



(51) International Patent Classification:
F02F 7/00 (2006.01)

(21) International Application Number:
PCT/IB2017/054415

(22) International Filing Date:
21 July 2017 (21.07.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201641025131 22 July 2016 (22.07.2016) IN

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(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
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.

(54) Title: CRANKCASE FOR AN INTERNAL COMBUSTION ENGINE

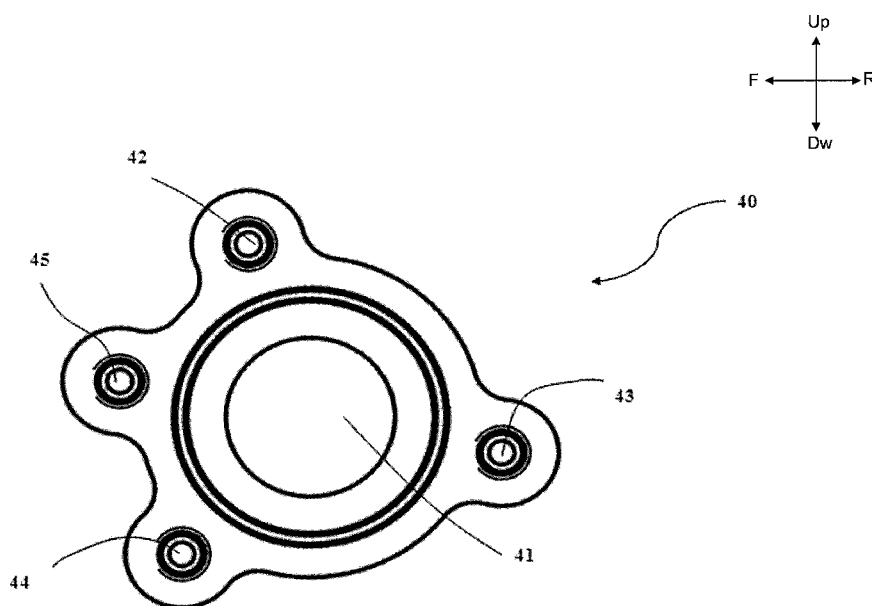


Figure 4

(57) Abstract: The present invention relates to an internal combustion engine (5) comprising of a crankcase (22). The crankcase (22) comprises of a crankcase right side (23) and a crankcase left side (24) which combine laterally to form said crankcase (22). Either of the crankcase right side (23) or the crankcase left side (24) comprises of a housing (50) formed in it. Furthermore, the housing (50) comprises of a mounting structure (40) formed in it which provides an efficient and balanced mounting to a magneto (60)/integrated starter generator (70) no matter how heavy the system is, eliminating any kind of noise and vibrations previously present in the mounted condition of the magneto (60)/integrated starter generator (70). The mounting structure (40) provided serves as a common mounting structure for the magneto (60) as well as the integrated starter generator (70).

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

Published:

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

CRANKCASE FOR AN INTERNAL COMBUSTION ENGINE

FIELD OF INVENTION

[0001] The present invention relates to an internal combustion engine and more particularly to a crankcase structure of the internal combustion engine.

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BACKGROUND OF INVENTION

[0002] Generally, an internal combustion engine is functionally connected to a rear wheel of a vehicle to provide a forward motion to it. The internal combustion engine comprises of a cylinder bore where the combustion occurs to provide the needed power for the forward motion of the vehicle. The internal combustion (IC) engine, among other components, has a cylinder on top of which a cylinder head is mounted, and receives a reciprocating piston from the bottom. On combustion of the air-fuel mixture, the piston transfers the energy generated during combustion to a crankshaft through a connecting rod thereby driving the crankshaft. In this way, the reciprocatory motion of the piston is converted to rotary motion of the crankshaft. The crankshaft rotation then in turn powers the vehicle.

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[0003] However, to initiate this process the internal combustion engine needs to be cranked. A typical two-wheeled vehicle can be cranked either by a kick starter or by an electric starter system. Typically, a magneto is required in a two-wheeled vehicle to generate electricity to provide power for the electrical loads of the vehicle. Though magneto is available to provide electrical power to electrical loads, it can generate electrical power only once engine has cranked. Since, initially magneto power is unavailable; the required electrical power to crank the internal combustion engine is received directly from the battery. Hence, the initial load on battery increases. Such a system uses a separate starter motor for cranking the engine and a separate magneto for generating power. Due to recent technical advancements, it is possible to replace the magneto by an integrated starter generator which is capable of functioning both as a

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starter motor for cranking the internal combustion engine and also as a power generating unit.

[0004] Generally, the stator of a typical magneto placed in the internal combustion engine is mounted inside a crankcase using double point mounting spaced apart at **180** degrees on a straight line. The same crankcase which accommodates the magneto could be used to mount the integrated starter generator also, but since integrated starter generator has both the starter motor and generator in the same unit, it is heavier as compared to a magneto. Moreover, due to large number of poles, proper mounting of integrated starter generator is desired. Hence, the same double point mounting used for mounting magneto if is used for mounting integrated starter generator would lead to its improper mounting. Since, the integrated starter generator is heavy it would not be balanced or mounted properly in such a double point mounting. The integrated starter generator in such a scenario would shake and not remain intact, leading to generation of unwanted noise and vibrations. Hence, it is desired to have an improved mounting for the integrated starter generator in which the vibrations and noises generated are reduced.

BRIEF DESCRIPTION OF DRAWINGS

[0005] The detailed description of the present subject matter is described with reference to the accompanying figures. Same numbers are used throughout the drawings to reference like features and components.

[0006] Figure **1** illustrates a left side view of an exemplary two-wheeled vehicle, in accordance with an embodiment of the present subject matter.

[0007] Figure **2** illustrates an isometric bottom view of an internal combustion engine of the exemplary two-wheeled vehicle in accordance with an embodiment of the present subject matter.

[0008] Figure 3 illustrates an isometric top view of the crankcase right side of the internal combustion engine comprising of a housing and a mounting structure according to a known art.

5 [0009] Figure 4 illustrates a top view of a mounting structure formed in the crankcase of the internal combustion engine in accordance with an embodiment of the present subject matter.

[00010] Figure 5 illustrates a top view of the mounting structure with a mirror image like orientation formed in the crankcase of the internal combustion engine in accordance with an embodiment of the present subject matter.

10 [00011] Figure 6 illustrates an isometric top view the crankcase right side of the internal combustion engine comprising of a housing and a mounting structure in accordance with an embodiment of the present subject matter.

[00012] Figure 7 illustrates an exploded view of a magneto with respect to the crankcase right side in accordance with an embodiment of the present subject matter.

15 [00013] Figure 8 illustrates an exploded view of an integrated starter generator with respect to the crankcase right side in accordance with an embodiment of the present subject matter.

DETAILED DESCRIPTION

20 [00014] Generally, the internal combustion engine is the power unit of the vehicle enabled to provide the required drive. Typically, the internal combustion engine is coupled to the drive wheel, which is generally the rear wheel. Mostly, the internal combustion engine comprises of a cylinder bore where the combustion occurs to provide the needed power for the forward motion of the vehicle. The internal combustion (IC) engine, among other components, comprises of a cylinder on top of which a cylinder head is mounted. The cylinder head is mounted to accommodate and receive the to-and-fro motion of the piston reciprocating from the bottom in an upward direction. On

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combustion of the air-fuel mixture, the piston transfers the energy generated during combustion to a crankshaft through a connecting rod thereby driving the crankshaft. In this way, the reciprocatory motion of the piston is converted to rotary motion of the crankshaft which in turn powers the vehicle.

5 **[00015]** However, the internal combustion engine needs to be cranked at first for the whole process to get started. Typically, a typical two-wheeled vehicle is cranked either by a kick starter or by an electric starter system. Therefore, a magneto is required in a two-wheeled vehicle to generate electricity to provide power for the electrical loads of the vehicle. Though magneto is available to provide electrical power to electrical
10 loads, it can generate electrical power only once engine has cranked. Since, initially magneto power is unavailable; the required electrical power to crank the internal combustion engine is received directly from the battery. Hence, the initial load on battery increases. Such a system uses a separate starter motor for cranking the engine and a separate magneto for generating power. Due to recent technical advancements, it is
15 possible to replace the magneto by an integrated starter generator which is capable of functioning both as a starter motor for cranking the internal combustion engine and also as a power generating unit.

[00016] Typically, the stator of a magneto placed in the internal combustion engine is mounted inside a crankcase using double point mounting spaced apart at **180** degrees
20 on a straight line. Generally, the same crankcase which accommodates the magneto could be used to mount the integrated starter generator also. However, the integrated starter generator has both the starter motor and generator in the same unit, making it heavier as compared to a magneto. Moreover, due to large number of poles, proper mounting of integrated starter generator is desired. Hence, the same double point
25 mounting used for mounting magneto if used for mounting of integrated starter generator would lead to its improper mounting. The integrated starter generator being heavy shakes due to the improper mounting and creates unwanted noise and vibrations. Additionally, to help in reduction of the manufacturing cost and time there is also a requirement of a crankcase which can provide a stable mounting to the magneto as well

as the integrated starter generator. Such an embodiment providing a common mounting does not needs to be changed each and every time differently for vehicles using a magneto and for vehicles using an integrated starter generator, saving both cost and time, and provides an ease of manufacturing.

5 **[00017]** Hence, an objective of the present subject matter is to provide a proper mounting for the integrated starter generator in the crankcase of the internal combustion engine. According to one aspect of the present subject matter, a mounting structure is formed in the crankcase for an efficient and balanced mounting of the integrated starter generator eliminating any kind of noise or vibration caused by the improper mounting of
10 the integrated starter generator.

[00018] According to additional aspect, the mounting structure formed in the crankcase enables a stable, efficient and balanced mounting for the integrated starter generator and the magneto as well. Thus, the present subject matter provides a crankcase with a mounting which can be used for vehicles using magneto and for vehicles using
15 integrated starter generator as well, reducing the manufacturing cost and time, and providing an ease of manufacturing as well.

[00019] In an embodiment, an internal combustion engine comprises of a cylinder bore where the combustion occurs to provide the needed power for the forward motion of the vehicle. The internal combustion (IC) engine, among other components,
20 comprises of a cylinder on top of which a cylinder head is mounted. The cylinder head is mounted to accommodate and receive the to-and-fro motion of the piston reciprocating from the bottom in an upward direction. On combustion of the air-fuel mixture, the piston transfers the energy generated during combustion to a crankshaft through a connecting rod thereby driving the crankshaft. In this way, the reciprocatory motion of
25 the piston is converted to rotary motion of the crankshaft which in turn powers the vehicle. In an embodiment, the internal combustion engine comprises of a transmission portion, wherein said transmission portion comprises of power transmission gears and the crankcase.

[00020] In an embodiment, the crankcase comprises of a crankcase left side and a crankcase right side which combine laterally to form and cover the transmission portion. The crankcase further comprises of a housing formed in either of the crankcase left side or crankcase right side. Depending on the requirement, the vehicle comprises of a magneto or an integrated starter generator being mounted on either the crankcase right side or the crankcase left side. (However, for convenience the housing and the magneto/integrated starter generator would be said to be a part of crankcase right side in the rest of the application) In an embodiment, a mounting structure is formed in a substantial central portion of the housing of the crankcase right side. The mounting structure is a hollow circular shaped structure molded in the housing of the crankcase right side such that, the opening of the mounting structure is aligned with the opening of the magneto and integrated starter generator allowing the crankshaft to pass through it. Either a magneto or an integrated starter generator is placed in the crankcase on an end portion of the crankshaft in the housing formed in the crankcase right side. In an embodiment, a mounting structure is formed in a substantial central portion of the housing of the crankcase right side. The mounting structure is a hollow circular shaped structure molded in the housing of the crankcase right side such that, the opening of the mounting structure is aligned with the opening of the magneto and integrated starter generator allowing the crankshaft to pass through it.

[00021] In an embodiment, either of the magneto or the integrated starter generator is mounted on the mounting structure formed in the housing of the crankcase right side. In an embodiment, the mounting structure comprises of at least four bosses formed at the outer periphery at its circumference. The bosses formed on the mounting structure allow the magneto as well as the integrated starter generator to be mounted in a stable and intact manner which eliminates any kind of noise or vibration caused in previous known arts due to improper mounting. In an embodiment, two of the four bosses formed on the circumference of the mounting structure are used for the mounting of the magneto, whereas three of the four bosses are used for the mounting of the integrated starter generator, such that one of the boss is a common mounting point for the magneto as well as the integrated starter generator. In an embodiment, the same crankcase

comprising of the mounting structure discussed above can be used for vehicles implementing magneto and for vehicles implementing integrated starter generator as well.

[00022] In an embodiment, the two bosses used for the mounting of the magneto are placed on two exact opposite points on the circumference of the mounting structure spaced 180 degrees apart. Out of the four bosses formed on the circumference of the mounting structure, three of them are formed equiangularly spaced 120 degrees apart allowing a stable mounting of the integrated starter generator. Such an equidistant arrangement of bosses provides a better load distribution of the system in a mounted condition. By such an arrangement the load is distributed evenly and there is no shake or imbalance in the fashion in which the magneto or the integrated starter generator is mounted, no matter how heavy it is. Therefore, such an arrangement enhances the stable and intact manner in which the magneto or the integrated starter generator is mounted resulting in an efficient and balanced mounting.

[00023] Thus, the present subject matter provides a mounting structure placed in the housing formed in the crankcase right side enabling a mounting of the magneto as well as the integrated starter generator. The mounting structure described above provides an advantage of reduced noise and vibration when either of the magneto or the integrated starter generator is mounted. In furtherance to it the present mounting structure allows a stable mounting of the magneto as well as the integrated starter generator.

[00024] The aforesaid and other advantages of the present subject matter would be described in greater detail in conjunction with the figures in the following description.

[00025] Arrows provided in the top right corner of each figure depicts direction with respect to the vehicle, wherein an arrow F denotes front direction, an arrow R indicated R direction, an arrow Up denotes upward direction, an arrow Dw denoted downward direction, an arrow Rh denotes right side, an arrow Lh denoted left side, as and where applicable.

[00026] Figure 1 illustrates a left side view of an exemplary two-wheeled step through (10), in accordance with an embodiment of present subject matter. The vehicle (10) has a frame assembly (not shown), which acts as the skeleton for bearing the loads. The frame assembly is a mono-tube type frame assembly that includes a head tube, a main tube, a down tube, and a rear tube. The main tube extends rearwardly downward from the head tube. The down tube extends rearward, along a longitudinal axis of the vehicle (100), from a rear portion of the main tube. The rear tube extends inclined rearward from a rear portion of the down tube towards a rear portion R of the vehicle. A handle bar assembly (2) is pivotally disposed through the head tube. The handle bar assembly (2) is connected to a front wheel (4A) by one or more front suspension(s) (7). A front fender (8) is disposed above the front wheel (4A) for covering at least a portion of the front wheel (4A). A headlamp unit (1) is provided attached and mounted to the frame assembly. A fuel tank (3) is mounted to the main tube of the frame assembly and is disposed in the front portion F of a step-through space of the frame assembly. In an embodiment, the power unit (5) which is an internal combustion engine is mounted to the down tube. The fuel tank (3) is functionally connected to the internal combustion engine (5). A swing arm (12) is swingably connected to the frame assembly. A rear wheel (4B) is rotatably supported by the swing arm (12). One or more rear suspension(s) (13), which are connecting the swing arm (12) at an angle, to sustain both the radial and axial forces occurring due to wheel reaction, to the frame assembly. A rear fender (14) is disposed above the rear wheel (4B). A seat assembly (9) is disposed at a rear portion R of the step-through space. Further, the seat assembly (9) is positioned above the rear wheel (4B). The vehicle (10) is supported by a center stand mounted to the frame assembly. A floorboard (6) being mounted to the down tube covers at least a portion of the internal combustion engine (5).

[00027] Figure 2 illustrates an isometric bottom view of the internal combustion engine of the exemplary two-wheeled vehicle in accordance with an embodiment of the present subject matter. In an embodiment, the internal combustion engine (5) comprises of a cylinder head (20) which accommodates a reciprocating piston (not shown) and allows the combustion to happen. The internal combustion engine (5) also comprises of

a cylinder block (21) formed below the cylinder head (20) to provide a passage for the piston to reciprocate. In furtherance to it, the internal combustion engine (5) comprises of a crankcase (22) comprising of a crankshaft (not shown) extending in a horizontal direction in the crankcase (22) and being connected to the piston to convert its reciprocatory motion into rotational motion. The crankcase (22) comprises of a crankcase right side (23) and a crankcase left side (24) which combine laterally to form said crankcase (22). Either a magneto (shown in Fig. 6) or an integrated starter generator (shown in Fig. 7) is placed in the crankcase (22) being mounted on either of the crankcase right side (23) or the crankcase left side (24). The magneto (shown in Fig. 7) and the integrated starter generator (shown in Fig. 8) being mounted on either of the crankcase right side (23) or the crankcase left side (24) comprise of a circular opening to accommodate the ends of the crankshaft.

[00028] Figure 3 illustrates an isometric top view of the crankcase right side (30) of the internal combustion engine (5A) according to a known art. The crankcase right side (30) comprises of a housing (34) formed in it. In an embodiment, either a magneto or an integrated starter generator is mounted on the housing formed in the crankcase right side (30) (The housing can be formed in either of the crankcase right side or crankcase left side, and the magneto or integrated starter generator can be mounted in the housing formed in either of the crankcase left side or crankcase right side. However, for convenience the housing and magneto/integrated starter generator would be said to be a part of the crankcase right side for the rest of the application). In an embodiment, a mounting structure (32) can be seen to be formed in the housing (34) with two mounting bosses (33) formed around it for mounting of the magneto. However if a similar structure is used for the mounting of the integrated starter generator the mounting wouldn't be perfect. The integrated starter generator being heavy with more number of poles isn't mounted perfectly in such a structure, which causes imbalance and shaking of the integrated starter generator leading to unwanted noise and vibrations. Additionally the mounting structure (32) needs to be changed varying upon what the vehicle is using, a magneto or an integrated starter generator. This leads to extra unwanted addition of manufacturing cost and time.

[00029] Figure 4 illustrates a top view of the mounting structure (40) formed in the housing (shown in Fig. 6) of the crankcase right side (23) of the exemplary two-wheeled vehicle (10) in accordance with an embodiment of the present subject matter. In an embodiment, the mounting structure (40) formed in the housing of the crankcase right side (23) as per the present subject matter, is a substantial circular shaped hollow structure. The mounting structure (40) comprises of an opening (41) to allow the an end of of the crankshaft to be disposed there, since the crankshaft is placed in a horizontal direction in the crankcase (22) with both its ends disposed on the crankcase right side (23) and crankcase left side (24). In an embodiment, at least four bosses (42, 43, 44, 45) formed on the outer periphery of the mounting structure (40) around its circumference, which serve a dual purpose of mounting of the magneto as well as the integrated starter generator. Out of the four bosses (42, 43, 44, 45) two of them (43, 45) forming a first set of bosses are used for the mounting of the magneto, whereas three of them (42, 43, 44) formed as second set of bosses are used for the mounting the integrated starter generator, such that one of the boss (43) acts a common point for the mounting of the magneto as well as the integrated starter generator. In an embodiment, the first set of bosses (43, 45) used for mounting of the magneto are formed on two opposite points spaced 180 degrees apart on the circumference of the mounting structure (40). Whereas, the second set of bosses (42, 43, 44) used for the mounting of the integrated starter generator are formed equiangularly placed 120 degrees apart on the circumference of the mounting structure (40). In an embodiment, the bosses (42, 43, 44, 45) are formed at such specific angles so that, there is an even load distribution when the integrated starter generator or the magneto is placed. By such an arrangement the load is distributed evenly and there is no shake or imbalance in the fashion in which the magneto or the integrated starter generator is mounted, no matter how heavy it is. Therefore, such an arrangement enhances the stable and intact manner in which the magneto or the integrated starter generator is mounted resulting in an efficient and balanced mounting of the magneto/integrated starter generator.

[00030] Figure 5 illustrates a top view of the mounting structure (40) with a mirror image like orientation formed in the housing (shown in Fig. 6) of the crankcase right

side (23) of the exemplary two-wheeled vehicle (10) in accordance with an embodiment of the present subject matter. In an embodiment, the mounting structure (40) comprising of plurality of bosses (42, 43, 44, 45) arranged in a first orientation as explained above enables an efficient and balanced mounting of the magneto as well as the integrated starter generator. The orientation of the bosses (42, 43, 44, 45) formed enable an even load distribution for the magneto as well as the integrated starter generator in a mounted condition resulting in an efficient and balanced mounting. However, when the orientation for the mounting structure (40) is changed to form a mirror like structure, there is no affect on the load distribution efficiency for the magneto and the integrated starter generator in a mounted condition. The pre-determined angles at which the bosses (42, 43, 44, 45) are formed still remain intact in such an orientation such that, the magneto and the integrated starter generator still can be mounted in a similar fashion. However, the set of second set of bosses (42, 43, 44) on which the integrated starter generator is mounted is changed to a second orientation of (42, 44, 45) when orientation of the mounting structure (40) is changed to a mirror image like orientation. There is no change in the orientation of the angles between the set of bosses (42, 43, 44, 45), thus maintaining the uniform load distribution of the magneto and the integrated starter generator in a mounted condition. Therefore, such an orientation of the mounting structure (40) as explained can also be used for an efficient and balanced mounting of the magneto and the integrated starter generator.

[00031] Figure 6 illustrates an isometric top view of the crankcase right side (23) of the exemplary two-wheeled vehicle (10) in accordance with an embodiment of the present subject matter. In an embodiment, the crankcase right side (23) comprises of a housing (50) formed in it which accommodates the magneto/integrated starter generator, crankshaft and other such wiring associated with it. The mounting structure (40) as per the present subject matter is also formed in the housing (50) in its substantial central portion. In an embodiment, the mounting structure (40) formed in the housing (50) allows the mounting of the magneto as well as the integrated starter generator. Thus, the present subject matter provides a common mounting for all the vehicles, be it a one using magneto or an integrated starter generator. Therefore, the present subject matter

reduces the manufacturing cost as well as the time, and provides an ease of manufacturing.

[00032] Figure 7 illustrates an exploded view of the magneto (60) with respect to the crankcase right side (23) of the exemplary two-wheeled vehicle (10) in accordance with an embodiment of the present subject matter. In an embodiment, the magneto (60) can be seen to mounted in the crankcase right side (23) through the mounting structure (40). The magneto (60) comprises of a couple of slots (61, 62) which are in line in a same axis as that of bosses (43, 45) to allow a perfect mounting of the magneto (60) on the mounting structure (40). A couple of fasteners (63, 64) help in perfect securing and mounting of the magneto (60) to the mounting structure (40). In an embodiment, the magneto (60) comprises of an opening (65) which is line in a same axis as that of the opening (41) of the mounting structure (40) which allows and end of the crankshaft to pass through it to be disposed on the crankcase right side. Thus, such an arrangement of bosses (43, 45) allows the magneto (60) to be perfectly mounted on the mounting structure (40).

[00033] Figure 8 illustrates an exploded view of the integrated starter generator (70) with respect to the crankcase right side (23) of the exemplary two-wheeled vehicle (10) in accordance with an embodiment of the present subject matter. In an embodiment, the integrated starter generator (70) can be seen to mounted in the crankcase right side (23) through the mounting structure (40). The integrated starter generator (70) comprises of various slots out of which three slots (71, 72, 73) are in line in a same axis as that of bosses (42, 43, 44) to allow a perfect mounting of the integrated starter generator (70) on the mounting structure (40). In an embodiment, fasteners (74, 75, 76) help in perfect securing and mounting of the integrated starter generator (70) to the mounting structure (40). In an embodiment, the integrated starter generator (70) comprises of an opening (77) which is line in a same axis as that of the opening (41) of the mounting structure (40) which allows and end of the crankshaft to pass through it to be disposed on the crankcase right side. Thus, such an arrangement of bosses (42, 43, 44) allow the integrated starter generator (70) to be perfectly mounted on the mounting structure (40).

5 [00034] Thus, the present subject matter provides a mounting structure (40) which can be used as a common mounting for the magneto (60) as well as the integrated starter generator (70). The mounting structure (40) with its specific arrangement of bosses (42, 43, 44, 45) helps is a perfect mounting of the magneto (60) as well as the integrated starter generator (70). Such an arrangement, helps is a perfect mounting with an even distribution of load such that the magneto/integrated starter generator being mounted does not shakes or is imbalanced, and is mounted in a stable and intact manner resulting in an efficient and balanced mounting no matter how heavy the system is.

10 [00035] It is to be understood that the aspects of the embodiments are not necessarily limited to the features described herein. Many modifications and variations of the present subject matter are possible in the light of above disclosure. Therefore, within the scope of claims of the present subject matter, the present disclosure may be practiced other than as specifically described.

I/We claim:

1. An internal combustion engine (5) for a two-wheeled vehicle (10) comprising:
 - a cylinder block (21) comprising of a cylinder to accommodate a reciprocating piston for combustion of fuel;
 - a crankcase (22) comprising of a crankshaft to convert reciprocatory motion of said piston to a rotational motion;
 - a housing (50) formed within said crankcase (22) to accommodate a mounting structure (40) formed therein;
 - a plurality of bosses (42, 43, 44, 45) formed around said mounting structure (40), wherein said plurality of bosses (42, 43, 44, 45) include a first set of bosses (43, 45) comprising at least two bosses (43, 45) separated by a first pre-determined angle, and a second set of bosses (42, 43, 44) comprising at least three bosses (42, 43, 44) formed equiangularly around said mounting structure (40).
2. The internal combustion engine (5) as claimed in claim 1, wherein said crankcase (22) comprises of a crankcase right side (23) and a crankcase left side (24), and wherein said crankcase right side (23) and a crankcase left side (24) combine laterally to form said crankcase (22).
3. The internal combustion engine (5) as claimed in claim 2, wherein said housing (50) is formed in one of said crankcase left side (24) and crankcase right side (23).
4. The internal combustion engine (5) as claimed in claim 1, wherein said mounting structure (40) is formed in a substantial central portion of said housing (50) to enable mounting of at least one of a magneto (60) and an integrated starter generator (70).
5. The internal combustion engine (5) as claimed in claim 1, wherein said mounting structure (40) is a substantial circular shaped hollow structure with said plurality of bosses (42, 43, 44, 45) formed along a circumference of said mounting structure (40).
6. The internal combustion engine (5) as claimed in claim 1, wherein said first set of bosses (43, 45) comprising of at least two bosses (43, 45) formed on an outer periphery on circumference of said mounting structure (40) for enabling mounting of said magneto (60).

7. The internal combustion engine (5) as claimed in claim 1, wherein said first pre-determined angle separating said first set of bosses (43, 45) is approximately 180 degrees enabling a uniform distribution of load of said magneto (60) in a mounted condition.
8. The internal combustion engine (5) as claimed in claim 1, wherein said second set of bosses (42, 43, 44) arranged in a first orientation comprises at least three bosses (42, 43, 44) formed along a circumference of said mounting structure (40) for enabling mounting of said integrated starter generator (70).
9. The internal combustion engine (5) as claimed in claim 1, wherein said second set of bosses (42, 43, 44) formed equiangularly are spaced 120 degrees apart along the circumference of said mounting element (40) enabling an even load distribution of said integrated starter generator (70) in a mounted condition.
10. The internal combustion engine (5) as claimed in claim 1, wherein said mounting structure (40) enables a common mounting for said magneto (60) and said integrated starter generator (70).
11. The internal combustion engine (5) as claimed in claim 1, wherein said second set of bosses (42, 45, 44) arranged in a second orientation comprises at least three bosses (42, 45, 44) formed along a circumference of said mounting structure (40) for enabling mounting of said integrated starter generator (70).
12. The internal combustion engine (5) as claimed in claim 11, wherein said second set of bosses (42, 45, 44) formed equiangularly are spaced 120 degrees apart along the circumference of said mounting element (40) enabling an even load distribution of said integrated starter generator (70) in a mounted condition.

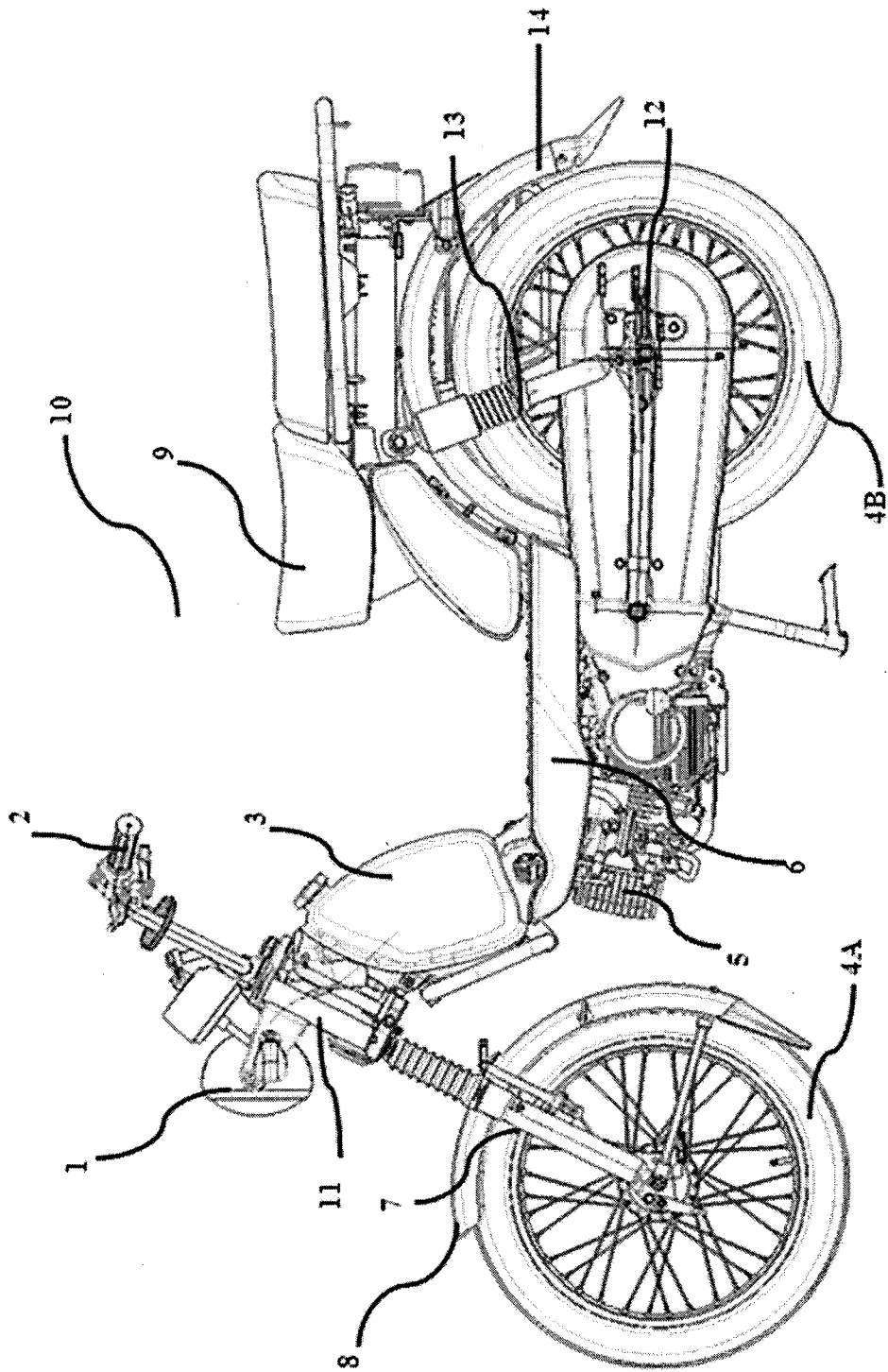
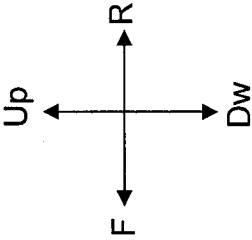


Figure 1

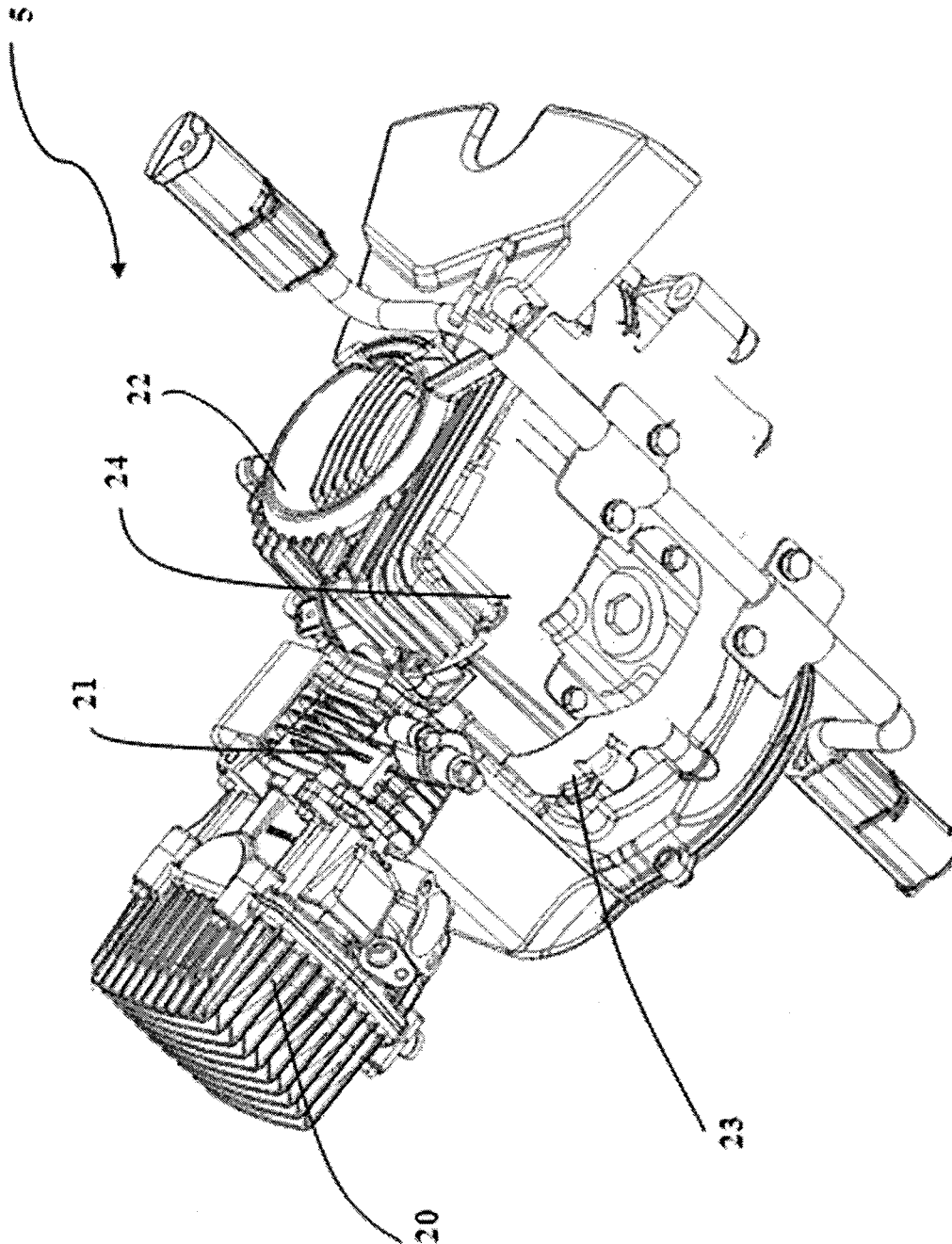
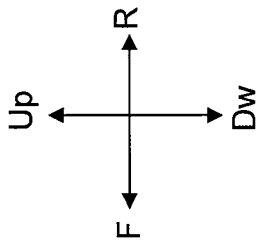
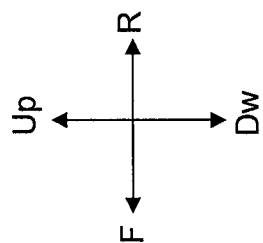


Figure 2



PRIOR ART

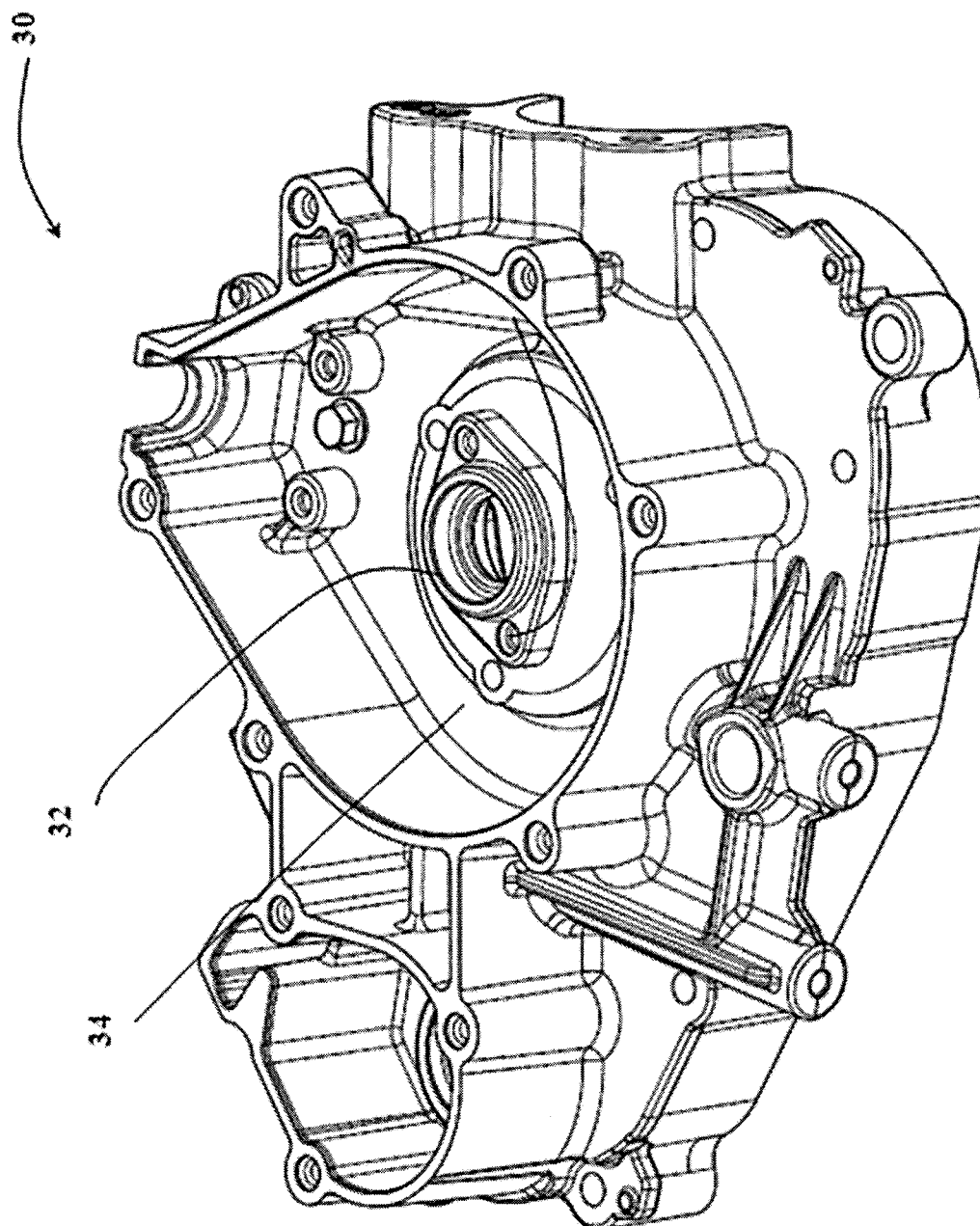


Figure 3

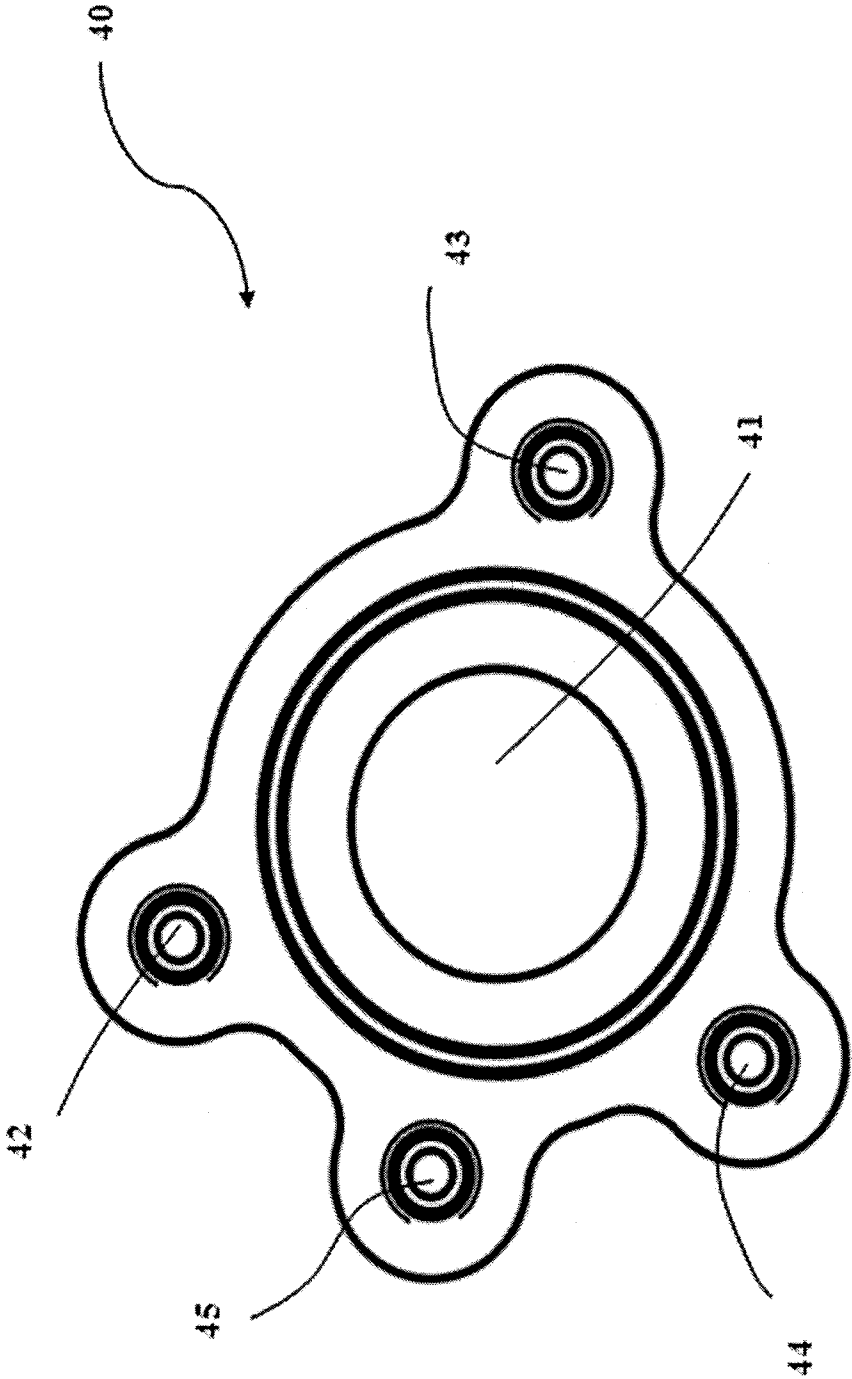
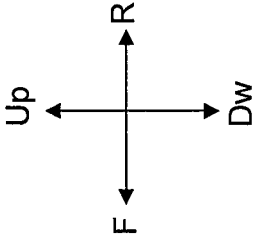


Figure 4

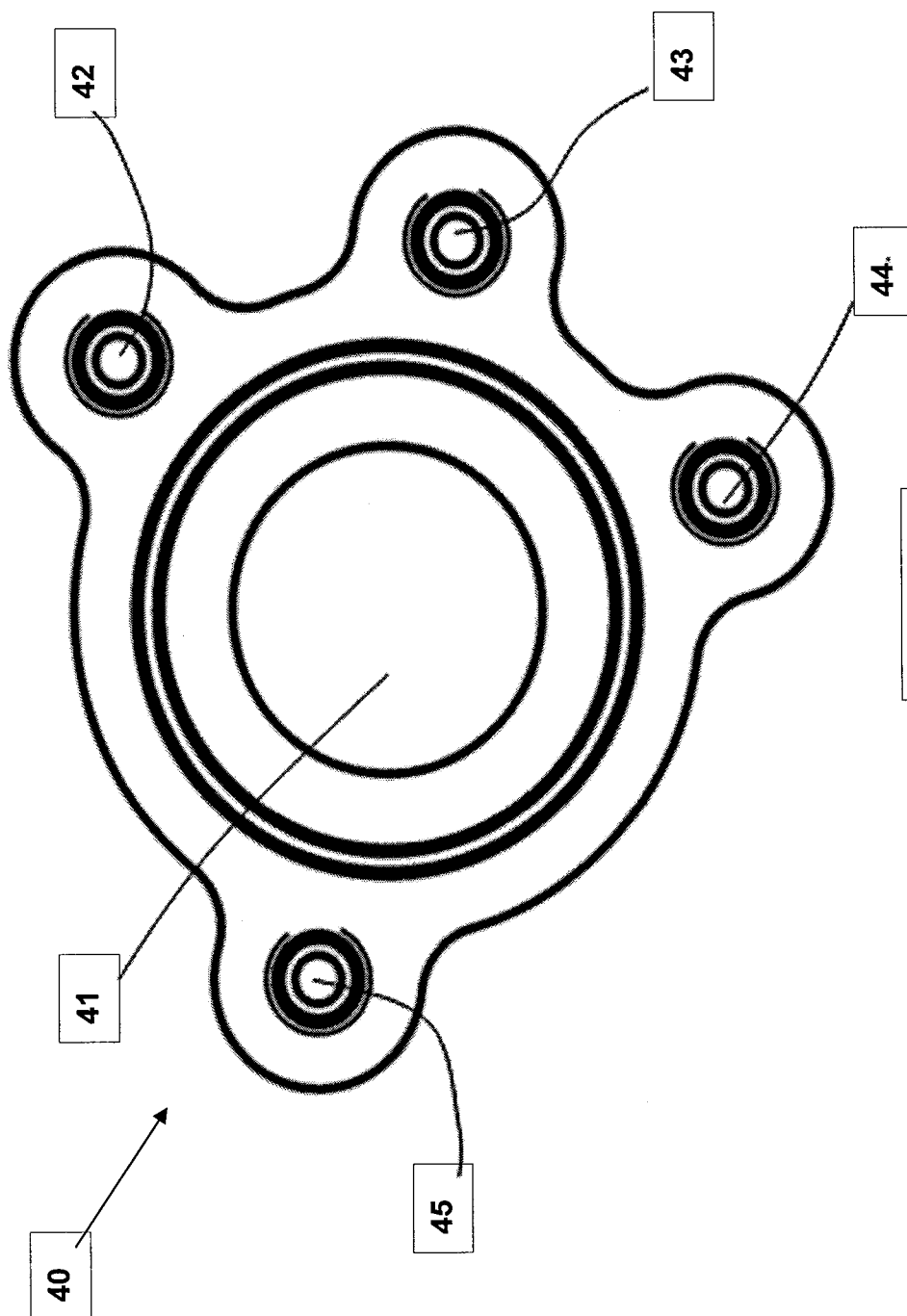
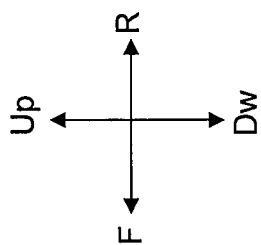


Figure 5

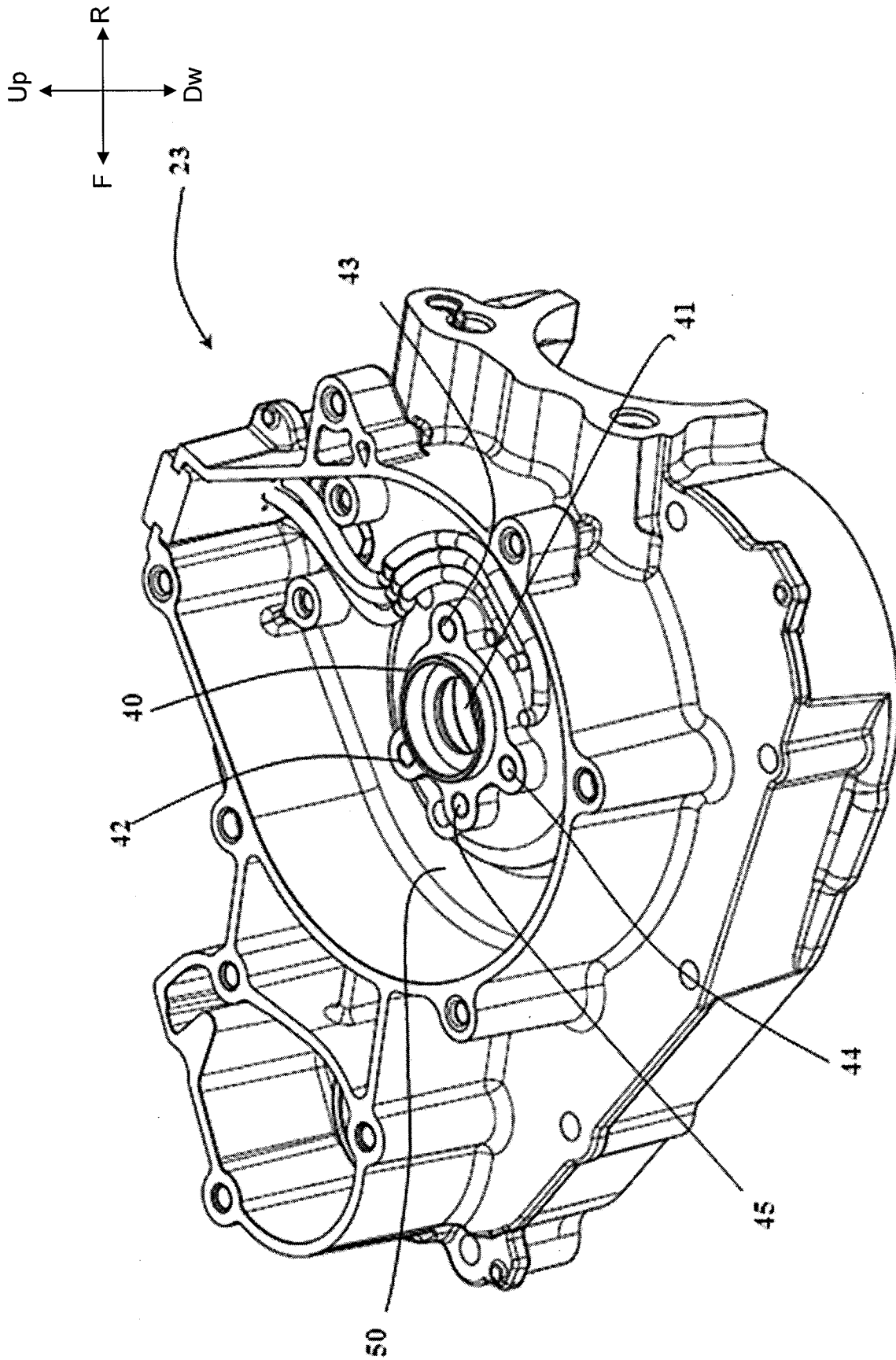


Figure 6

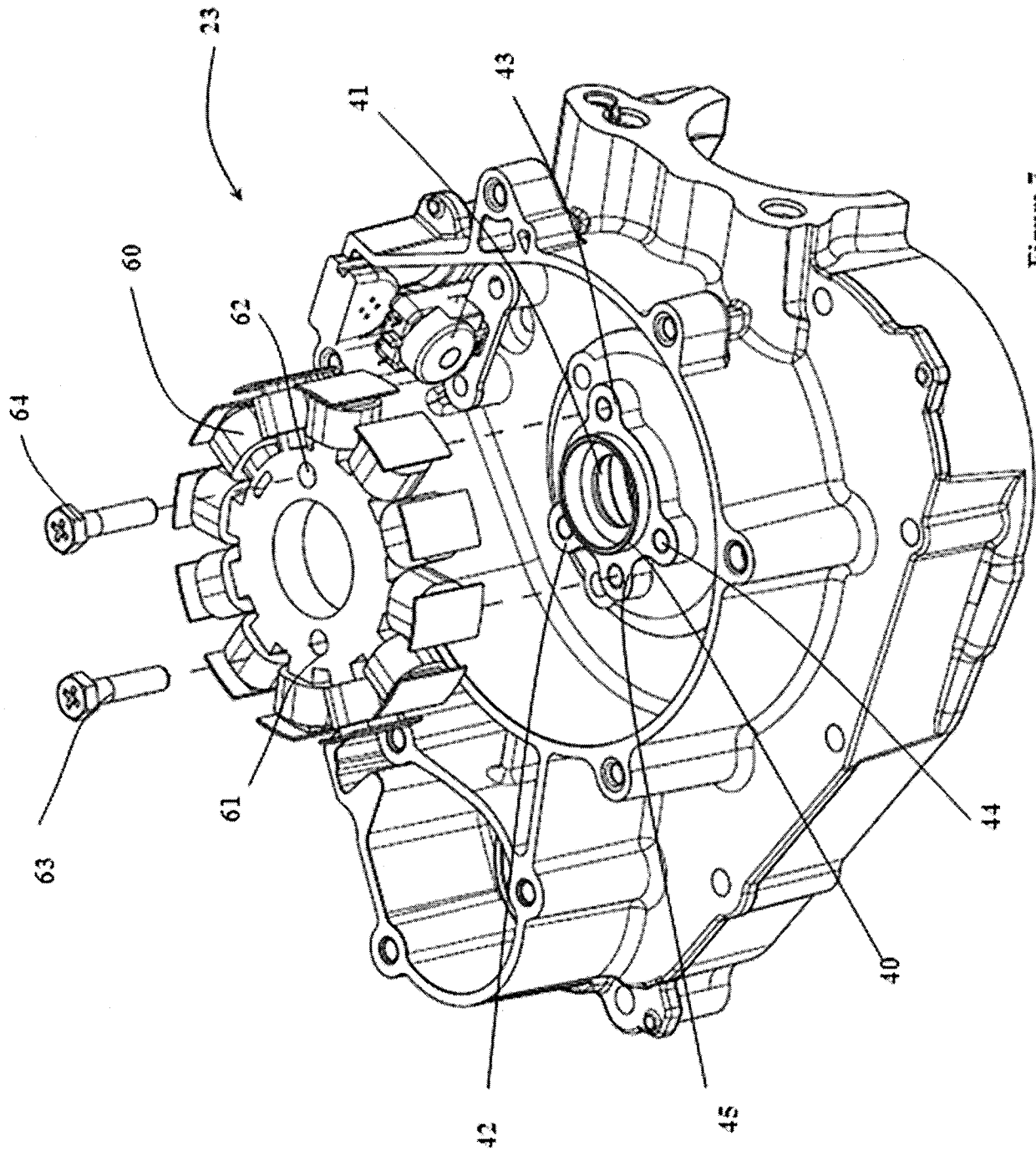
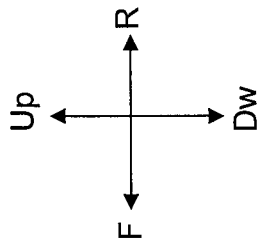


Figure 7

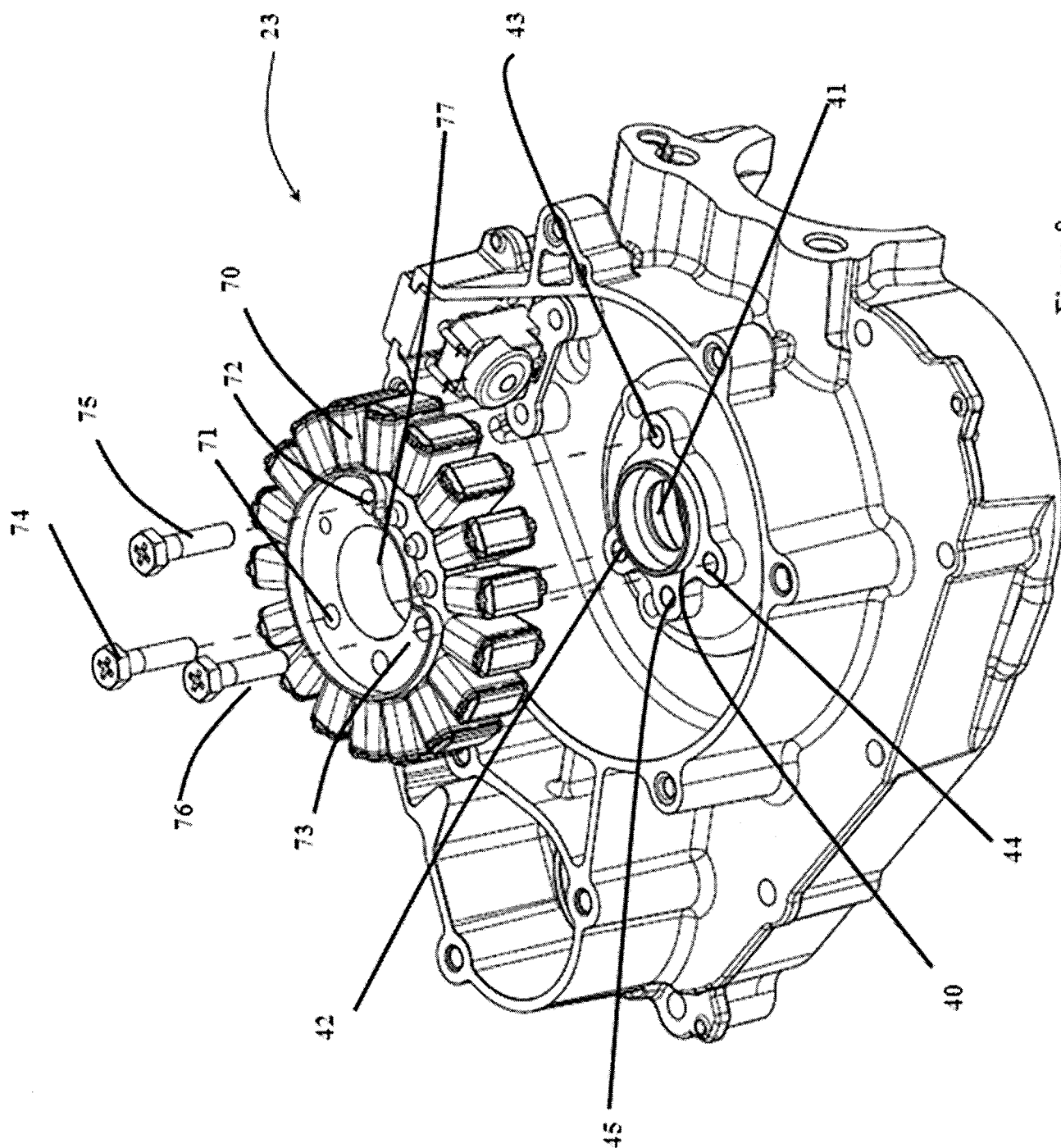
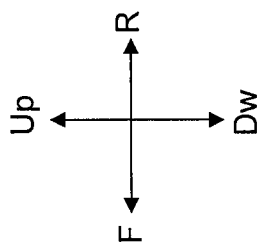


Figure 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/054415

A. CLASSIFICATION OF SUBJECT MATTER
F02F7/00 Version=2017.01

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)

F02F7/00

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)

Patseer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US20070144479 A1, MITSUBISHI HEAVY INDUSTRIES, LTD., 28 June 2007 (28/06/2007) Paragraphs- (36-44)	1-12
A	US20020148432 A1, MASAHISA KAMIYA, 17 October 2002 (17/10/2002) Claims- (1-7)	1-12

☐ 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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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
09-11-2017

Date of mailing of the international search report
09-11-2017

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2017/054415

Citation	Pub.Date	Family	Pub.Date
US 20070144479 A1	28-06-2007	CN 1971019 A	30-05-2007
		CN 1971019 B	13-06-2012
		US 7389763 B2	24-06-2008
US 20020148432 A1	17-10-2002	US 6647944 B2	18-11-2003