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(54) **COMBINED AXLE STRUCTURE OF A STATOR ASSEMBLY FOR A RADIATOR FAN**

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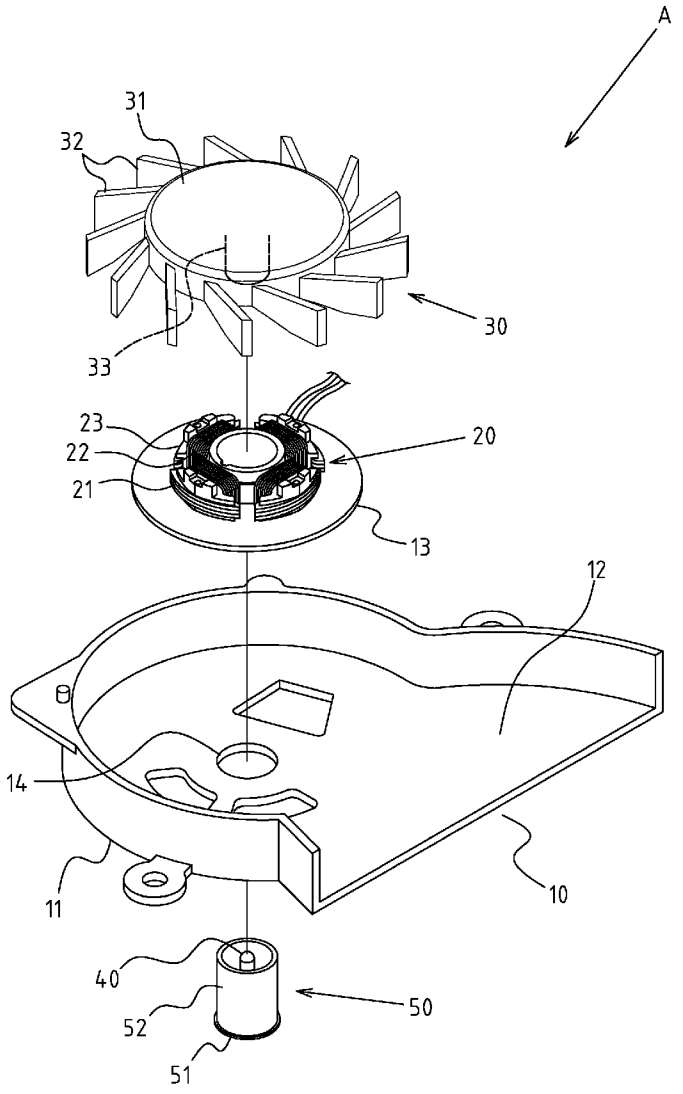
(57) **ABSTRACT**

A combined axle structure of a stator assembly for a radiator fan, of which said radiator fan comprises: a pedestal, a stator assembly, a rotor blade unit and a reverse axle. The pedestal includes a sustaining face and a stator assembly face. The stator assembly includes silicon-steel sheet, coil and insulated frame. The insulated frame is mated with a metal bearing block, which is designed like a cup, and includes a bottom wall and a circumferential wall. The top of the circumferential wall is positioned into the insulated frame. An axle socket is set at the center of the bottom wall, allowing for insertion of the bottom of the reverse axle. An embedded locator is set centrally into the stator assembly face of the pedestal, allowing for mating with the bottom of the metal bearing block.



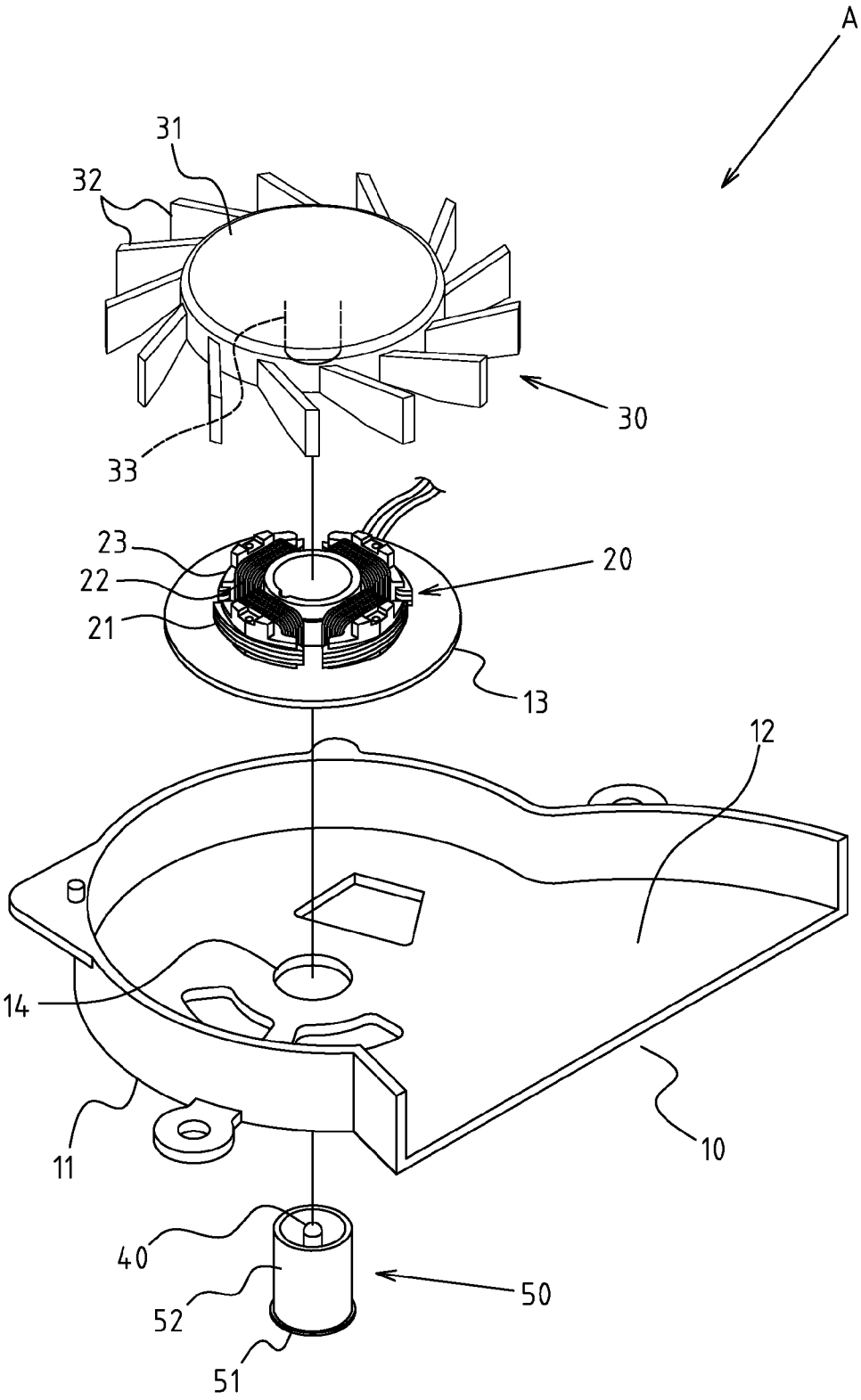


FIG.1

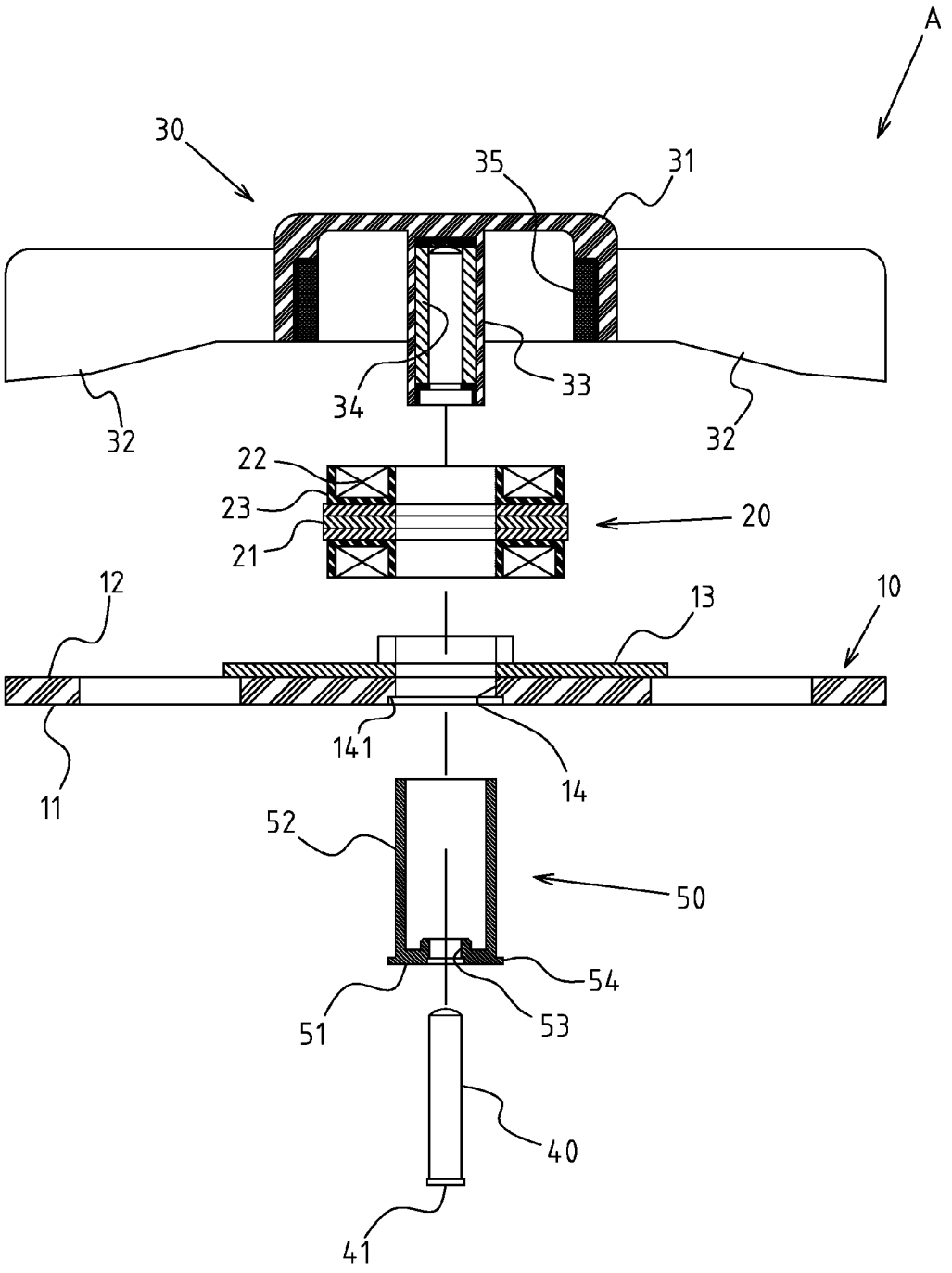

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FIG.2

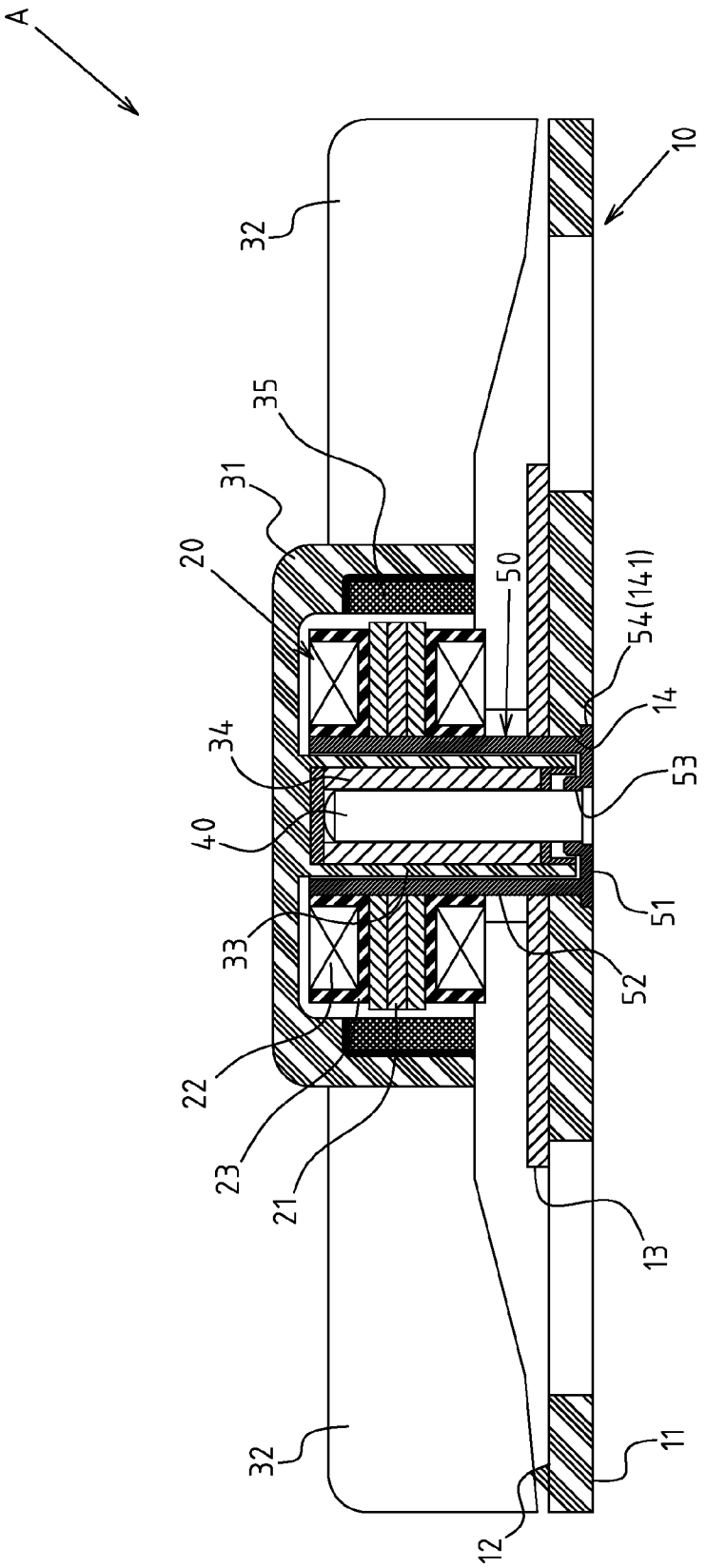

FIG.3

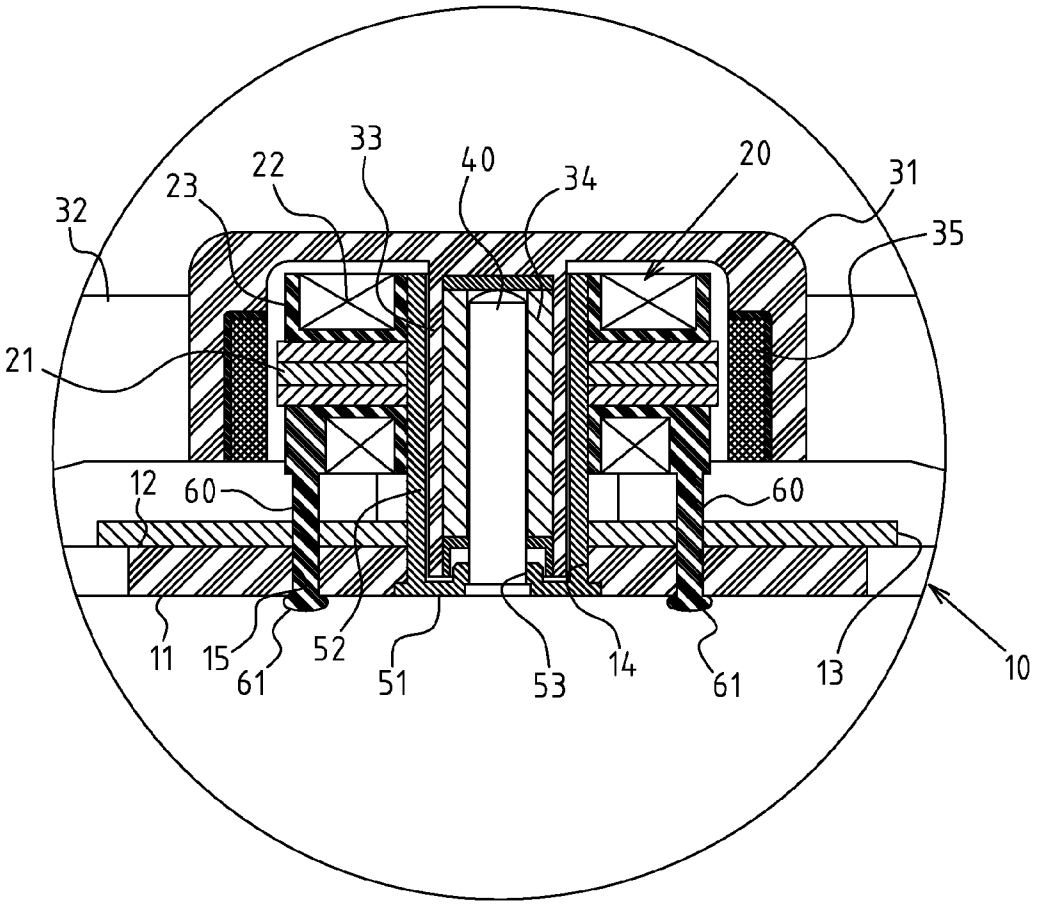

FIG.4

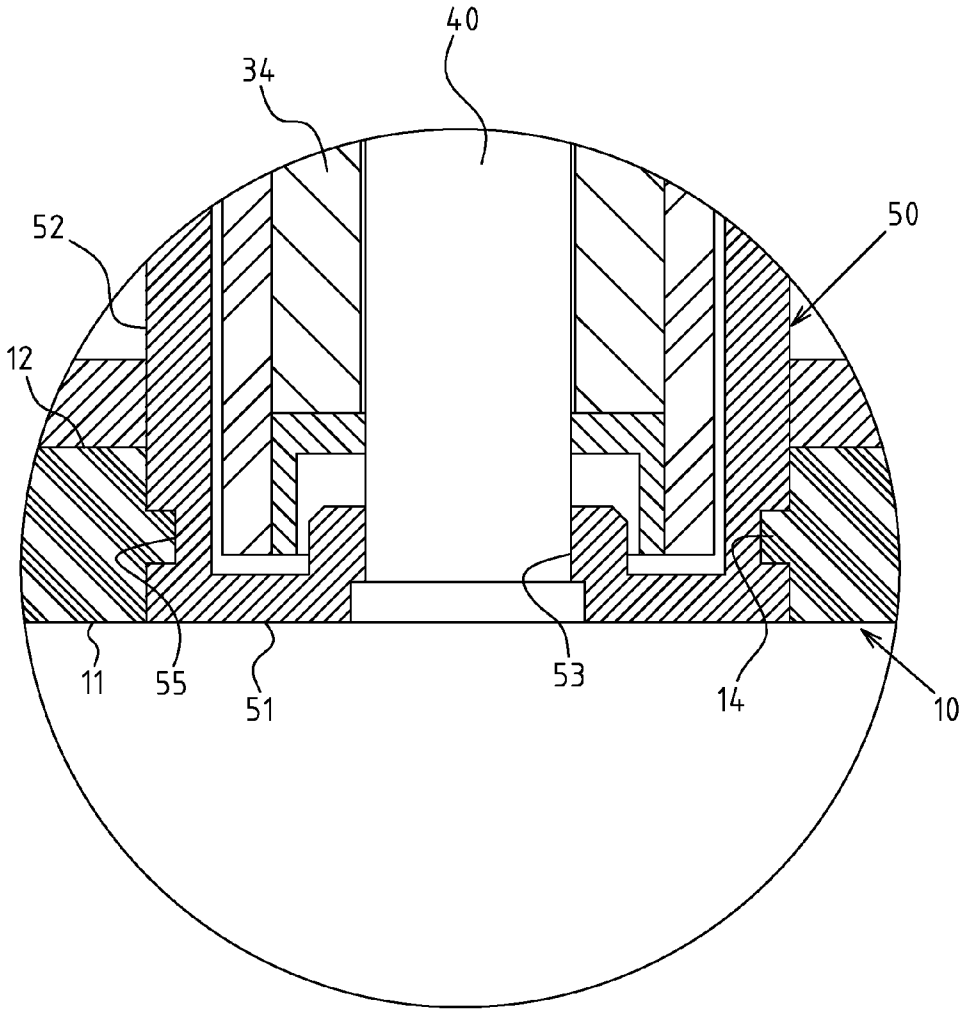

FIG.5

COMBINED AXLE STRUCTURE OF A STATOR ASSEMBLY FOR A RADIATOR FAN

CROSS-REFERENCE TO RELATED U.S. APPLICATIONS

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

NAMES OF PARTIES TO A JOINT RESEARCH AGREEMENT

[0003] Not applicable.

REFERENCE TO AN APPENDIX SUBMITTED ON COMPACT DISC

[0004] Not applicable.

BACKGROUND OF THE INVENTION

[0005] 1. Field of the Invention

[0006] The present invention relates generally to a partial structure of radiator fan, and more particularly to an innovative one which is designed with a combined axle structure of a stator assembly.

[0007] 2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 37 CFR 1.98.

[0008] If the axle of a conventional radiator fan is set laterally onto the hub, there exist some matching errors, such as: the matching error between the axle and rotor hub, or that between the rotor's magnetic ring and stator coil, or that between the axle and stator bearing, or that between the stator bearing and bearing block. Hence, louder noises may occur due to mismatching in manufacturing of the radiator fan.

[0009] For this reason, a reverse radiator fan has been developed in such a manner that the axle of rotor is reversely mated onto the stator pedestal, realizing accurate perpendicularity between the axle and stator pedestal. Yet, the coil assembly of the stator is generally assembled onto the preformed cylinder of the stator pedestal in a single modular form. After completion of assembly, larger matching errors may occur, so the mismatching between the coil assembly and rotor's magnetic ring will lead to unsmooth operation and louder noises.

[0010] Thus, to overcome the aforementioned problems of the prior art, it would be an advancement if the art to provide an improved structure that can significantly improve the efficacy.

[0011] Therefore, the inventor has provided the present invention of practicability after deliberate design and evaluation based on years of experience in the production, development and design of related products.

BRIEF SUMMARY OF THE INVENTION

[0012] The enhanced efficacy of the present invention is as follows:

[0013] Based on the unique design of the present invention wherein the "combined axle structure of stator assembly for radiator fan" allows the reverse axle to be assembled onto said metal bearing block, and the metal bearing block and the pedestal are assembled firmly, the metal bearing block and stator assembly of the present invention could be accurately matched by means of injection molding. Meanwhile, the reverse axle and metal bearing block are combined metalicly with excellent matching accuracy and concentricity, such that the reverse axle and stator assembly can be accurately matched. And, the matching error of the stator assembly and pedestal has no effect on the assembly matching of the stator assembly, axle and rotor blade unit. The combined structure of the radiator fan allows for great improvement of the matching accuracy, guarantees more smooth operation and reduces efficiently the noises with better applicability.

[0014] The improvements brought about by this invention are as follow:

[0015] Based on the structural configuration wherein a locating column is formed onto the insulated frame of the stator assembly, a through-hole is set correspondingly to the pedestal for penetration of the locating column, and a hot-melt expanded end is formed onto the locating column for abutting onto the sustaining face of the pedestal, the stator assembly and the pedestal can be assembled more stably and firmly.

[0016] Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0017] FIG. **1** is an exploded perspective view of the preferred embodiment of the radiator fan of the present invention.

[0018] FIG. **2** is an exploded sectional view of the preferred embodiment of the radiator fan of the present invention.

[0019] FIG. **3** is an assembled sectional view of the preferred embodiment of the radiator fan of the present invention.

[0020] FIG. **4** is an assembled sectional view of another preferred embodiment of the present invention.

[0021] FIG. **5** is an assembled sectional view of other preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0022] FIGS. **1** and **2** depict preferred embodiments of a combined axle structure of radiator fan's stator assembly of the present invention, which, however, are provided for only explanatory objective for patent claims. Said radiator fan A comprises of a pedestal **10**, a stator assembly **20**, a rotor blade unit **30** and a reverse axle **40** (a metal axle). Of which, the pedestal **10** includes a sustaining face **11** and a stator assembly face **12**. A circuit board **13** is set on the stator assembly face **12**. The stator assembly **20** includes silicon-steel sheet **21**, coil **22** and insulated frame **23**. Among which, the insulated frame **23** is mated with a metal bearing block **50**, which is a copper block set like a cup. It includes a bottom wall **51** and a circumferential wall **52**, of which the top of the circumferential wall **52** is positioned into the inner flange of the insulated frame **23**. An axle socket **53** is set at the center of the bottom wall **51**, allowing for insertion of the bottom **41** of the reverse axle **40**. An embedded locator **14** is set centrally into the stator assembly face **12** of the pedestal **10**, allowing for mating with the bottom of the metal bearing block **50**.

[0023] Of which, the embedded locator **14** for the pedestal **10** can have a through-hole or grooved pattern. Referring to

FIGS. **2** and **3**, when the embedded locator **14** is a through-hole, an annular flange **54** is protruded on the bottom of the metal bearing block **50**, such that an expanded ring slot **141** is set correspondingly at the bottom of the through-hole embedded locator **14**, allowing for abutting and embedding of the annular flange **54**. Of which, the annular flange **54** at bottom of the metal bearing block **50** and the embedded locator **14** can be fixed by adhesive. Moreover, the peripheral surface at bottom of the metal bearing block **50** can have a rough surface correspondingly to the embedded locator **14**, thus increasing the inserting fixation.

[0024] Referring to FIG. **4**, a locating column **60** is formed onto the insulated frame **23** of the stator assembly **20** and protruded towards the pedestal **10**, such that a through-hole **15** is set correspondingly to the pedestal **10** for penetration of the locating column **60**. A hot-melt expanded end **61** is formed onto the locating column **60** for abutting onto the sustaining face **11** of the pedestal **10**, so that the stator assembly **20** and pedestal **10** can be assembled more stably.

[0025] Furthermore, the structure of said rotor blade unit **30** is not improved in the present invention, but represented by typical units, which comprise: a hub **31**, several blades **32**, an axle bush **33**, a bearing **34** and a magnetic ring **35** as shown in FIGS. **1** and **2**. Of which, said blades **32** are protruded at interval onto the periphery of the hub **31**, the axle bush **33** is set into the center of the hub **31**, the bearing **34** is assembled into the axle bush **33** for insertion of the reverse axle **40**, and the magnetic ring **35** is set annularly onto the circumferential wall of the hub **31**.

[0026] Based upon above-specified structure, when the stator assembly **20** of the radiator fan A of the present invention is fabricated, the silicon-steel sheet **21**, axle **40** and metal bearing block **50** can be located into an injection molding template, enabling injection coating of the insulated frame **23**. The reverse axle **40** is inserted into the axle socket **53** set at the center of the bottom wall **51** of the metal bearing block **50**, such that the reverse axle **40** is accurately located onto the center of the stator assembly **20**, thus forming a stator assembly **20** of high accuracy. Next, the stator assembly **20** can be accurately assembled onto the pedestal **10** based on the embedded matching of the metal bearing block **50** and the embedded locator **14** set at the center of the stator assembly face **12** of the pedestal **10**.

[0027] Referring also to FIG. **5**, a ring groove **55** or spacing groove is set at bottom of the metal bearing block **50**, such that the pedestal **10** made of plastics can be firmly mated with the ring groove **55** or spacing groove at bottom of the metal bearing block **50** by means of injection coating.

1. A combined axle structure of a stator assembly for a radiator fan, of which the radiator fan comprises: a pedestal, a stator assembly, a rotor blade unit and a reverse axle; the pedestal includes a sustaining face and a stator assembly face; a circuit board is set on the stator assembly face; the stator assembly includes silicon-steel sheet, coil and insulated frame; among which, the insulated frame is mated with a metal bearing block, which is formed like a cup, and includes a bottom wall and a circumferential wall; of which the top of the circumferential wall is positioned into the insulated frame; an axle socket is set at the center of the bottom wall, allowing for insertion of the bottom of the reverse axle; an embedded locator is set centrally into the stator assembly face of the pedestal, allowing for mating with the bottom of the metal bearing block.

2. The structure defined in claim **1**, wherein the embedded locator for the pedestal is a through-hole or a grooved pattern; when the embedded locator is a through-hole, an annular flange is protruded on the bottom of the metal bearing block, such that an expanded ring slot is set correspondingly at the bottom of the through-hole embedded locator, allowing for abutting and embedding of the annular flange.

3. The structure defined in claim **2**, wherein the annular flange at bottom of the metal bearing block and the embedded locator can be fixed by adhesive.

4. The structure defined in claim **1**, wherein the peripheral surface at bottom of the metal bearing block can be a rough surface correspondingly to the embedded locator.

5. The structure defined in claim **1**, wherein a ring groove or spacing groove is set at bottom of the metal bearing block, such that the pedestal made of plastics can be firmly mated with the ring groove or spacing groove at bottom of the metal bearing block by means of injection coating.

6. The structure defined in claim **1**, wherein a locating column is formed onto the insulated frame of the stator assembly and protruded towards the pedestal, such that a through-hole is set correspondingly to the pedestal for penetration of the locating column; and a hot-melt expanded end is formed onto the locating column for abutting onto the sustaining face of the pedestal.

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