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(54) Marine propeller with an adjustable exhaust configuration

(57) A marine propeller (10) with an adjustable exhaust structure is disclosed. Each adjustable exhaust device (30) of the adjustable exhaust structure includes an exhaust hole unit (40) with exhaust through holes (46) cut through the outer surface (226) and inner surface (228) of the propeller hub (22) of the marine propeller (10), an adjustment member (50) with shielding portions (548) mounted in the exhaust hole unit (40), and a fastening member (60) for securing the adjustment member (50) in position. The adjustment member (50) is movable to adjust the shielding area of the shielding portions (548) relative to the exhaust through holes (46) when disengaged from the constraint of the fastening member (60). Thus, the exhaust volume is adjustable to fit different conditions without changing any component parts of the marine propeller (10), facilitating ease of use of the marine propeller (10).

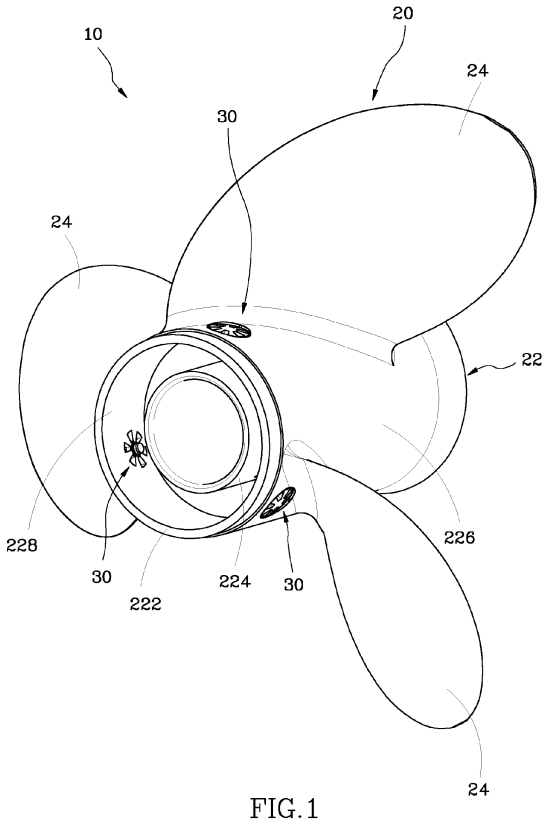

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to marine propellers and more particularly, to a marine propeller with an adjustable exhaust structure for allowing adjustment of exhaust volume.

2. Description of the Related Art

[0002] US 5916003 discloses a propeller device, which comprises a propeller body with a propeller hub having 4 propeller blades extending therefrom and an aperture on each propeller blade, and a plug having a diametric profile shaped to be received and retained within each aperture. The vent plugs are provided with openings therethrough so that fluids can flow from a passage within a hub of the propeller device to a region proximate the outer cylindrical surface of the hub. The plugs can be changed to modify the size of the ventilation aperture without having to change the propeller device itself.

[0003] The propeller device is driven by an engine to move the propeller blades through water, achieving propeller thrust and forcing the boat to move forwards. At the same time, waste engine gas enters the passage of the propeller hub. At this time, a part of waste engine gas is exhausted through the ventilation aperture. Thus, the ventilation apertures of the plugs assist lowering the internal air pressure of the passage of the propeller hub, reducing water pressure from the propeller blades and enhancing propelling speed of the propeller blades.

[0004] However, under different application conditions, such as water level, load, temperatures, and etc., the user must selectively use different sizes of plugs having different dimensions of ventilation apertures, or plugs without any ventilation aperture to adjust the exhaust volume of the propeller device to an optimal condition for better propeller performance.

[0005] On other words, the user must prepare many different plugs having different dimensions of ventilation apertures. Preparing a large number of plugs relatively increases the cost. Further, the plugs may be missed easily when not in use. Therefore, the aforesaid prior art design of propeller device is not convenient to use.

SUMMARY OF THE INVENTION

[0006] The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a marine propeller, which allows convenient adjustment of the exhaust volume without changing any component parts, facilitating ease of use.

[0007] To achieve this and other objects of the present invention, a marine propeller comprises a propeller body. The propeller body comprises a propeller hub and a plurality of propeller blades. The propeller hub comprises an outer surface and an inner surface. The propeller blades are extended outwardly from the outer surface of the propeller hub. The marine propeller further comprises at least one adjustable exhaust device. Each adjustable exhaust device comprises an exhaust hole unit cut through the outer surface and inner surface of the propeller hub, an adjustment member mounted in the exhaust hole unit, and fastening means for securing the adjustment member to the exhaust hole unit in position. The exhaust hole unit comprises at least one exhaust through hole. The adjustment member comprises at least one shielding portion for shielding the at least one exhaust through hole. Further, before the adjustment member is secured in position by the fastening means, the adjustment member is movable relative to the exhaust hole unit to adjust the shielding area of the at least one shielding portion relative to the at least one exhaust through hole.

[0008] Thus, under different application conditions, the user can adjust the exhaust volume to the optimal status without changing any component parts of the marine propeller, enabling the marine propeller to provide a proper speed. Thus, the marine propeller is very convenient to use.

[0009] Other advantages and features of the present invention will be fully understood by reference to the following specification in conjunction with the accompanying drawings, in which like reference signs denote like components of structure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 is an elevational view of a marine propeller with an adjustable exhaust structure in accordance with a first embodiment of the present invention.

FIG. 2 is an exploded view of the marine propeller with an adjustable exhaust structure in accordance with the first embodiment of the present invention.

FIG. 3 is a side view of the first embodiment of the present invention, illustrating one exhaust hole unit in the propeller body of the marine propeller.

FIG. 4 is an enlarged view of a part of FIG. 3, illustrating one adjustment member installed in the exhaust hole unit.

FIG. 5 is an end view of the adjustment member shown in FIG. 4.

FIG. 6 is a side view of the adjustment member shown in FIG. 4.

FIG. 7 is a sectional view of e marine propeller with an adjustable exhaust structure in accordance with the first embodiment of the present invention.

FIG. 8 is similar to FIG. 4 but showing the angular position of the adjustment member adjusted relative to the exhaust hole unit.

FIG. 9 is similar to FIG. 4 but showing the angular position of the adjustment member adjusted relative to the exhaust hole unit.

FIG. 10 is a side view of a marine propeller with an adjustable exhaust structure in accordance with a second embodiment of the present invention, illustrating one exhaust hole unit in a propeller body.

FIG. 11 is a sectional view of the marine propeller with an adjustable exhaust structure in accordance with the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0011] Referring to FIGS. 1-3, a marine propeller in accordance with a first embodiment of the present invention is shown. The marine propeller **10** comprises a propeller body **20,** three adjustable exhaust devices **30.** Each adjustable exhaust device **30** comprises, installed in the propeller body **20,** an exhaust hole unit **40,** an adjustment member **50,** and a fastening member **60.**

[0012] The propeller body **20** comprises a propeller hub **22,** and three propeller blades **24.** The propeller hub **22** comprises an outer tube **222** and an inner tube **224** integrally formed of multiple rib plates (not shown), and an outer surface **226** and an inner surface **228** located on the outer tube **222.** The propeller blades **24** are outwardly extended from the outer surface **226** of the propeller hub **22.** The adjustable exhaust devices **30** are respectively disposed between each two adjacent propeller blades **24.**

[0013] Referring to FIG. 4 and FIGS. 2 and 3 again, each exhaust hole unit **40** comprises a recess **42,** an axle hole **44,** and six exhaust through holes **46.** The recess **42** is located on the outer surface **226** comprises a bottom wall **422,** an inner peripheral wall **424,** and two blocks **426** protruded from the inner peripheral wall **424.** The axle hole **44** and the exhaust through holes **46** extend through the bottom wall **422** of the recess **42** and the inner surface **228** of the propeller hub **22.** Further, the exhaust through holes **46** are spaced around the axle hole **44.**

[0014] Referring to FIGS. 5 and 6, each adjustment member **50** comprises a shaft **52,** and an adjustment wheel **54** formed integral with one end of the shaft **52.** The shaft **52** comprises a groove **522** extending around the periphery thereof. The adjustment wheel **54** is shaped like a gearwheel, comprising a circular peripheral wall **542,** and a plurality of notches **544** arranged around a circle, i.e., equiangularly spaced around the circular peripheral wall **542.** The adjustment wheel **54** further comprises six through holes **546** cut through the opposing top and bottom sides thereof and spaced around the shaft **52,** and a shielding portion **548** between each two adjacent through holes **546.**

[0015] Referring to FIG. 7 and FIGS. 2 and 4 again, in each adjustable exhaust device **30,** the shaft **52** of the adjustment member **50** is inserted into the axle hole **44** of the exhaust hole unit **40,** the adjustment wheel **54** of the adjustment member **50** is set in the recess **42** of the exhaust hole unit **40,** and the two blocks **426** of the recess **42** are respectively engaged into one respective notch **544** of the adjustment wheel **54.** The fastening member **60** is a C-shaped retaining ring mounted in the groove **522** of the shaft **52** of the adjustment member **50** to secure the adjustment member **50** to the exhaust hole unit **40.** The user can detach the fastening member **60,** and then remove the adjustment wheel **54** of the adjustment member **50** out of the recess **42,** and then rotate the adjustment member **50** to the desired angle, and then set the adjustment wheel **54** of the adjustment member **50** in the recess **42** again, and thus the shielding portions **548** of the adjustment wheel **54** of the adjustment member **50** are moved relative to the exhaust through holes **46** to change their shielding area relative to the exhaust through holes **46** and to further adjust the exhaust volume of the marine propeller **10.**

[0016] For example, in the configuration shown in FIG. 8, the shielding portions **548** of the adjustment wheel **54** of the adjustment member **50** are moved away from the exhaust through holes **46** of the exhaust hole unit **40** and the exhaust through holes **46** of the exhaust hole unit **40** are fully opened. At this time, the exhaust volume of the marine propeller **10** reaches the maximum level. In the configuration shown in FIG. 9, the exhaust through holes **46** of the exhaust hole unit **40** are fully shielded by the shielding portions **548** of the adjustment wheel **54** of the adjustment member **50,** and the internal gas of the propeller hub **22** cannot be exhausted. At this time, the exhaust volume of the marine propeller **10** reaches the minimum level. Further, the shielding portions **548** of the adjustment wheel **54** of the adjustment member **50** can be moved to a position to partially shield the exhaust through holes **46** of the exhaust hole unit **40,** as shown in FIG. 4. Subject to the aforesaid operation of rotating the adjustment member **50** relative to the exhaust hole unit **40,** the shielded area of the exhaust through holes **46** of the exhaust hole unit **40** is relatively adjusted.

[0017] In other words, under different application conditions, the user can adjust the exhaust volume to the optimal status without changing any component parts of the marine propeller **10,** enabling the marine propeller **10** to provide a proper speed. Thus, the marine propeller **10** is very convenient to use.

[0018] It is to be noted that in each of the aforesaid adjustable exhaust devices **30,** the fastening member **60** is not limited to C-shaped retaining ring, and any of a variety of other fastening means capable of prohibiting the adjustment member **50** from escaping out of the exhaust hole unit **40** and allowing movement of the shielding portions **548** of the adjustment wheel **54** of the adjustment member **50** relative to the exhaust through holes **46** of the exhaust hole unit **40** before fixation can be used as a substitute. Further, the number and locations of the blocks **426** of the recess **42** of each exhaust hole unit **40** may be changed without departing from the spirit and

scope of the invention. One single block **426** can also achieve the same effect of securing the adjustment member **50** in position.

[0019] In the aforesaid first embodiment, the relative positioning between the exhaust hole unit **40** and the respective adjustment member **50** and quantitative adjustment of the relative angle therebetween are achieved by means of selectively engaging the relative smaller number of the blocks **426** of the exhaust hole unit **40** into the relatively larger number of the notches **544** of the adjustment member **50.** Alternatively, the adjustment member **50** can be made having a relatively smaller number of blocks for selectively engaging a larger number of notches in the exhaust hole unit **40.** Further, it is not a limitation to arrange the notches around a circle.

[0020] Further, the number and arrangement of the exhaust through holes **46** of the exhaust hole unit **40** and the number and arrangement of the through holes **546** and shielding portions **548** of each adjustment member **50** are not limited to the aforesaid design. Actually, each adjustable exhaust device **30** can be made having at least one set of exhaust through holes **46,** through holes **546** and shielding portions **548** to achieve the same effects.

[0021] Further, the marine propeller **10** can be made having at least one adjustable exhaust device **30** to achieve the aforesaid exhaust volume adjustment effect. However, arranging one adjustable exhaust device **30** between each two adjacent propeller blades **24** can balance the resistance of the propeller blades **24,** facilitating smooth operation of the marine propeller **10.**

[0022] In the aforesaid first embodiment, the recess **42,** axle hole **44** and exhaust through holes **46** of the exhaust hole unit **40** are located on the propeller body **20,** however, this arrangement is not a limitation. In a second embodiment of the present invention as shown in FIGS. 10 and 11, the exhaust hole unit **70** of the marine propeller comprises a through hole **72** extending through the outer surface **226** and inner surface **228** of the propeller hub **22** of the propeller body **20,** and a plug **74** fixedly mounted in the through hole **72.** The plug **72** defines an axle hole **742,** and a plurality of exhaust through holes **744.** Thus, this exhaust hole unit **70** achieves the same effects as the exhaust hole unit **40** of the aforesaid first embodiment.

[0023] Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A marine propeller (10) comprising a propeller body (20), being **characterized in that** said propeller body (20) comprising a propeller hub (22) and a plurality of propeller blades (24), said propeller hub (22) comprises an outer surface (226) and an inner surface (228), said propeller blades (24) being extended outwardly from said outer surface (226) of said propeller hub (22), wherein said marine propeller (10) further comprises at least one adjustable exhaust device (30), each said adjustable exhaust device (30) comprising an exhaust hole unit (40) cut through said outer surface (226) and said inner surface (228) of said propeller hub (22), an adjustment member (50) mounted in said exhaust hole unit (40), and fastening means (60) for securing said adjustment member (50) to said exhaust hole unit (40) in position, said exhaust hole unit (40) comprising at least one exhaust through hole (46), said adjustment member (50) comprising at least one shielding portion (548) for shielding said at least one exhaust through hole (46), said adjustment member (50) being movable relative to said exhaust hole unit (40) to adjust the shielding area of said at least one shielding portion (548) relative to said at least one exhaust through hole (46) before being secured in position by said fastening means (60).

2. The marine propeller (10) as claimed in claim 1, being **characterized in that** said fastening means (60) is a fastening member detachably mounted at said adjustment member (50), said at least one shielding portion (548) of said adjustment member (50) being movable relative to said at least one exhaust through hole (46) after detachment of said fastening member (60) from said adjustment member (50).

3. The marine propeller (10) as claimed in claim 2, being **characterized in that** said adjustment member (50) is rotatable relative to said propeller hub (22) to adjust the shielding area of said at least one shielding portion (548) relative to said at least one exhaust through hole (46).

4. The marine propeller (10) as claimed in claim 3, being **characterized in that** said exhaust hole unit (40) further comprises an axle hole (44); said adjustment member (50) comprises a shaft (52) inserted into said axle hole (44) and rotatable relative to said propeller hub (10) after detachment of said fastening member (60) from said adjustment member (50), and an adjustment disc formed integral with said shaft (52), said adjustment disc comprising at least one through hole (72) and said at least one shielding portion (548), said at least one through hole (72) being kept in communication with said at least one exhaust through hole (46).

5. The marine propeller (10) as claimed in claim 4, being **characterized in that** said exhaust hole unit (40) further comprises a recess (42) located on said outer surface (226) of said propeller hub (22), said recess (42) defining therein a bottom wall; said axle hole

(742) and said at least one exhaust through hole (46) extend through said bottom wall of said recess (42) and said inner surface (228) of said propeller body (10); said adjustment disc is set in said recess (42).

6. The marine propeller (10) as claimed in claim 5, being **characterized in that** one of said exhaust hole unit (40) and said adjustment member (50) comprises a plurality of notches (544), and the other of said exhaust hole unit (40) and said adjustment member (50) comprises at least one block (426) selectively engaged into said notches (544).

7. The marine propeller (10) as claimed in claim 6, being **characterized in that** said recess (42) of said exhaust hole unit (40) further comprises an inner peripheral wall (424); said at least one block (426) is extended from said inner peripheral wall (424); said adjustment disc of said adjustment member (50) comprises a peripheral wall; said notches (544) are located on the peripheral wall of said adjustment disc of said adjustment member (50).

8. The marine propeller (10) as claimed in claim 7, being **characterized in that** said exhaust hole unit (40) comprises two blocks (426) disposed at two opposing sides; said notches (544) of said adjustment member (50) are equiangularly spaced around a circle.

9. The marine propeller (10) as claimed in claim 4, being **characterized in that** said exhaust hole unit (40) comprises a plurality of exhaust through holes (46) spaced around said axle hole (44); said adjustment disc of said adjustment member (50) comprises a plurality of through holes (72) spaced around said shaft (52) and respectively kept in communication with said exhaust through holes (46) of said exhaust hole unit (40), and one said shielding portion (548) disposed between each two adjacent said through holes (72).

10. The marine propeller (10) as claimed in claim 4, being **characterized in that** said shaft (52) of said adjustment member (50) comprises a groove (522) extending around the periphery thereof; said fastening means (60) is a C-shaped retaining ring mounted in said groove (522) of said shaft (52).

11. The marine propeller (10) as claimed in claim 1, being **characterized in that** said exhaust hole unit (40) further comprises a recess (42) located on said outer surface (226) of said propeller hub (22); said adjustment member (50) is set in said recess (42).

12. The marine propeller (10) as claimed in claim 1, being **characterized in that** said at least one adjustable exhaust device (30) is arranged in such a manner that one said adjustable exhaust device (30) is disposed between each two adjacent said propeller blades (24).

13. A marine propeller (10) being **characterized in that** the marine propeller (10) further comprises a propeller body (20), said propeller body (20) comprising a propeller hub (22) and a plurality of propeller blades (24), said propeller hub (22) comprising an outer surface (226) and an inner surface (228), said propeller blades (24) being extended outwardly from said outer surface (226) of said propeller hub (22), wherein said marine propeller (10) further comprises at least one adjustable exhaust device (30), each said adjustable exhaust device (30) comprising an exhaust hole unit (40), an adjustment member (50) mounted in said exhaust hole unit (40), and fastening means (60) for securing said adjustment member (50) to said exhaust hole unit (40) in position, said exhaust hole unit (40) comprising a through hole (72) extending through said outer surface (226) and said inner surface (228) of said propeller hub (22) and a plug (74) fixedly mounted in said through hole (72), said plug (74) comprising at least one exhaust through hole (46), said adjustment member (50) comprising at least one shielding portion (548) for shielding said at least one exhaust through hole (46), said at least one shielding portion (548) being movable relative to said at least one exhaust through hole (46) to adjust the shielding area of said at least one shielding portion (548) relative to said at least one exhaust through hole (46) before being secured in position by said fastening means (60).

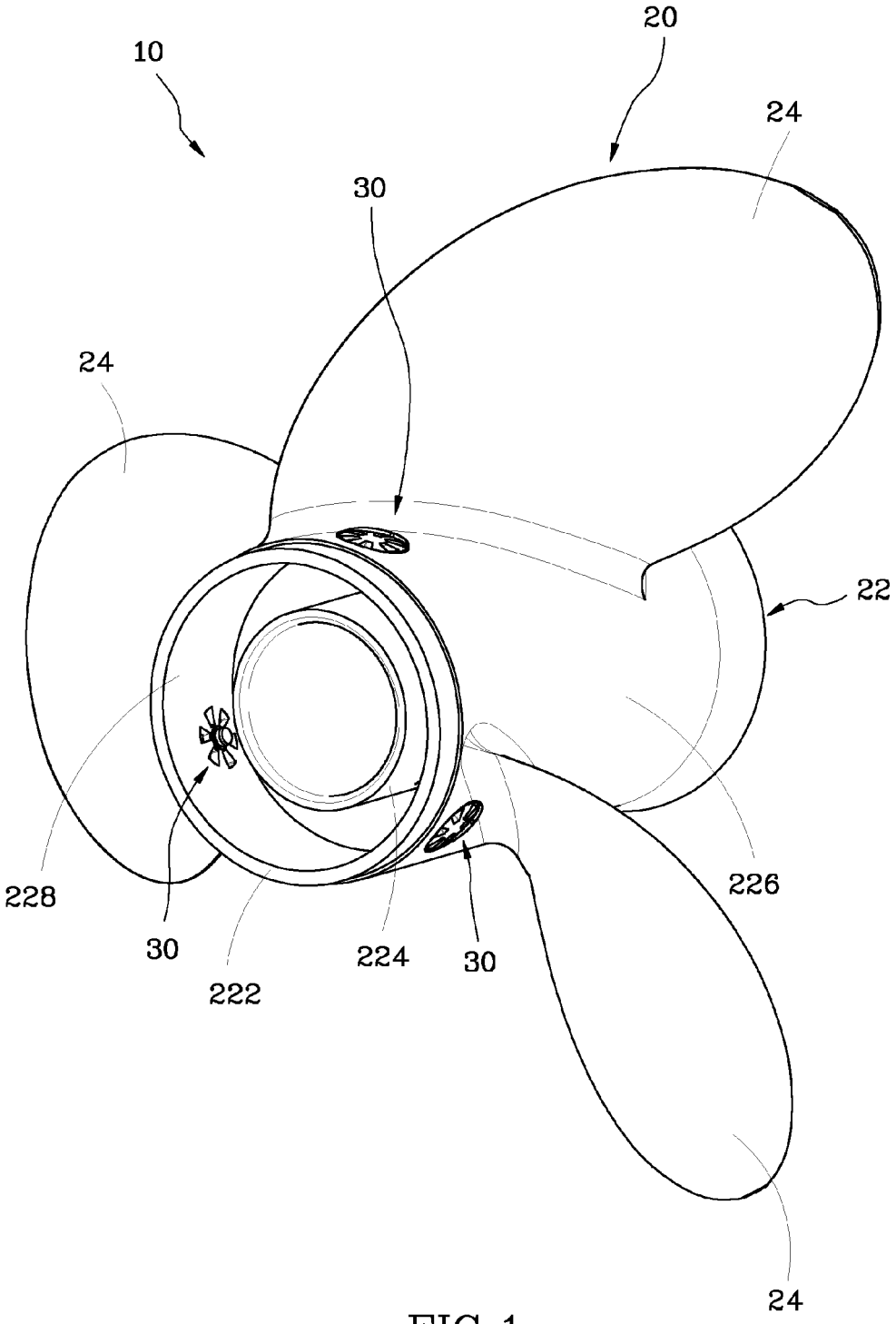

FIG.1

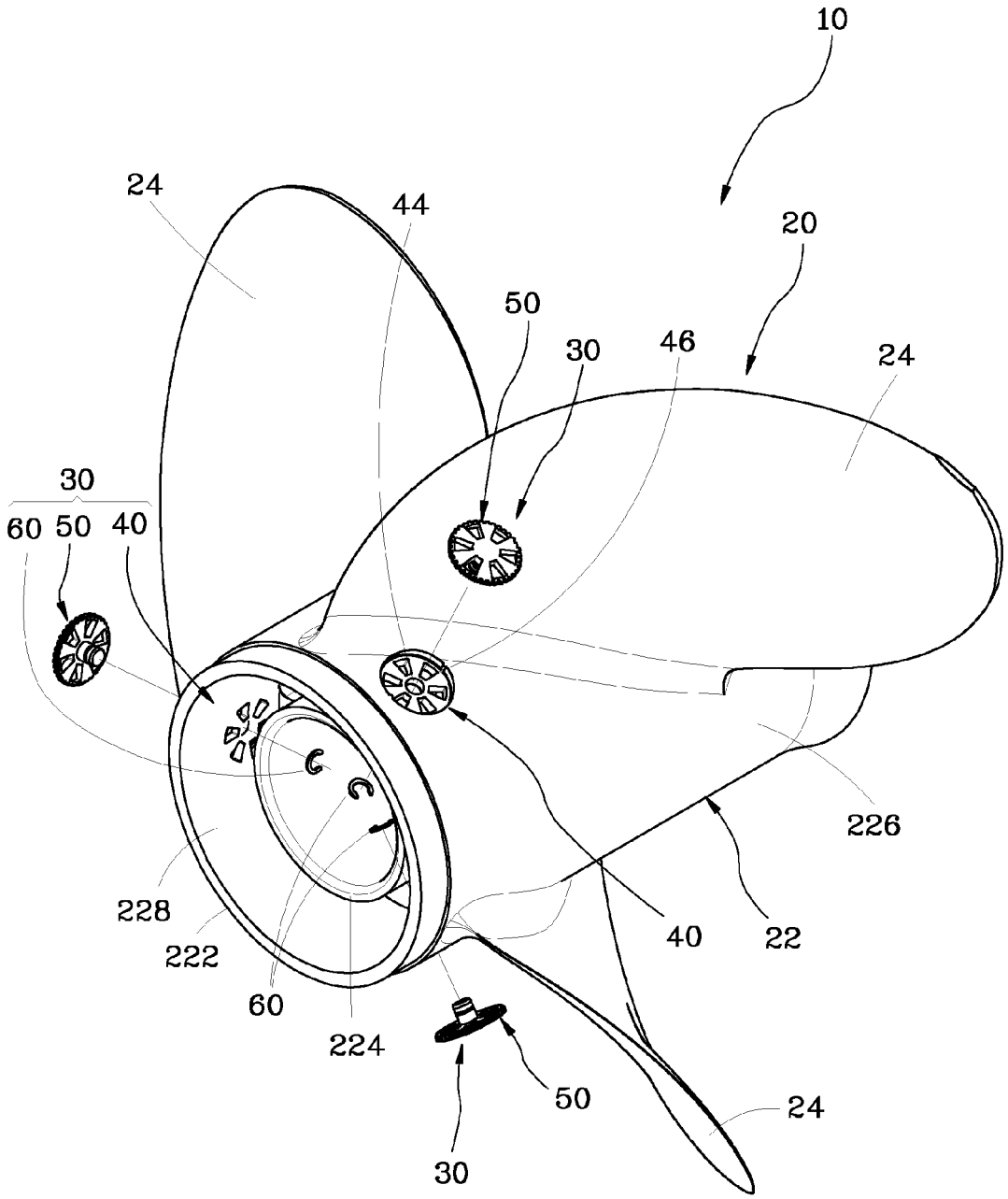

FIG. 2

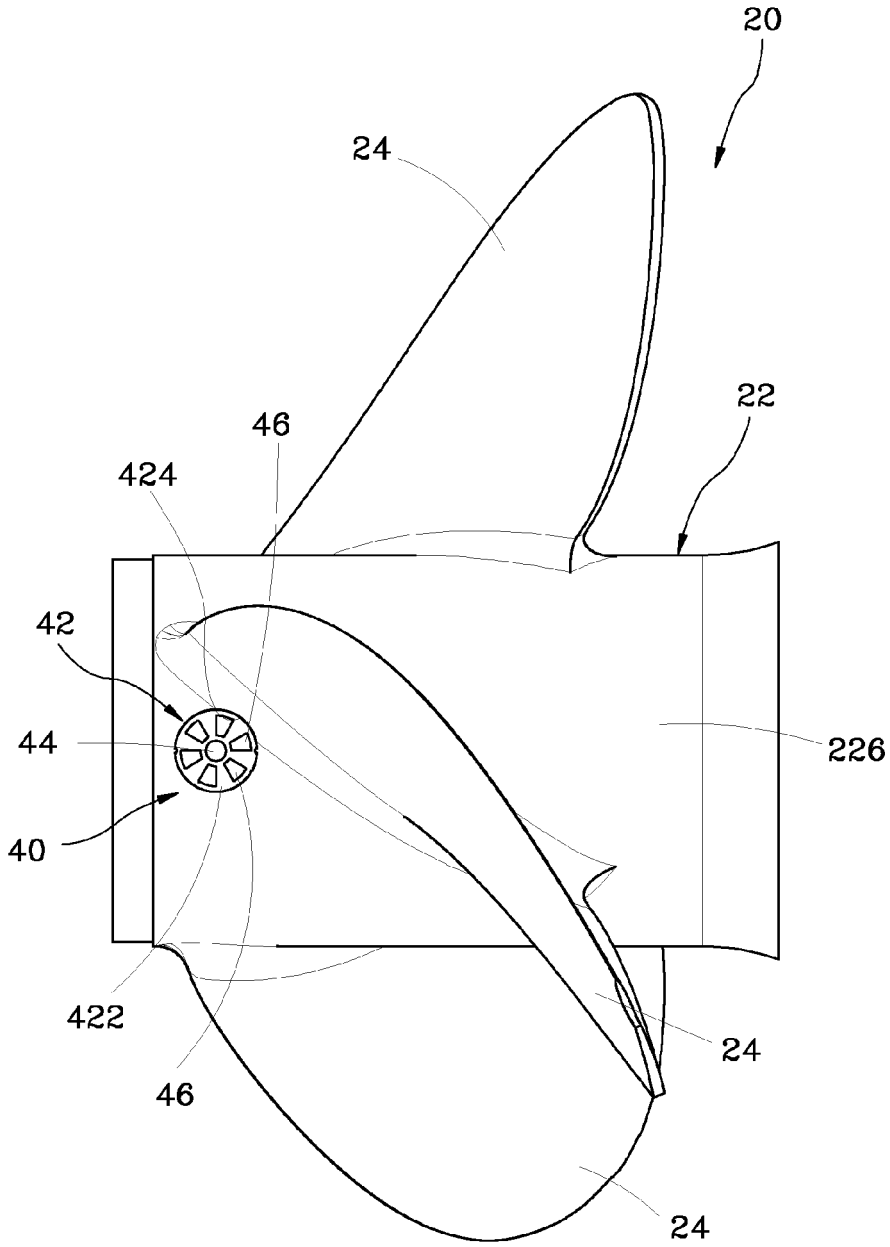

FIG. 3

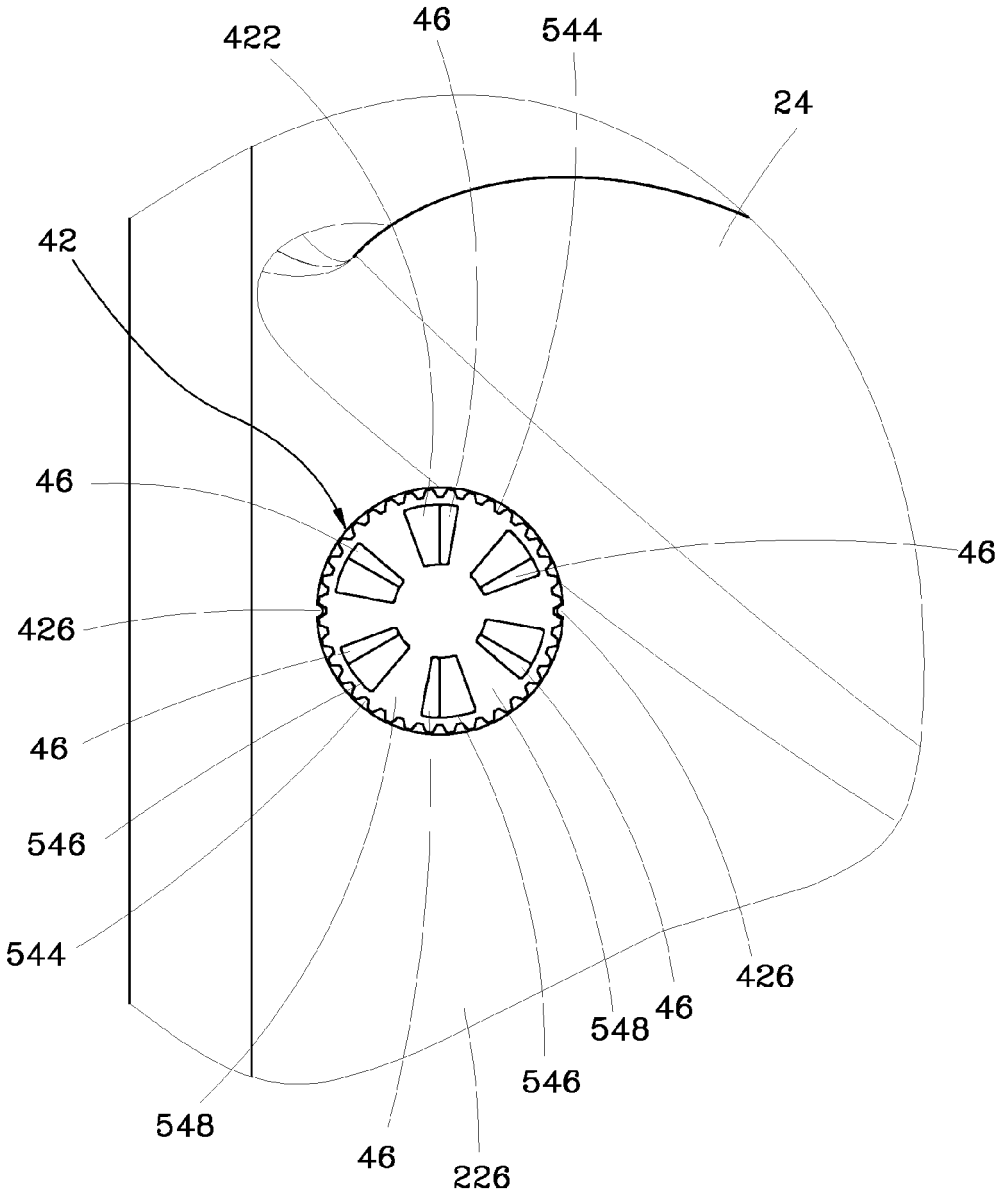

FIG. 4

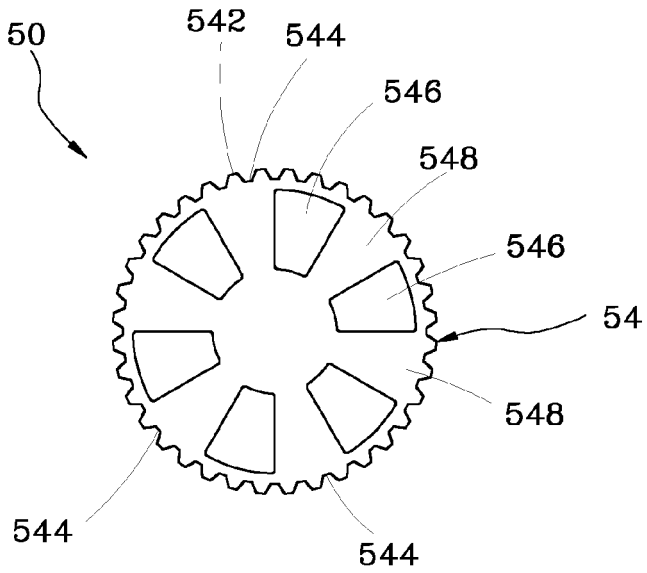

FIG. 5

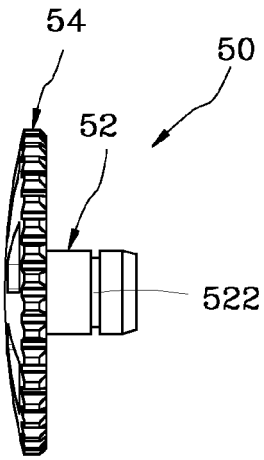

FIG. 6

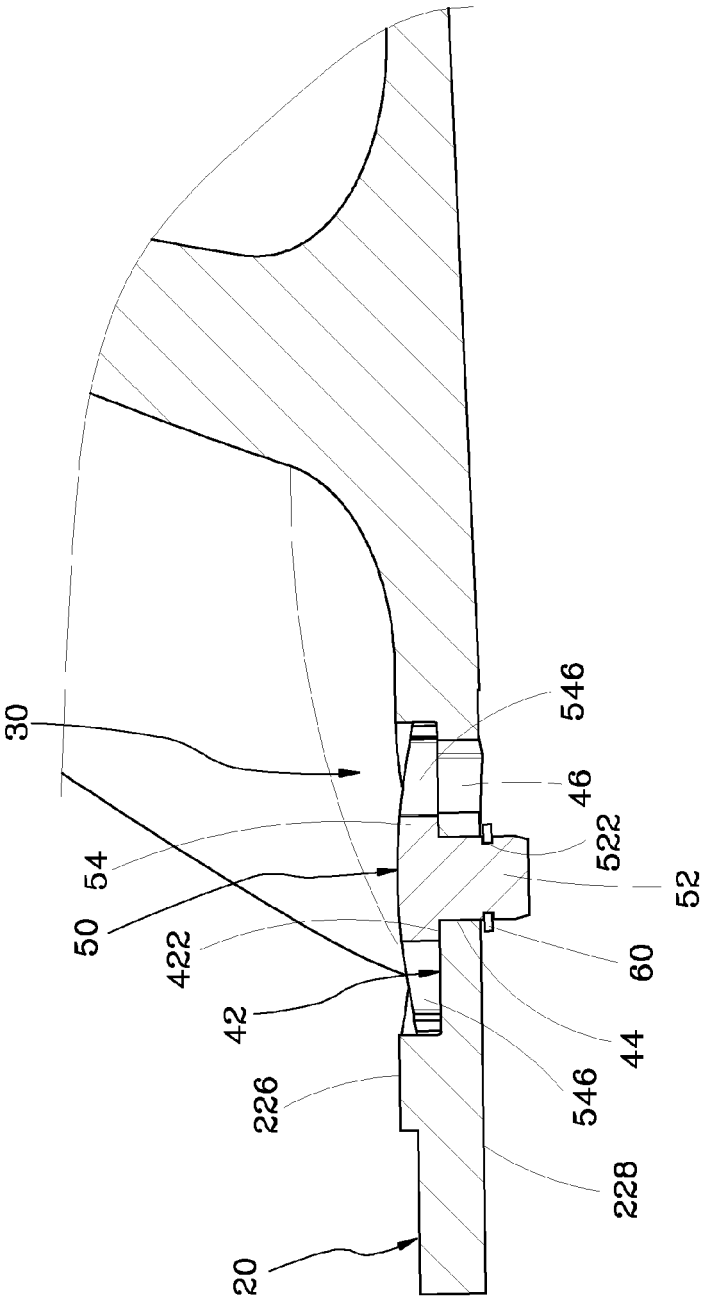

FIG. 7

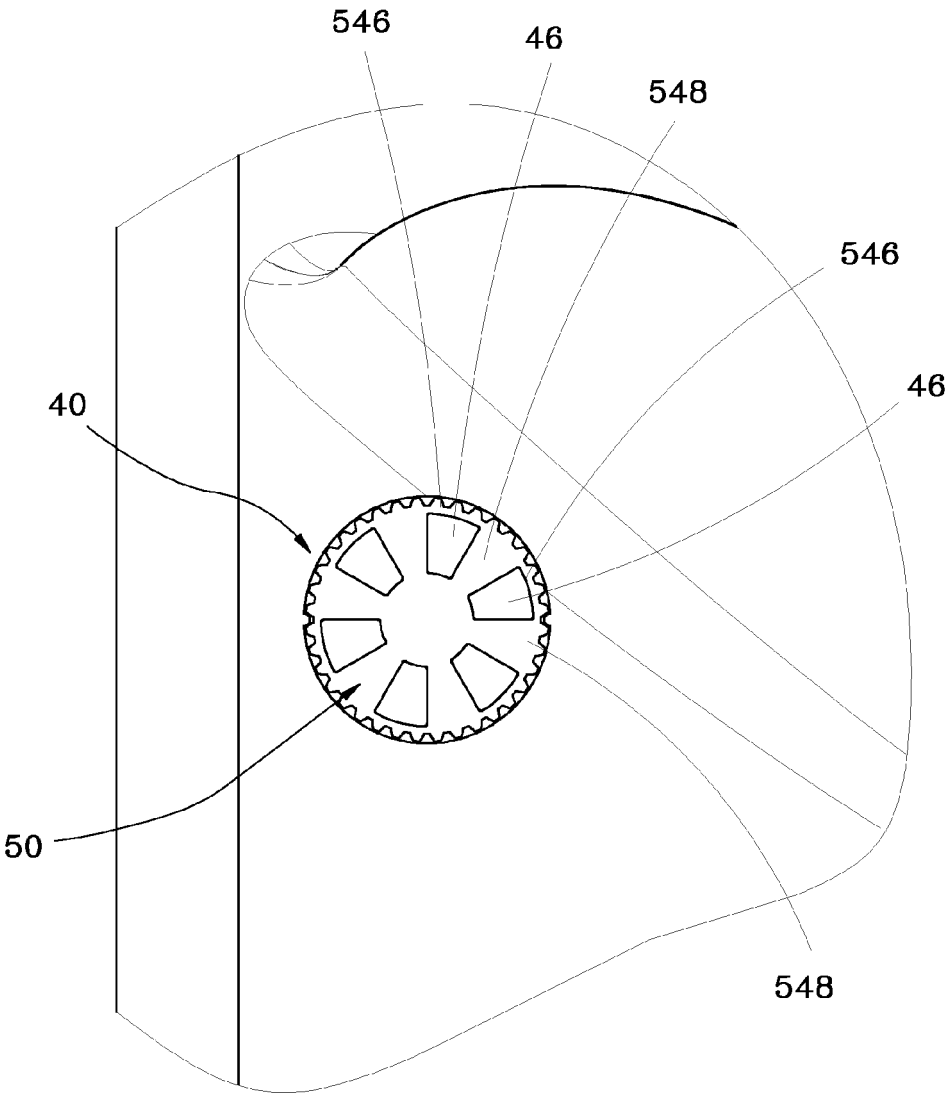

FIG. 8

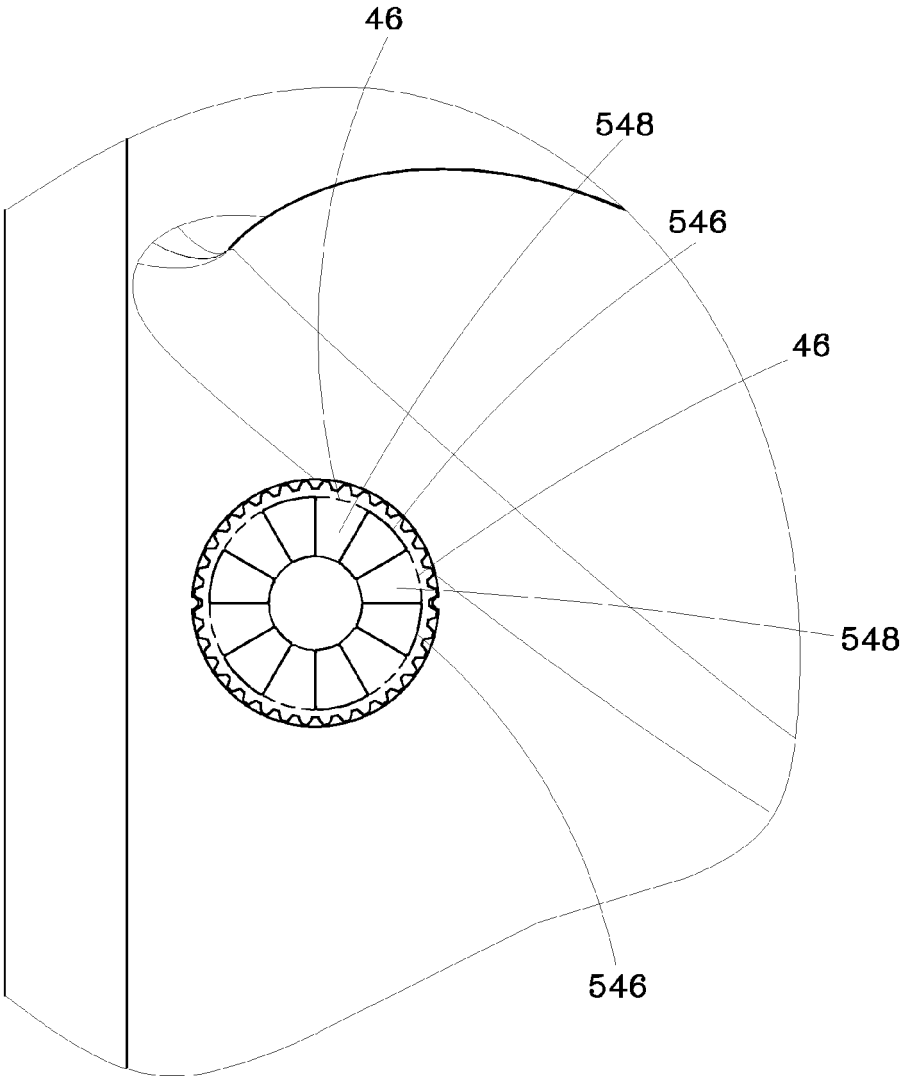

FIG. 9

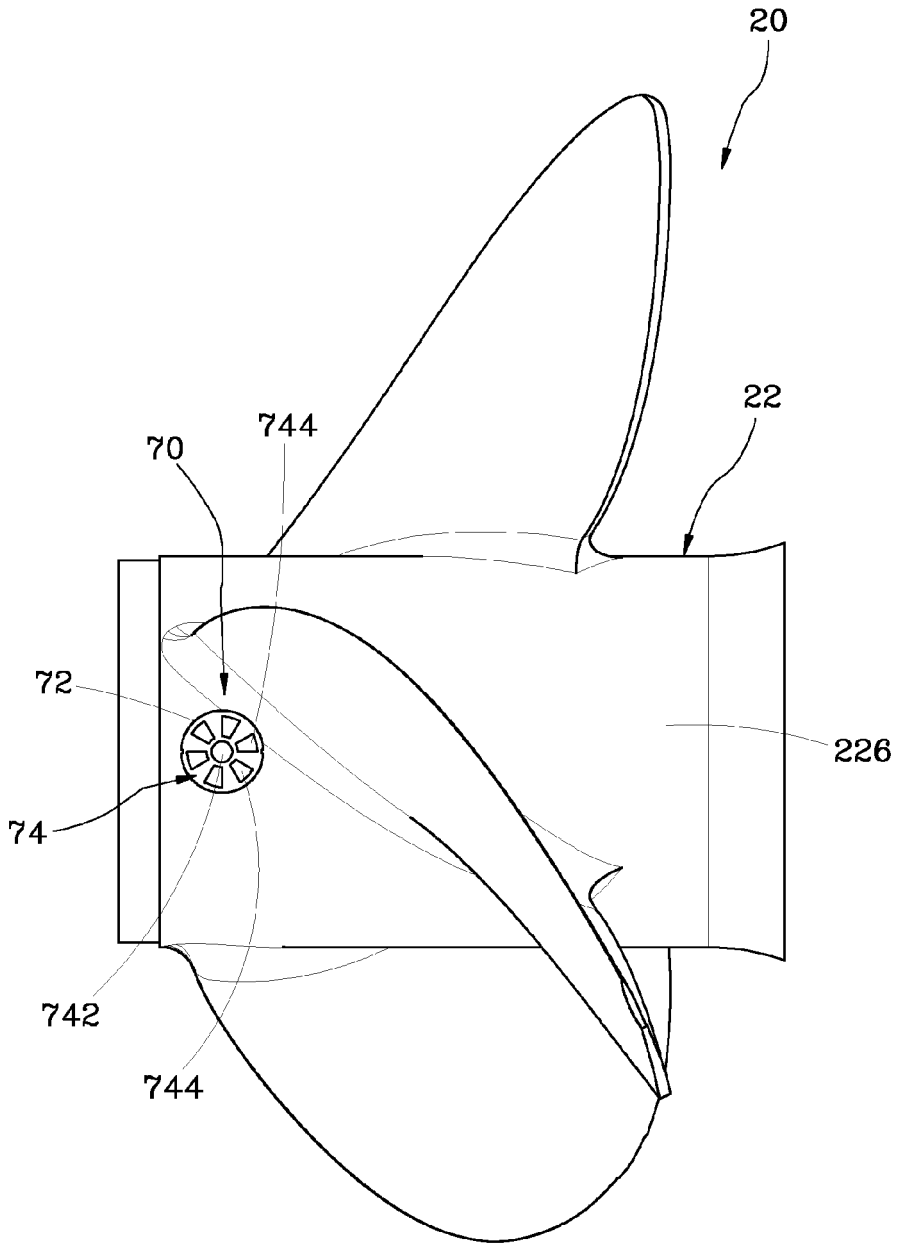

FIG.10

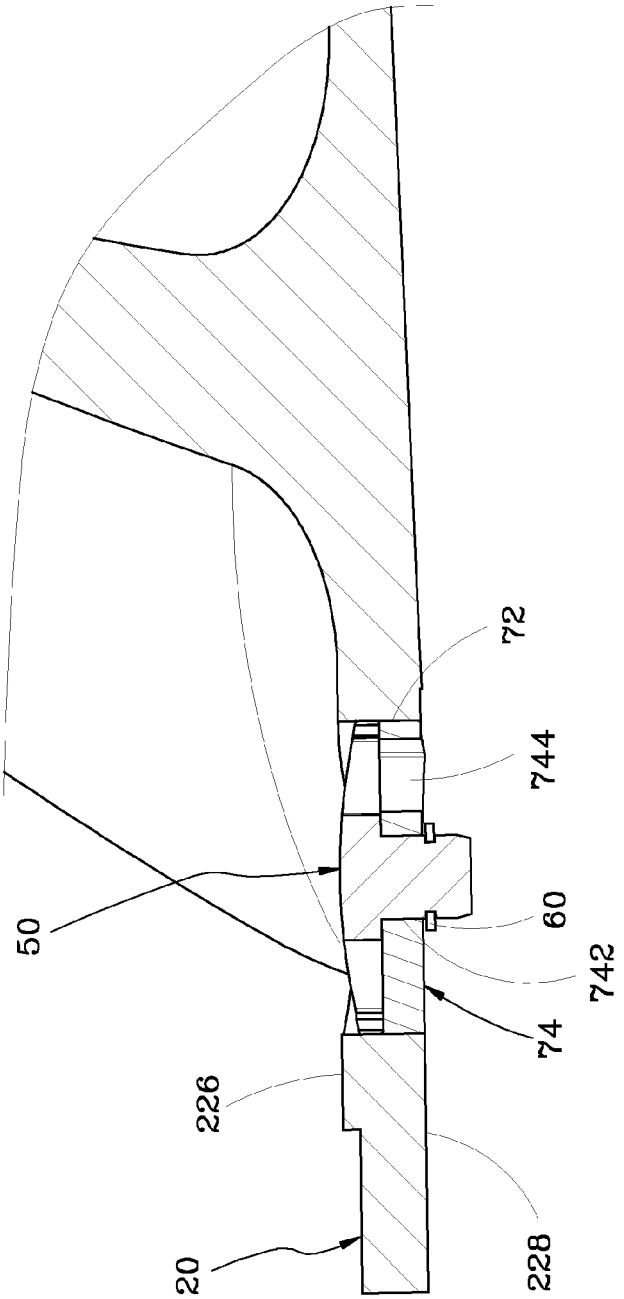

FIG.11

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EUROPEAN SEARCH REPORT

Application Number
EP 12 17 5523

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 375 528 B1 (NEISEN GERALD F [US]) 23 April 2002 (2002-04-23) * column 4, lines 18-64; figures 4,5 *	1-13	INV. B63H20/26 B63H21/32
X	US 7 762 772 B1 (ALBY JEREMY L [US] ET AL) 27 July 2010 (2010-07-27) * column 3, line 46 - column 5, line 40; figures 1-6 *	1,12,13	

TECHNICAL FIELDS SEARCHED (IPC)

B63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 October 2013	Brumer, Alexandre

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 17 5523

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11-10-2013

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 7762772 B1	27-07-2010	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5916003 A **[0002]**