coupled to said guard.

14. The modular power tool of claim 12 wherein said gear case includes a pair of substantially symmetrical air flow passages each of which provides a vent passage in the respective left and right hand orientation.

15. The modular power tool of claim 14 wherein said air flow passages have substantially symmetrical fins and ribbing.

16. The modular power tool of claim 12 wherein said handle is a clam shell handle.

17. The modular power tool of claim 14 wherein said handle is adaptable to receive a power supply.

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19. The modular power tool of claim 12 wherein said motor further includes a flange for coupling to said handle.

20. The modular power tool of claim 12 wherein said motor housing further includes a flange for coupling to said handle.

21. The modular power tool of claim 12 wherein said motor housing is symmetrical.

22. The modular power tool of claim 12 wherein said motor, said gear case, said handle, said guard assembly and said housing are connected by a plurality of common fasteners.

23. A method for assembling a modular power tool, comprising:

inserting a drive system through a cavity in a symmetrical handle such that said drive system is supported through said cavity;

fastening a drive housing to said symmetrical handle;

wherein, said drive housing, said symmetrical handle, and said drive system are coupled with a plurality of common fasteners.

24. The method of claim 23 further including:

fastening a guard assembly to said drive housing.

25. The method of claim 23 wherein said drive system includes:
a motor; and
a gear case coupled to said motor.

26. The method of claim 25 wherein said gear case includes a pair of substantially symmetrical air flow passages, said air flow passages have substantially symmetrical fins and ribbing.

27. The method of claim 23 further comprising the step of mounting a battery to said handle.

28. The method of claim 23 wherein said handle is a clam shell handle.

29. The method of claim 23 wherein said drive system further includes a flange for coupling to said handle.

30. The method of claim 23 wherein said drive housing further includes a flange for coupling to said handle.

31. The method of claim 23 wherein said drive housing is symmetrical.

32. The method of claim 24 wherein said guard assembly includes a guard and a shoe assembly coupled to said guard.

33. 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 left hand guard assembly and right hand guard assembly each adapted to be mounted to said gear case; and

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.

34. The kit of claim 33 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.

35. The kit of claim 34 wherein said air flow passages have substantially symmetrical fins and ribbing.

36. The kit of claim 33 further comprising a battery adapted to be mounted to said handle.

37. The kit of claim 33 wherein said handle is a clam shell handle.

38. The kit of claim 33 further including a motor housing, including a flange for coupling to said handle.

39. The kit of claim 38 wherein said motor housing is symmetrical.

40. The kit of claim 33 wherein said left and right hand guard assemblies each include a saw guard and a saw shoe assembly coupled to said saw guard.

41. The kit of claim 33 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.

42. 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; and

wherein said handle, said gear case and said plurality of different sized motors couple to said guard assembly.

43. A modular power tool kit, comprising;

a motor;

a gear case adapted to be mounted to said motor;

a handle having a motor opening adapted to receive said motor therein, said handle including a first side and a second side with said motor opening extending from said first side through said second side;

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

wherein said handle, said gear case and said motor couple to said left and right hand guard assemblies in both a left and right hand configuration, wherein in said left hand configuration, said left hand guard assembly is mounted to said first side of said handle in said right hand orientation, said right hand guard assembly is mounted to said second side of said handle.

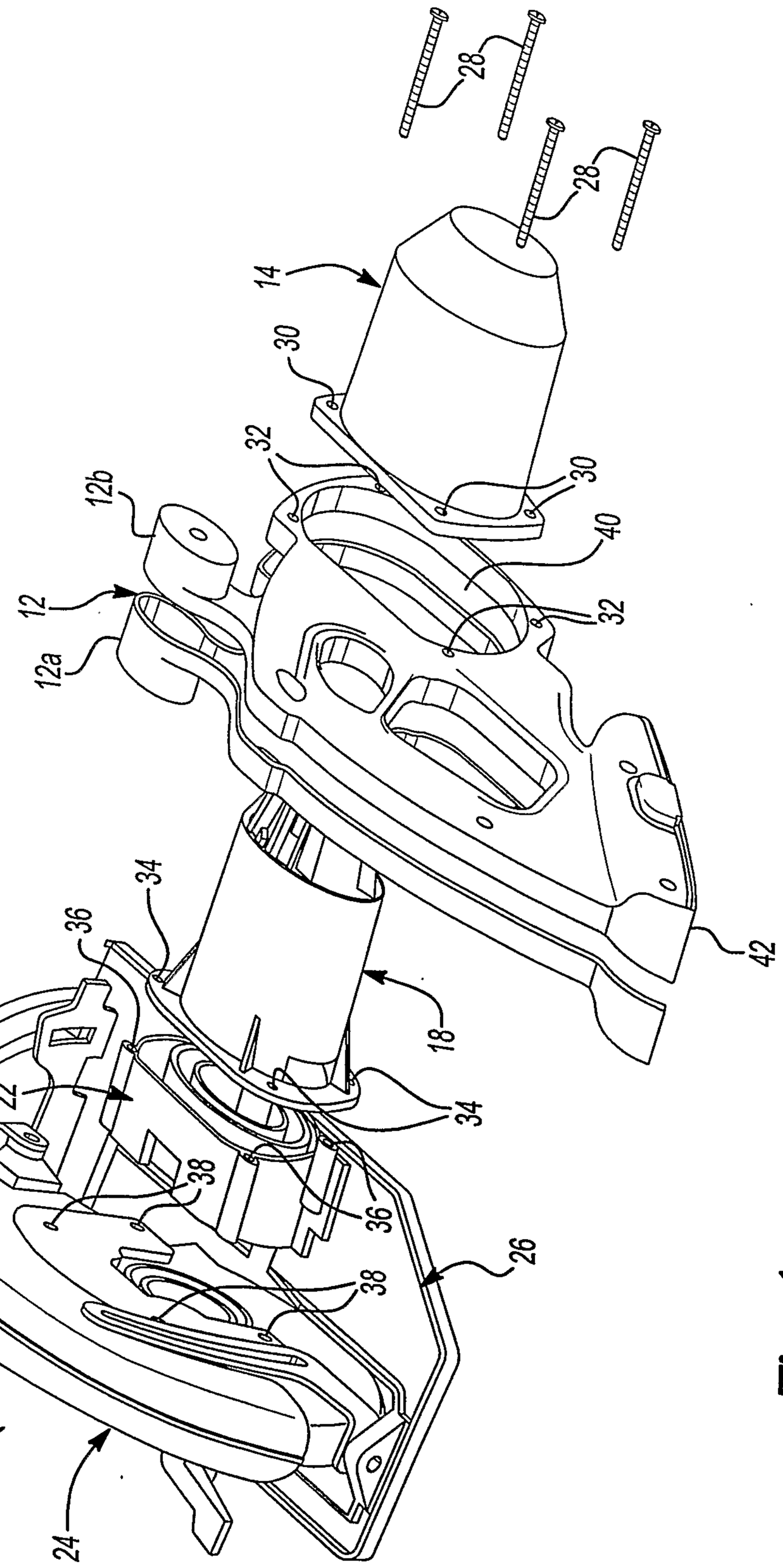


Fig-1

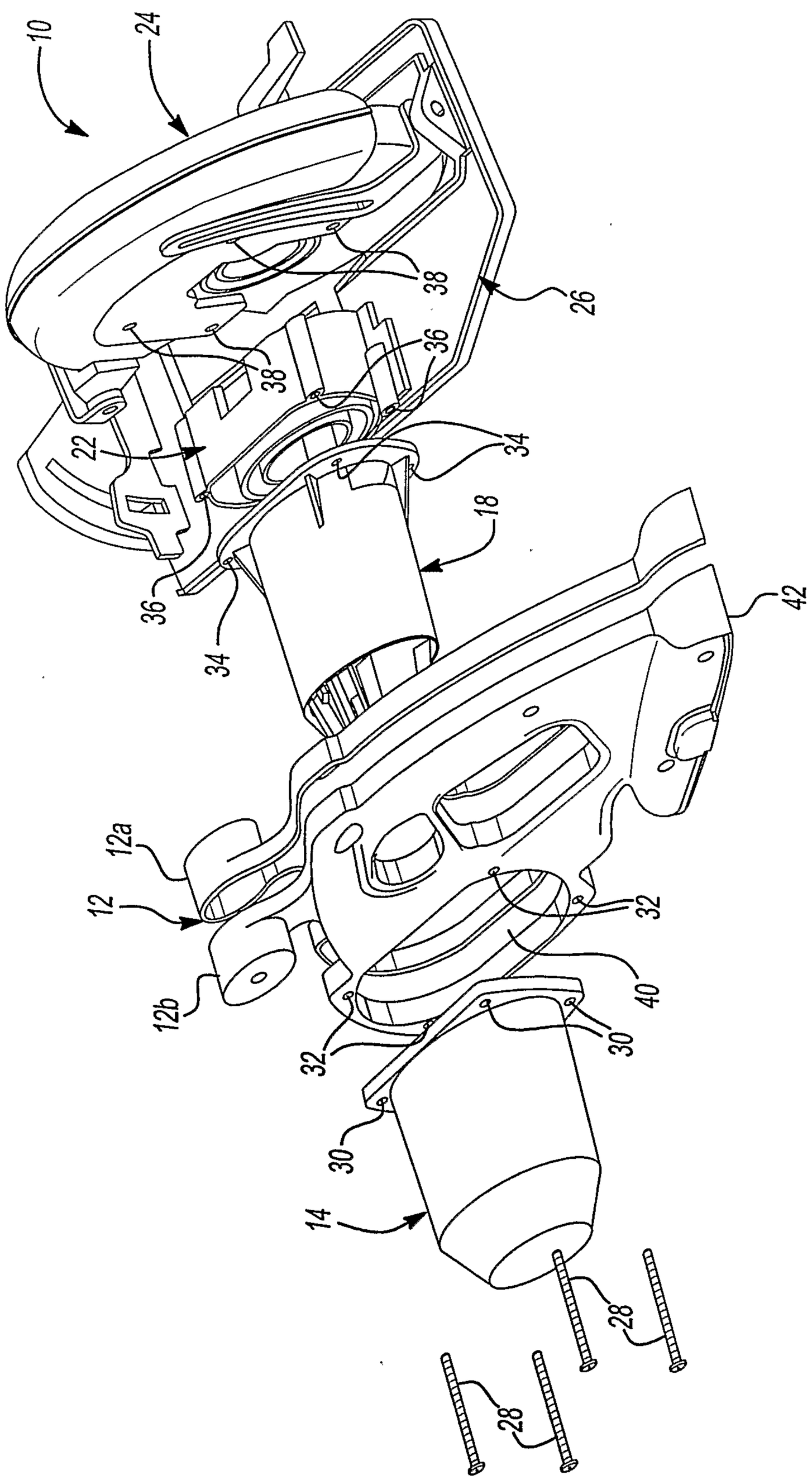


Fig-2

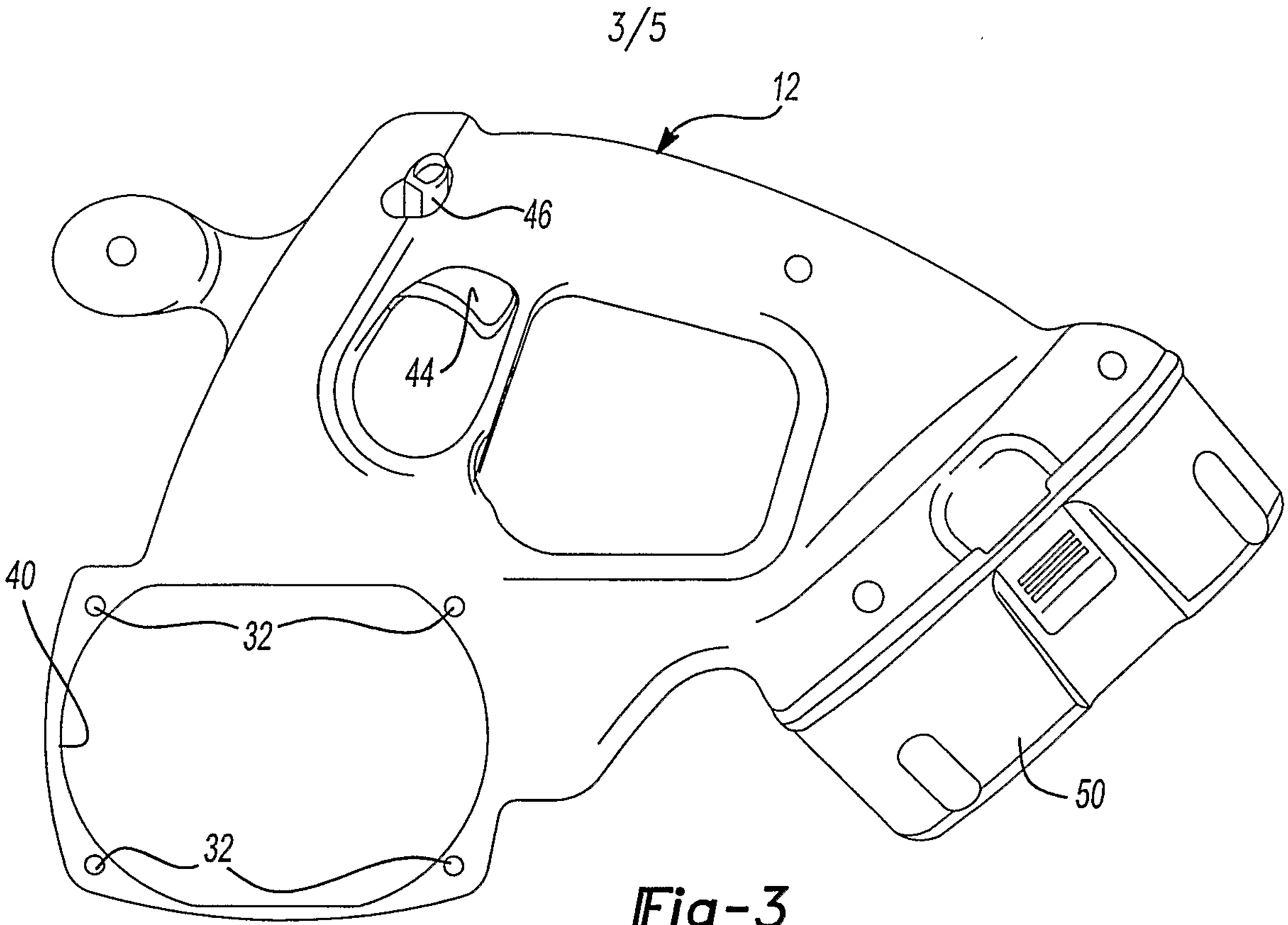


Fig-3

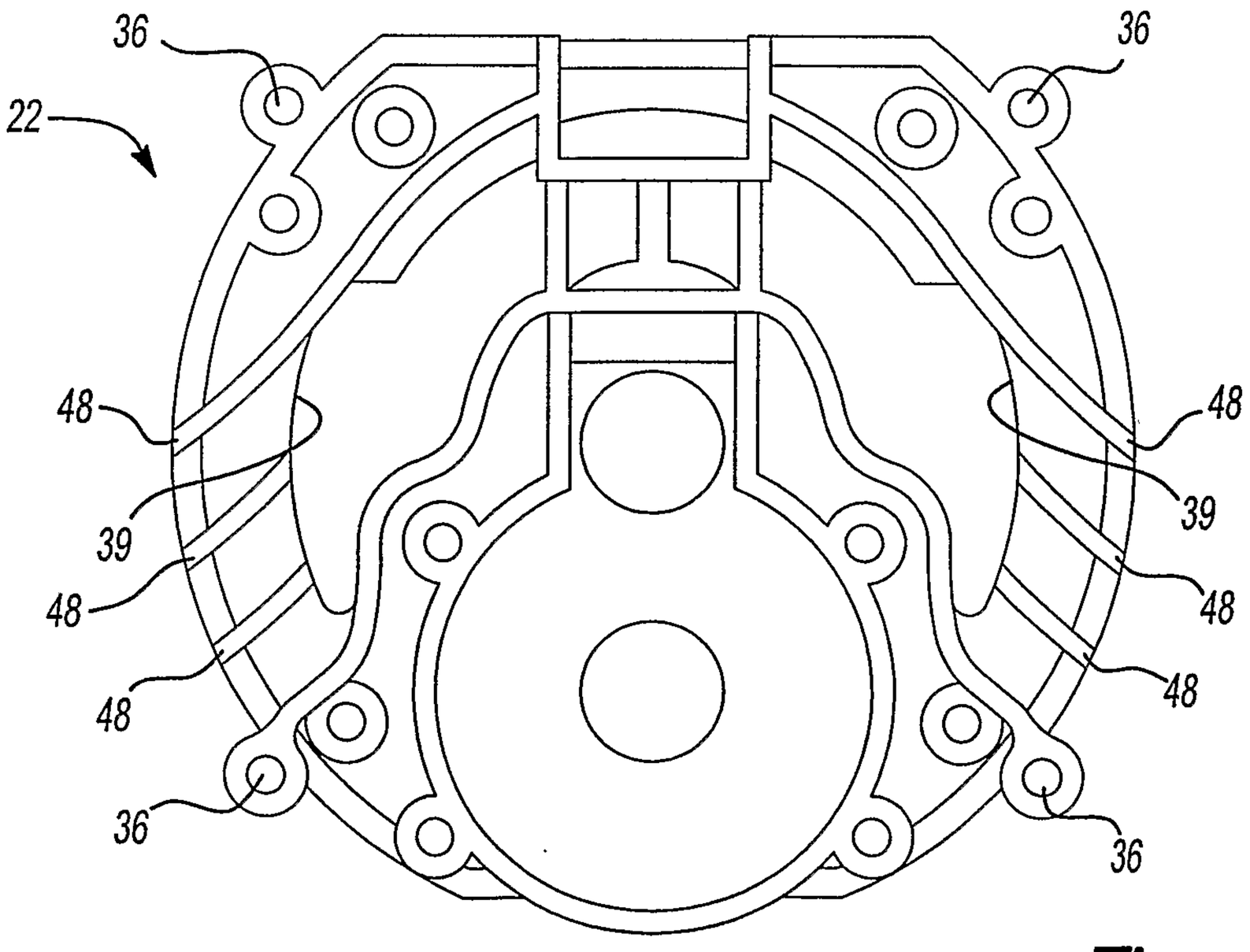


Fig-4

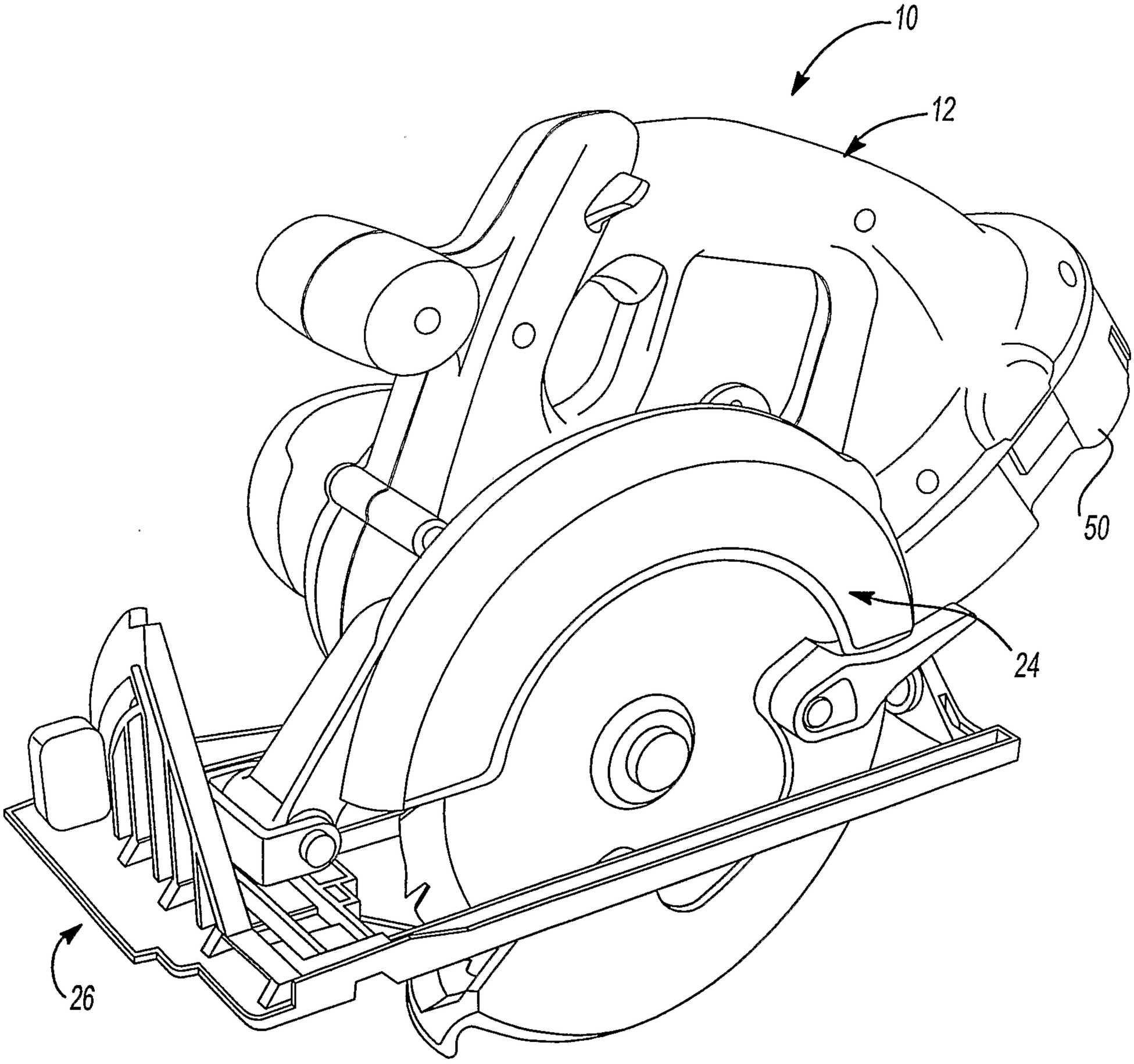


Fig-5

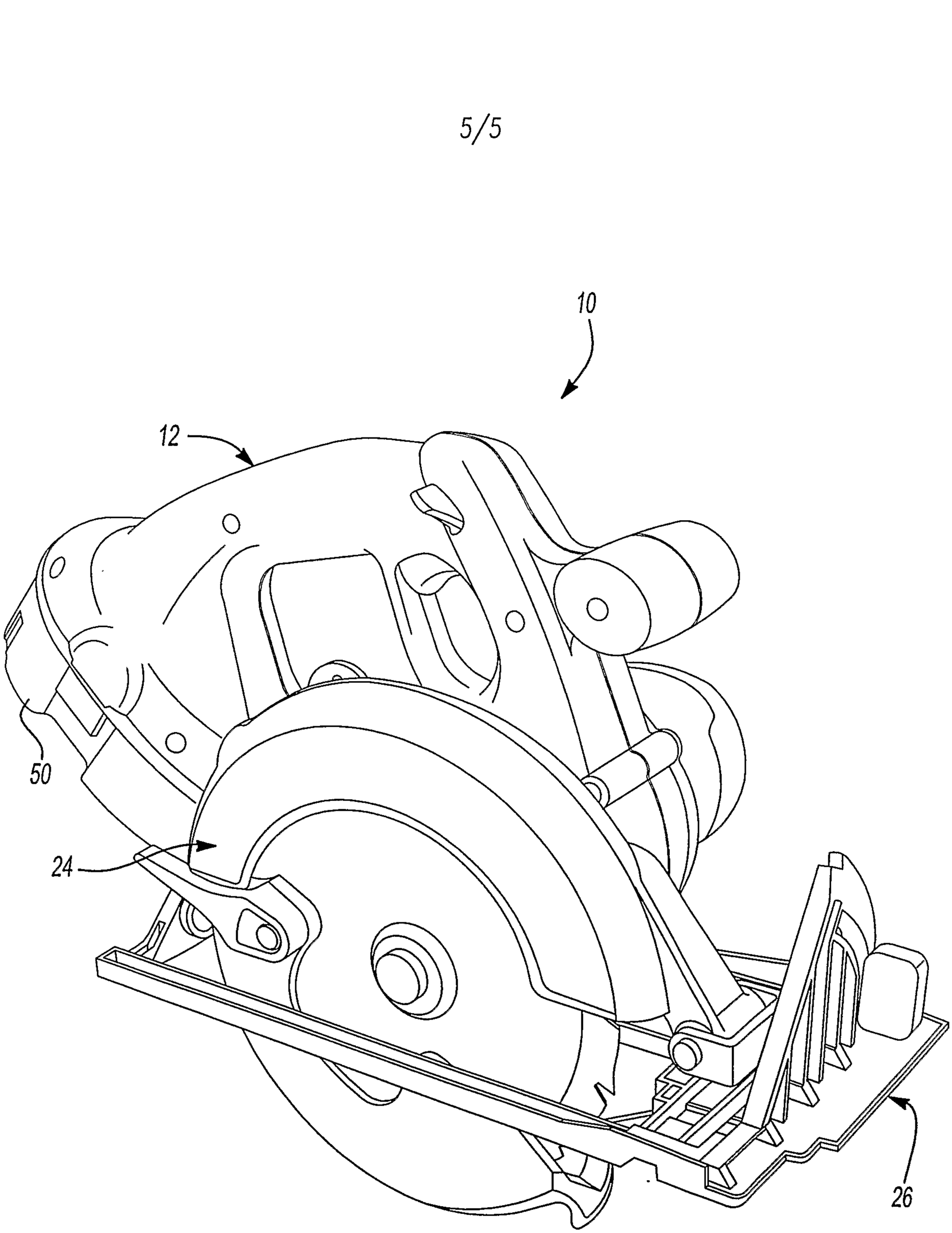
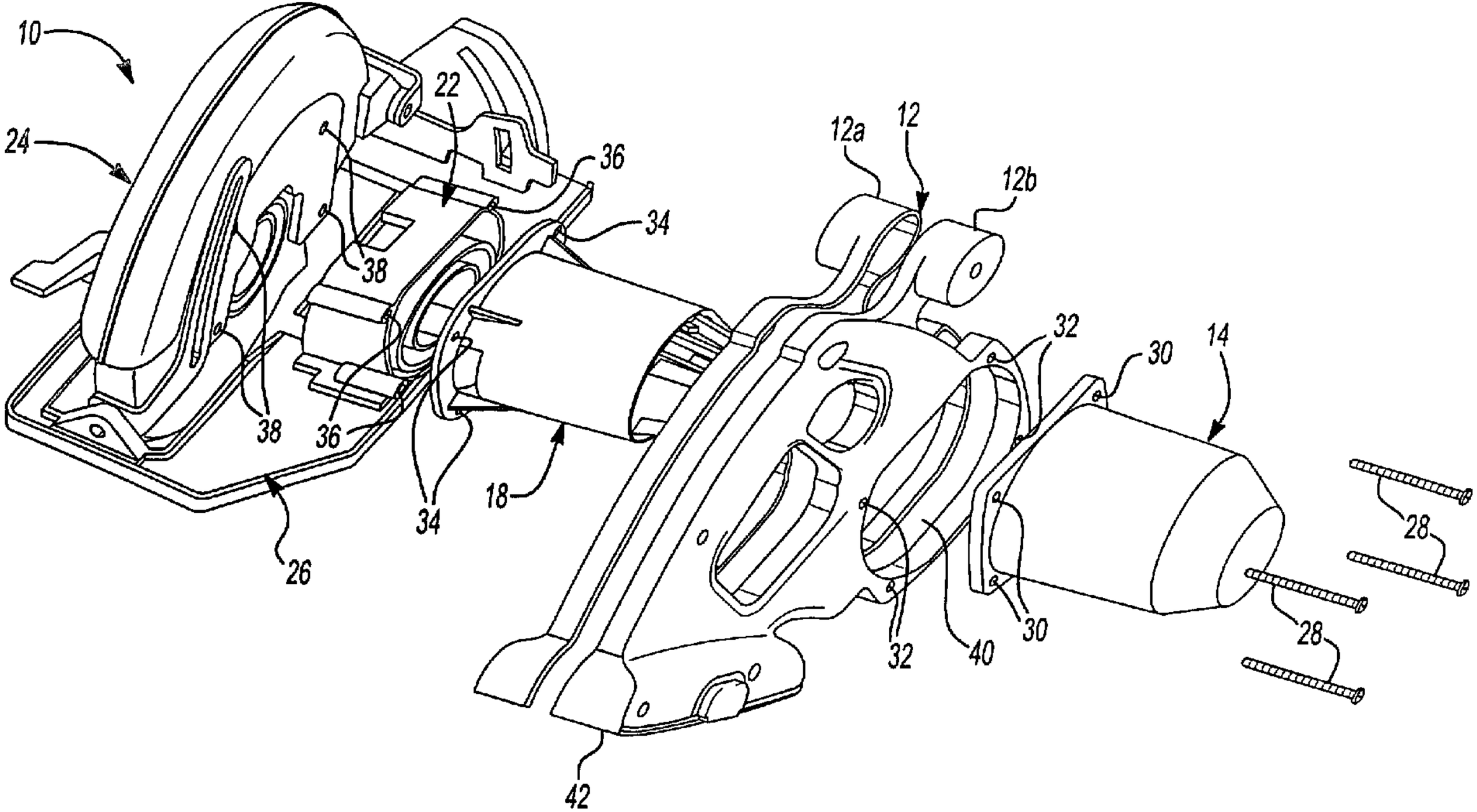


Fig-6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