

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
31 December 2008 (31.12.2008)

PCT

(10) International Publication Number
WO 2009/000109 A1

(51) International Patent Classification:
B05B 1/14 (2006.01) **A47K 3/28** (2006.01)

(21) International Application Number:
PCT/CN2007/002008

(22) International Filing Date: 27 June 2007 (27.06.2007)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(54) Title: SHOWER HEAD WITH LIGHT EMITTING MEANS

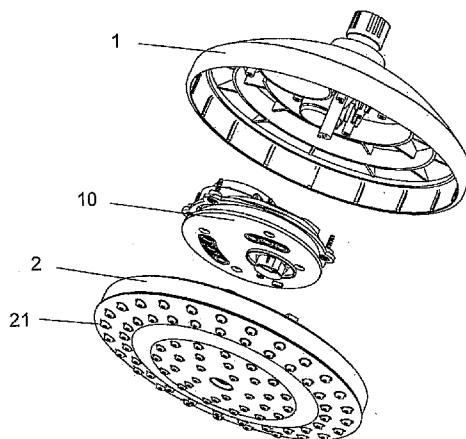


Fig. 2

(57) Abstract: A shower head with a light emitting means (3) comprises a shower head body having a rear portion (1) adapted to be connected to a water supply and a front portion (2) with a perforated member (21) adapted to discharge water in the form of a spray, a power source and a light emitting means. The light emitting means is powered by the power source which comprises a water turbine (4) with blades (41) driven by force of water passing through, an electrical generator (5) for converting mechanical energy into electrical energy, a cluster of gears for transmission of motion from the water turbine to the electrical generator and a printed circuit board (9) which transforms alternating current into direct current.

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SHOWER HEAD WITH LIGHT EMITTING MEANS

Technical Field

The present invention relates to shower fixtures and more particularly
5 pertains to a shower head with a light emitting means.

Background Art

Some shower heads available in the marketplace can generate color
lights so that the user can have visual enjoyment during showering. To generate
color lights, a light emitting means is disposed inside or outside the shower
10 head. The power source which provides electricity to the light emitting means
can be batteries or commercial power for homes. If batteries are used, they
have to be replaced after consumption which is inconvenient. If commercial
power for homes is used, accidents like leakage of electricity may occur which
is dangerous. Moreover, the light emitting means requires extra electricity, and
15 this is obviously not cost-effective.

Disclosure of the Invention

In view of the aforesaid disadvantages now present in the prior art, the
object of the present invention is to provide a shower head with a light emitting
means which is powered by a hydroelectric generator disposed in the shower
20 head to avoid extra requirement of electricity, leakage of electricity and
replacement of power source while at the same time to provide visual
enjoyment and/or indications to the user during showering. The present
invention is convenient to use, cost-effective, safe and reliable.

To attain this, the present invention generally comprises a shower head
25 body having a rear portion adapted to be connected to a water supply and a
front portion with a perforated member adapted to discharge water in the form
of a spray, a power source and a light emitting means, wherein the perforated
member is disposed with a groove, the groove is disposed with a cover, the
cover is adapted to be in sealed engagement with the groove to prevent water

from entering the groove; the power source is disposed inside the shower head body in between the rear portion and the front portion and comprises a water turbine with blades driven by force of water passing through, an electrical generator for converting mechanical energy into electrical energy, a cluster of gears for transmission of motion from the water turbine to the electrical generator and a printed circuit board which transforms alternating current into direct current; the water turbine is disposed near the rear portion and is connected to the cluster of gears by way of a shaft being connected to the first gear of the cluster of gears, the last gear of the cluster gears is connected to a shaft of the electrical generator, the electrical generator is connected to the printed circuit board by an insulated conductive wire; the cluster of gears and the printed circuit board are disposed inside a watertight casing and water seals are used to make the points of connection watertight of the shaft of the water turbine with the first gear of the cluster of gears, of the shaft of the electrical generator with the last gear of the cluster gears and of the insulated conductive wire that connects the electrical generator with the printed circuit board; and the light emitting means is disposed in the groove of the perforated member and sealed by the cover of the groove, the light emitting means is connected to the printed circuit board by an insulated conductive wire and water seal is used to make the point of connection watertight.

The water seal can be an o-ring which is used as a gasket to make a joining surface watertight or a v-shaped shaft ring which seals axially against a counter surface.

The printed circuit board is laminated with molten plastics to make it watertight.

The surface of the watertight casing facing the front portion of the shower head body is disposed with a plurality of packing rings which makes the surface of the watertight casing watertight. A plurality of springs corresponding to the plurality of packing rings is also provided so as to make the surface of the

watertight casing stays close to the inner surface of the front portion of the shower head body.

The cover of the groove of the perforated member is made of transparent or semi-transparent material so that the light emitted by the light emitting means
5 can be seen.

The light emitting means comprises one or more light emitting diodes.

The light emitting means comprises one or more light bulbs.

The light emitting means comprises one or more light emitting sources powered by electricity.

10 The printed circuit board is disposed near the front portion, thereby shortening the length of the insulated conductive wire that connects the printed circuit board with the light emitting means.

The water turbine is disposed inside a ring-shaped housing, thereby limiting the space surrounding the blades of the water turbine so that the force
15 of water coming in can be increased and the protection for the blades against destruction owing to external accidental shocks can be secured.

The top inlet of the rear portion is disposed with a filter, thereby separating large particles from incoming water and thus obstructing the passage of large particles from damaging the blades of the water turbine.

20 The shower head body is fixed on the wall.

Alternatively, the shower head body is hand-held and one end of which is connected to a shower hose through which water flows into the shower head body.

The operation of the present invention is as follows:

25 When the water supply, that is, the faucet is turned on, water from the water supply flows from the top inlet of the rear portion, where the water flow is the strongest, into the shower head body and then comes out from the perforated member of the front portion. The incoming water flows through the shower head body and the flowing water turns the blades of the water turbine

and the water turbine therefore rotates. The mechanical energy is thus transferred from the flowing water to the water turbine. As the water turbine is connected to the cluster of gears by way of a shaft being connected to the first gear of the cluster of gears, the cluster of gears is thus set in motion by the rotation of the water turbine. And, as the last gear of the cluster of gears is connected to a shaft of the electrical generator, the last gear of the cluster of gears transmits the motion to the electrical generator and makes the electrical generator to turn. The electrical generator then functions like a hydroelectric generator converting the mechanical energy into the electrical energy. The electrical energy generated is alternating current whose magnitude and direction vary cyclically. As the electrical generator is connected to the printed circuit board by an insulated conductive wire, the alternating current is transmitted to the printed circuit board. The printed circuit board transforms the alternating current which it receives from the electrical generator into direct current which is then transmitted to the light emitting means by an insulated conductive wire to provide current and turn on the light emitting means. The light emitting means emits color light and make the water coming out from the perforated member having the same color. Therefore, a user can have visual enjoyment of the color light while showering. Further, as the water flow is stronger, higher mechanical energy and thus higher electrical energy is generated, and vice versa as the water flow is weaker, lower mechanical energy and thus lower electrical energy is generated. As a result of the changes of the water flow, the printed circuit board gives signals to the light emitting means to turn brighter if the water flow is stronger and to turn dimmer if the water flow is weaker.

Brief Description of Drawings

FIG. 1 shows a perspective view of the present invention.

FIG. 2 shows an exploded view of the present invention.

FIG. 3 shows an exploded view of the rear portion of the present

invention

FIG. 4 shows an exploded view of the front portion of the present invention.

FIG. 5 shows an exploded view of the components of the present invention disposed in between the rear portion and the front portion thereof.

FIG. 6 shows a view of the front surface of the front portion of the present invention.

FIG. 7 shows a cross-sectional view along the line A-A in FIG. 6.

FIG. 8 shows a cross-sectional view along the line B-B in FIG. 6.

FIG. 9 shows a cross-sectional view along the line C-C in FIG. 6.

FIG. 10 shows the circuit diagram of the present invention.

Best Mode for Carrying out the Invention

FIGS. 1 to 10 illustrate the construction of the present invention. As illustrated, the present invention generally comprises a shower head body having a rear portion 1 adapted to be connected to a water supply as shown in FIGS. 2 and 3 and a front portion 2 with a perforated member 21 adapted to discharge water in the form of a spray as shown in FIGS. 2 and 4, a power source and a light emitting means 3.

As shown in FIG. 4, the perforated member 21 is disposed with a groove 22, the groove 22 is disposed with a cover 23, the cover 23 is adapted to be in sealed engagement with the groove 22 to prevent water from entering the groove 22.

As shown in FIG. 5, the power source is disposed inside the shower head body in between the rear portion 1 and the front portion 2 and comprises a water turbine 4 with blades 41 driven by force of water passing through, an electrical generator 5 for converting mechanical energy into electrical energy, a cluster of gears which is formed by a first large gear 6, a second large gear 7 and a third small gear 7 for transmission of motion from the water turbine 4 to the electrical generator 5 and a printed circuit board 9 which transforms

alternating current into direct current.

The water turbine 4 is disposed near the rear portion 1 and is connected to the cluster of gears by way of a shaft 42 being connected to the first large gear 6 and the first large gear 6 meshes with the second large gear 7 while the second large gear 7 meshes with the third small gear 8. The third small gear 8 is connected to a shaft 51 of the electrical generator 5. The electrical generator 5 is connected to the printed circuit board 9 by an insulated conductive wire (not shown). In this embodiment, the cluster of gears is formed by three gears. In other embodiments, the number of gears can vary.

The cluster of gears and the printed circuit board 9 are disposed inside a watertight casing 10. An o-ring 43 is used as a water seal to make the point of connection watertight of the shaft 42 of the water turbine 4 with the first large gear 6 of the cluster of gears. An o-ring 52 and a v-shaped shaft ring 53 are used as water seals to make the point of connection watertight of the shaft 51 of the electrical generator 5 with the third small gear 8. The printed circuit board 9 is laminated with molten plastics to make it watertight.

The surface of the watertight casing 10 facing the front portion 2 of the shower head body is disposed with a plurality of packing rings 11 which makes the surface of the watertight casing 10 watertight. A plurality of springs 12 corresponding to the plurality of packing rings 11 is also provided so as to make the surface of the watertight casing 10 stays close to the inner surface of the front portion 2 of the shower head body.

As shown in FIG. 4, the light emitting means 3 is disposed in the groove 22 of the perforated member 21 and sealed by the cover 23 of the groove 22.

The light emitting means 3 is connected to the printed circuit board 9 by an insulated conductive wire (not shown) and an o-ring 31 is used as a water seal to make the point of connection watertight. The cover 23 of the groove 22 of the perforated member 21 is made of transparent or semi-transparent material so that the light emitted by the light emitting means 3 can be seen. In this

embodiment, the light emitting means 3 comprises four sets each of three light emitting diodes. In other embodiments, the number of diodes can vary. Further, the light emitting means 3 can comprise light bulbs or any other light emitting sources powered by electricity.

5 As shown in FIG. 7, the printed circuit board 9 is disposed near the front portion 2, thereby shortening the length of the insulated conductive wire (not shown) that connects the printed circuit board 9 with the light emitting means 3.

 The water turbine 4 is disposed inside a ring-shaped housing 44, thereby limiting the space surrounding the blades 41 of the water turbine 4 so that the
10 force of water coming in can be increased and the protection for the blades 41 against destruction owing to external accidental shocks can be secured.

 As shown in FIG. 3, the top inlet of the rear portion 1 can be disposed with a filter (not shown), thereby separating large particles from incoming water and thus obstructing the passage of large particles from damaging the blades
15 41 of the water turbine 4.

 The shower head body is fixed on the wall in this embodiment. In other embodiments, the shower head body can be hand-held and one end of which is connected to a shower hose through which water flows into the shower head body.

20 As shown in FIG. 10, the circuit of the embodiment includes the electrical generator 5 which is actuated by the incoming water. The electrical generator 5 connects to the printed circuit board 9 by an insulated conductive wire, and the printed circuit board 9 connects to the light emitting means 3 which comprises four sets each of three light emitting diodes by two insulated conductive wires,
25 for the incoming current and one for the outgoing current. The four sets each of three light emitting diodes are arranged in serial.

 The operation of the embodiment is as follows:

 When the water supply, that is, the faucet is turned on, water from the water supply flows from the top inlet of the rear portion 1, where the water flow

is the strongest, into the shower head body and then comes out from the perforated member 21 of the front portion 2. The incoming water flows through the shower head body and the flowing water turns the blades 41 of the water turbine 4 and the water turbine 4 therefore rotates. The mechanical energy is thus transferred from the flowing water to the water turbine 4. As the water turbine 4 is connected to the cluster of gears by way of the shaft 42 being connected to the first large gear 6 of the cluster of gears, the cluster of gears is thus set in motion by the rotation of the water turbine 4. And, as the third small gear 8 of the cluster of gears is connected to the shaft 51 of the electrical generator 5, the third small gear 8 of the cluster of gears transmits the motion to the electrical generator 5 and makes the electrical generator 5 to turn. The electrical generator 5 then functions like a hydroelectric generator converting the mechanical energy into the electrical energy. The electrical energy generated is alternating current whose magnitude and direction vary cyclically. As the electrical generator 5 is connected to the printed circuit board 9 by an insulated conductive wire, the alternating current is transmitted to the printed circuit board 9. The printed circuit board 9 transforms the alternating current which it receives from the electrical generator 5 into direct current which is then transmitted to the light emitting means 3 by an insulated conductive wire to provide current and turn on the light emitting means 3. The light emitting means 3 emits color light and make the water coming out from the perforated member 21 having the same color. Therefore, a user can have visual enjoyment of the color light while showering. Further, as the water flow is stronger, higher mechanical energy and thus higher electrical energy is generated, and vice versa as the water flow is weaker, lower mechanical energy and thus lower electrical energy is generated. As a result of the changes of the water flow, the printed circuit board 9 gives signals to the light emitting means 3 to turn brighter if the water flow is stronger and to turn dimmer if the water flow is weaker.

The above embodiment is a preferred embodiment of the present invention. The present invention is capable of other embodiments and is not limited by the above embodiment. Any other variation, decoration, substitution, combination or simplification, whether in substance or in principle, not deviated from the spirit of the present invention, is replacement or substitution of equivalent effect and falls within the scope of protection of the present invention.

Industrial Applicability

The present invention provides a shower head with a light emitting means which is powered by a hydroelectric generator disposed inside the shower head to avoid extra requirement of electricity, leakage of electricity and replacement of power source while at the same time to provide visual enjoyment and/or indications to the user during showering. The present invention is convenient to use, cost-effective, safe and reliable.

CLAIMS

1. A shower head with a light emitting means comprising a shower head body having a rear portion adapted to be connected to a water supply and a front portion with a perforated member adapted to discharge water in the form of a spray, a power source and a light emitting means, wherein the perforated member is disposed with a groove, the groove is disposed with a cover, the cover is adapted to be in sealed engagement with the groove to prevent water from entering the groove; the power source is disposed inside the shower head body in between the rear portion and the front portion and comprises a water turbine with blades driven by force of water passing through, an electrical generator for converting mechanical energy into electrical energy, a cluster of gears for transmission of motion from the water turbine to the electrical generator and a printed circuit board which transforms alternating current into direct current; the water turbine is disposed near the rear portion and is connected to the cluster of gears by way of a shaft being connected to the first gear of the cluster of gears, the last gear of the cluster gears is connected to a shaft of the electrical generator, the electrical generator is connected to the printed circuit board by an insulated conductive wire; the cluster of gears and the printed circuit board are disposed inside a watertight casing and water seals are used to make the points of connection watertight of the shaft of the water turbine with the first gear of the cluster of gears, of the shaft of the electrical generator with the last gear of the cluster gears and of the insulated conductive wire that connects the electrical generator with the printed circuit board; and the light emitting means is disposed in the groove of the perforated member and sealed by the cover of the groove, the light emitting means is connected to the printed circuit board by an insulated conductive wire and water seal is used to make the point of connection watertight.
2. The shower head with a light emitting means as in Claim 1, wherein the

water seal is an o-ring which is used as a gasket to make a joining surface watertight or a v-shaped shaft ring which seals axially against a counter surface.

3. The shower head with a light emitting means as in Claim 1, wherein the printed circuit board is laminated with molten plastics to make it watertight.
4. The shower head with a light emitting means as in Claim 1, wherein the surface of the watertight casing facing the front portion of the shower head body is disposed with a plurality of packing rings which makes the surface of the watertight casing watertight.
5. The shower head with a light emitting means as in Claim 4, wherein a plurality of springs corresponding to the plurality of packing rings is also provided so as to make the surface of the watertight casing stays close to the inner surface of the front portion of the shower head body.
6. The shower head with a light emitting means as in Claim 1, wherein the cover of the groove of the perforated member is made of transparent or semi-transparent material so that the light emitted by the light emitting means can be seen.
7. The shower head with a light emitting means as in Claim 1, wherein the light emitting means comprises one or more light emitting diodes.
8. The shower head with a light emitting means as in Claim 1, wherein the light emitting means comprises one or more light bulbs.
9. The shower head with a light emitting means as in Claim 1, wherein the light emitting means comprises one or more light emitting sources powered by electricity.
10. The shower head with a light emitting means as in Claim 1, wherein the printed circuit board is disposed near the front portion, thereby shortening the length of the insulated conductive wire that connects the printed circuit board with the light emitting means.
11. The shower head with a light emitting means as in Claim 1, wherein the

water turbine is disposed inside a ring-shaped housing, thereby limiting the space surrounding the blades of the water turbine so that the force of water coming in can be increased and the protection for the blades against destruction owing to external accidental shocks can be secured.

- 5 12. The shower head with a light emitting means as in Claim 1, wherein the top inlet of the rear portion is disposed with a filter, thereby separating large particles from incoming water and thus obstructing the passage of large particles from damaging the blades of the water turbine.
- 10 13. The shower head with a light emitting means as in Claim 1, wherein the shower head body is fixed on the wall.
14. The shower head with a light emitting means as in Claim 1, wherein the shower head body is hand-held and one end of which is connected to a shower hose through which water flows into the shower head body.

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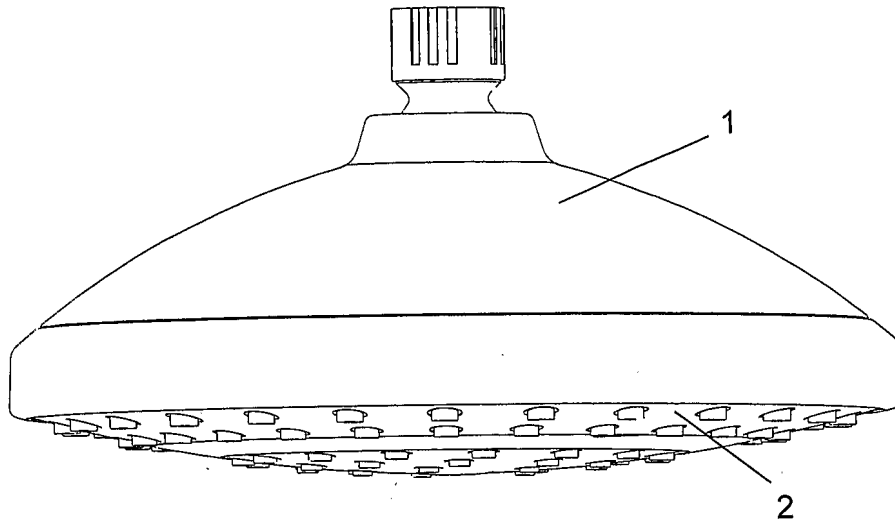


Fig. 1

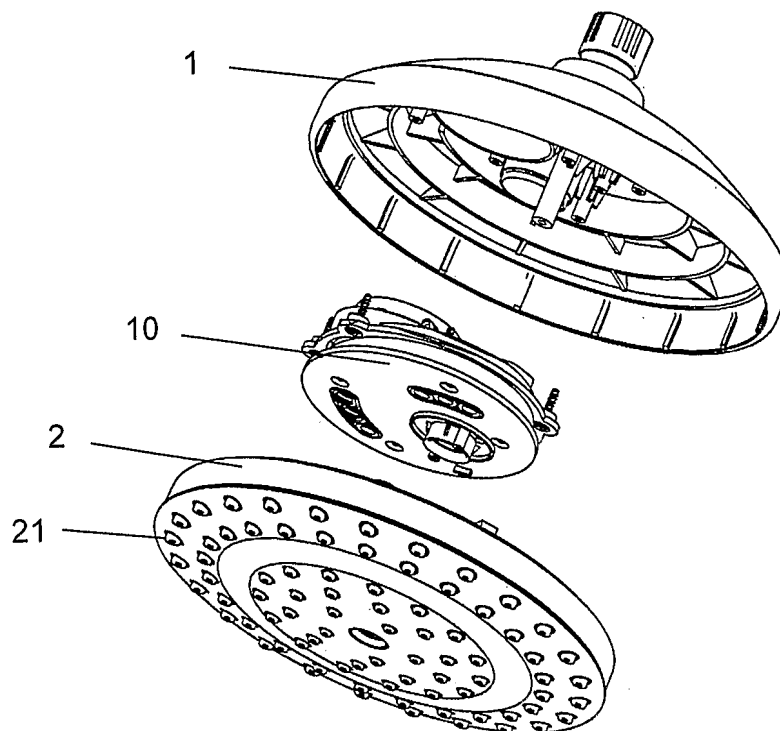


Fig. 2

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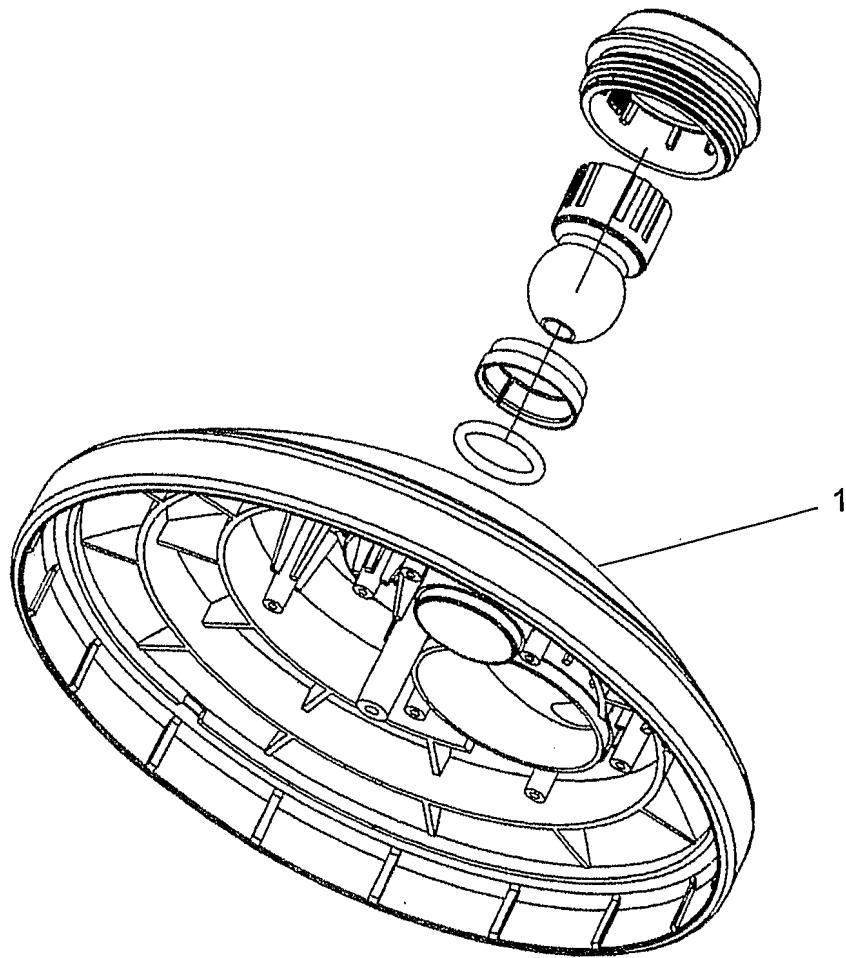


Fig. 3

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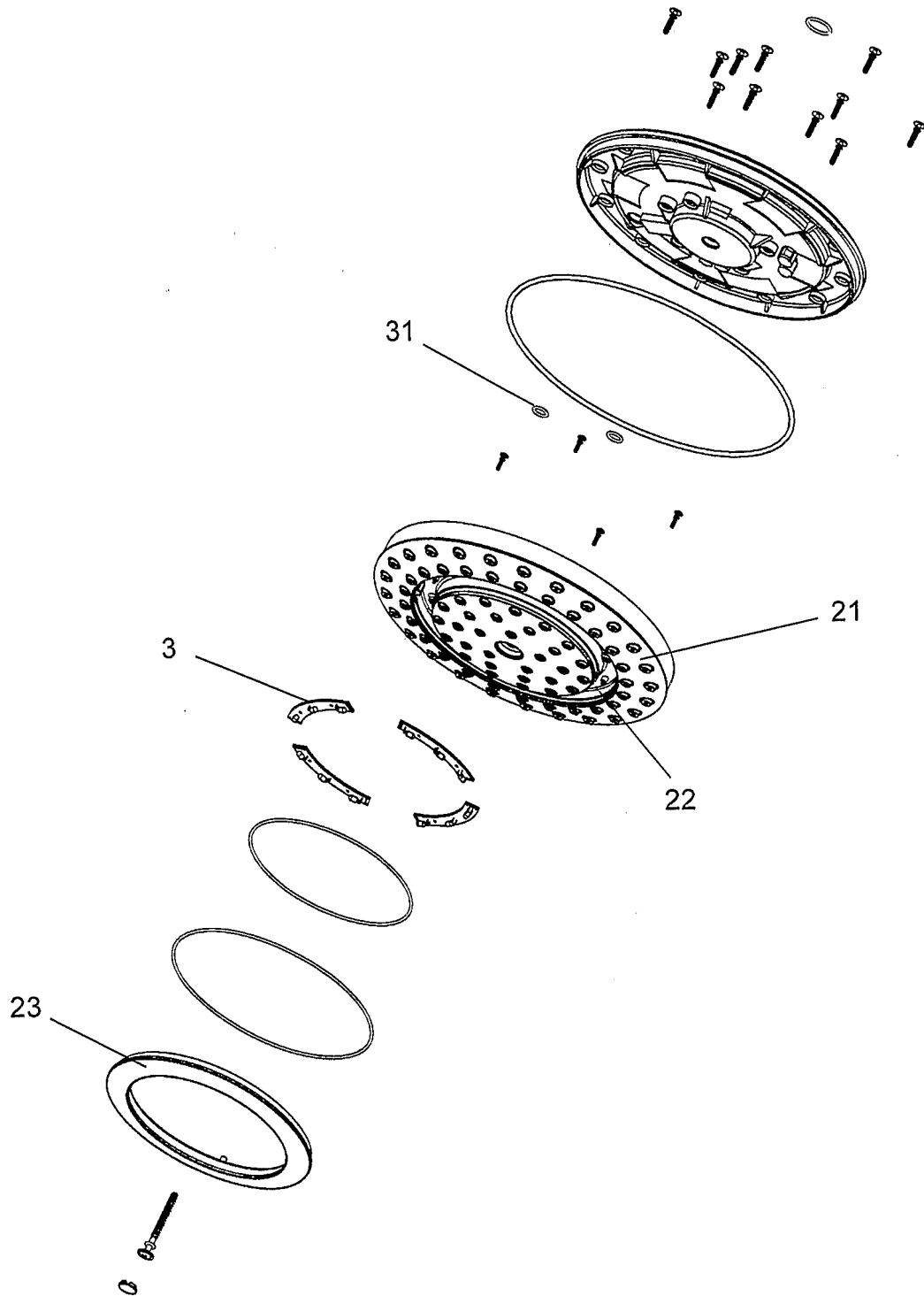


Fig. 4

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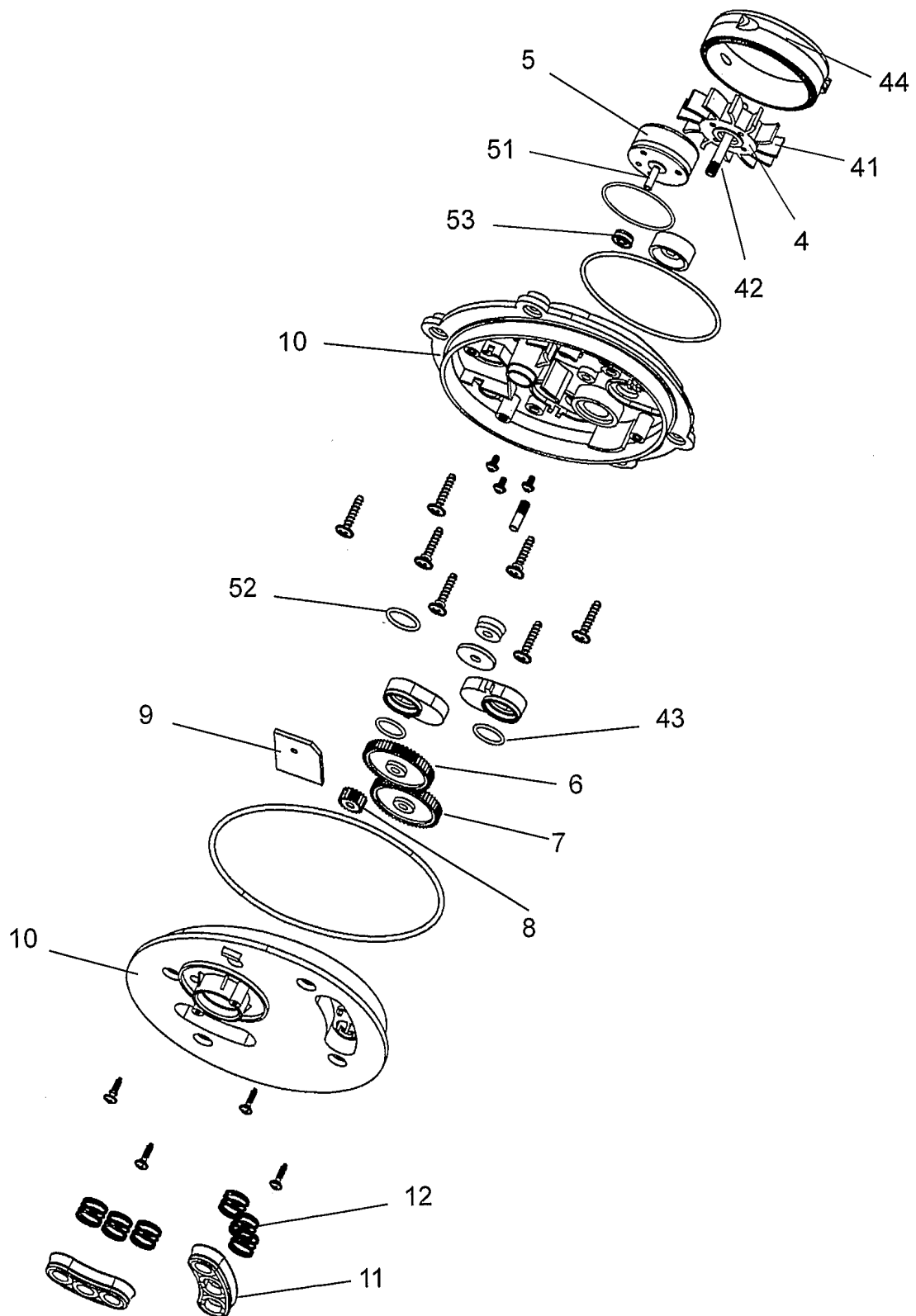


Fig. 5

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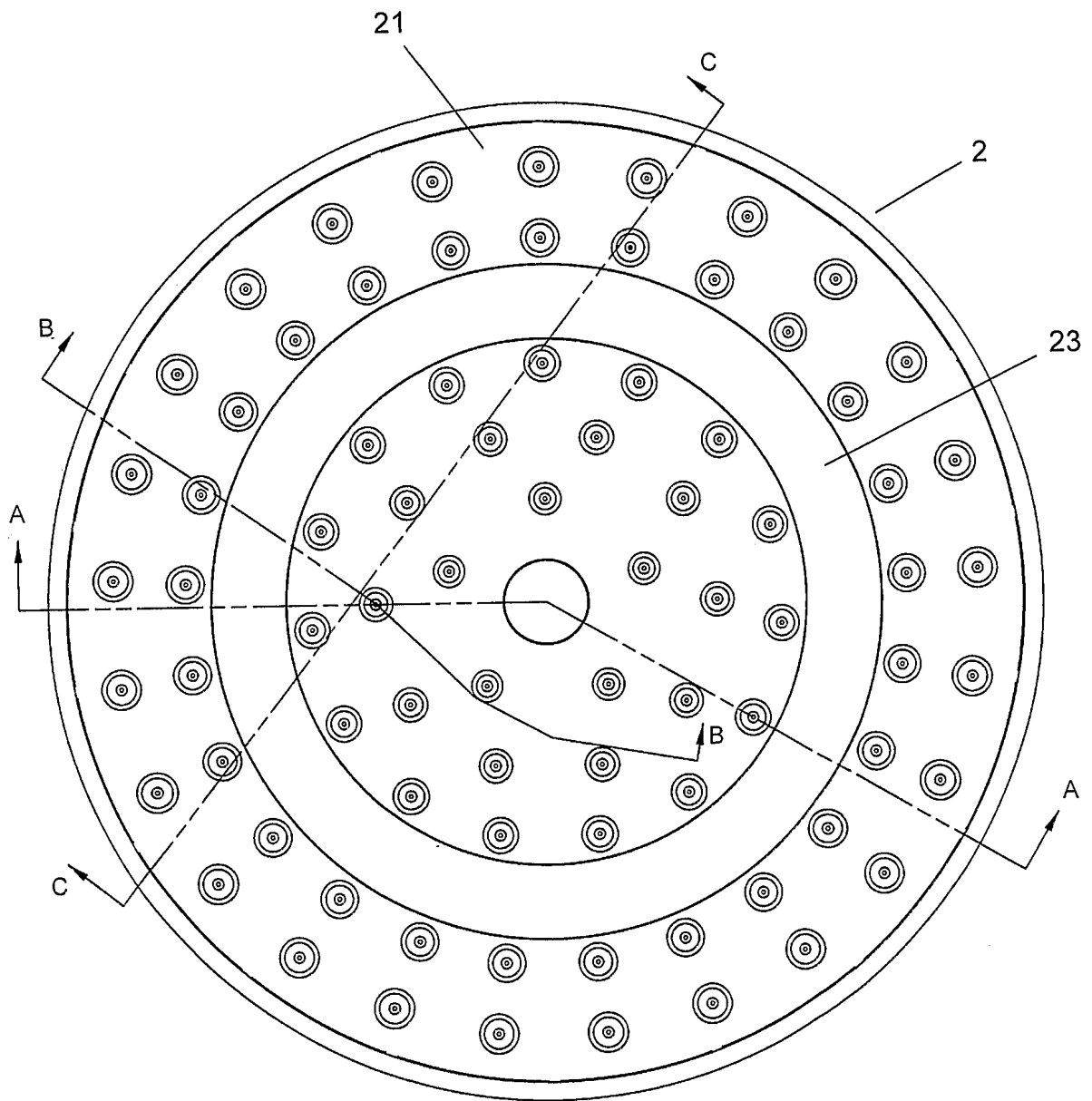


Fig. 6

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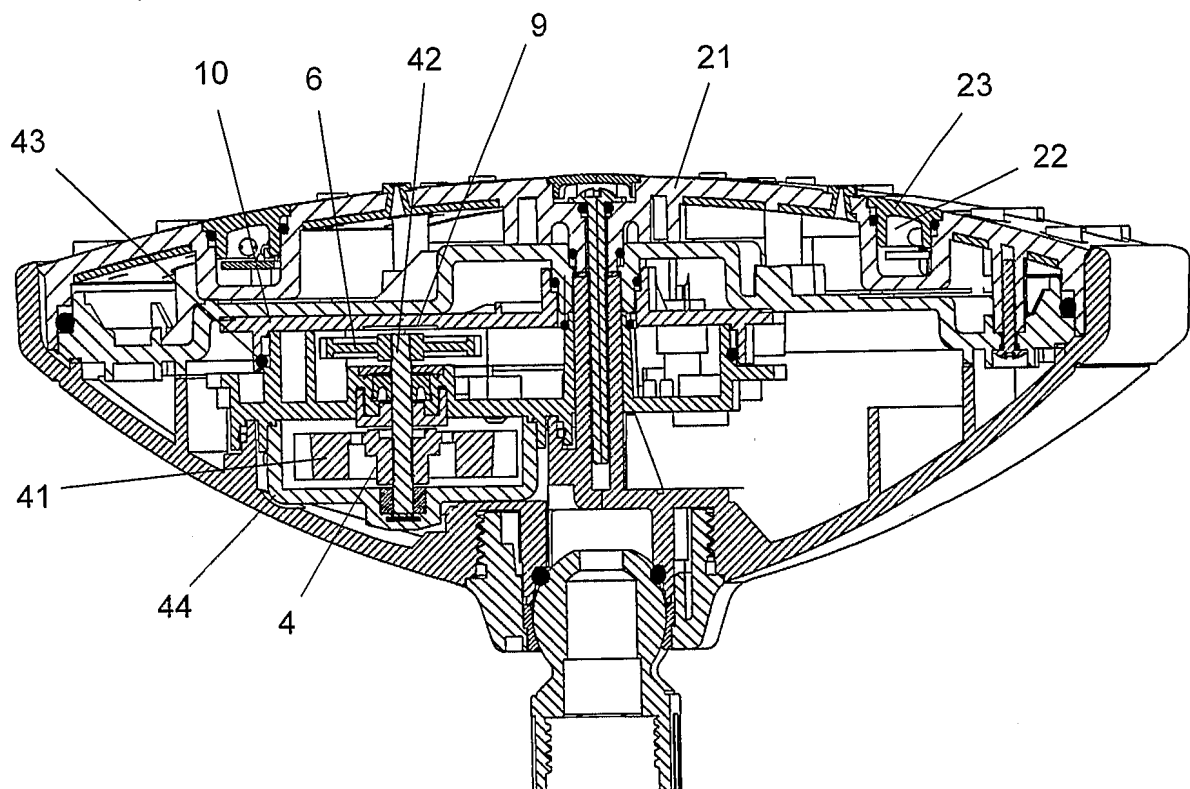


Fig. 7

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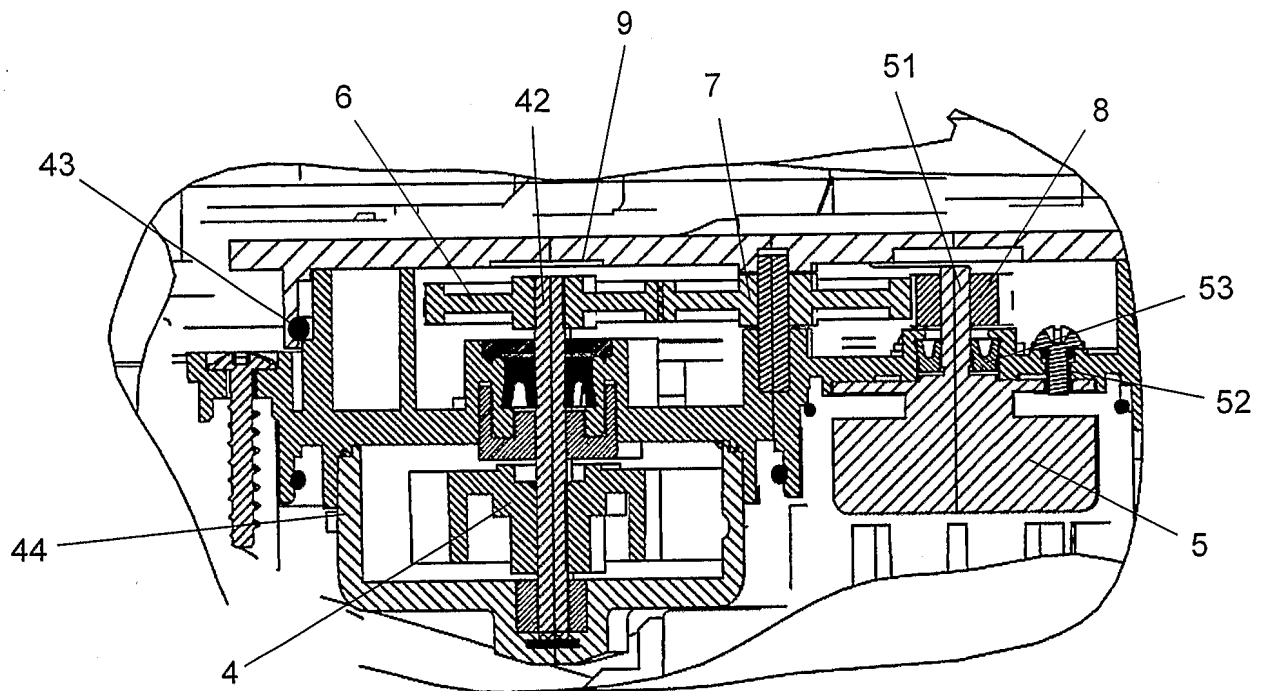


Fig. 8

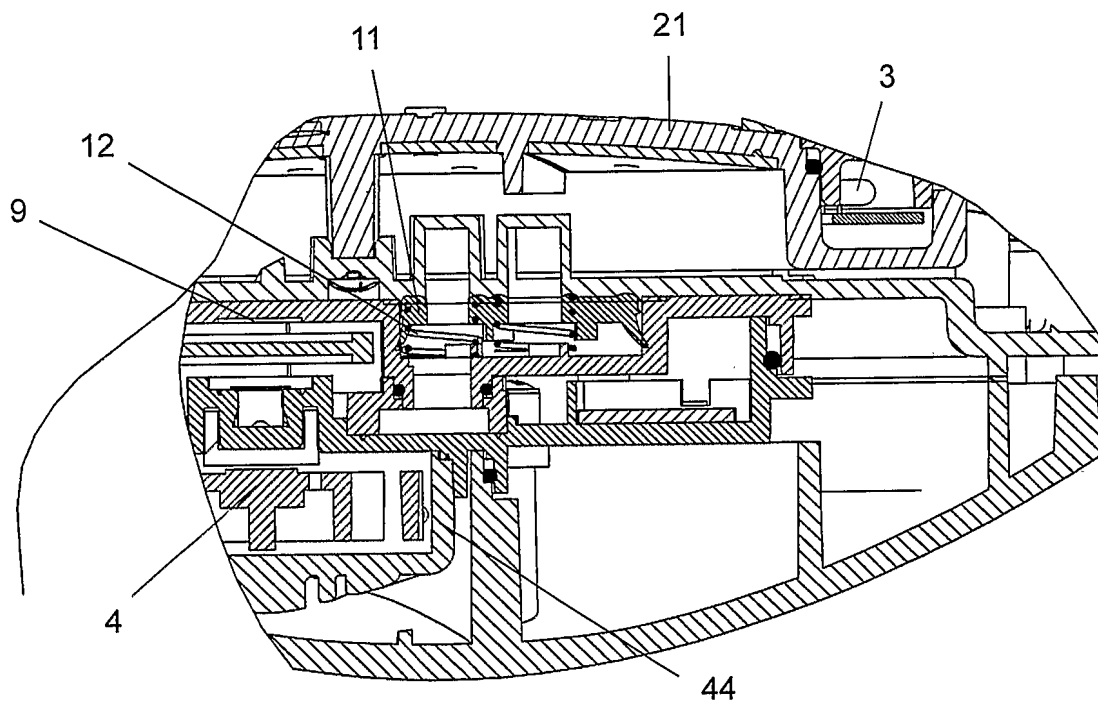


Fig. 9

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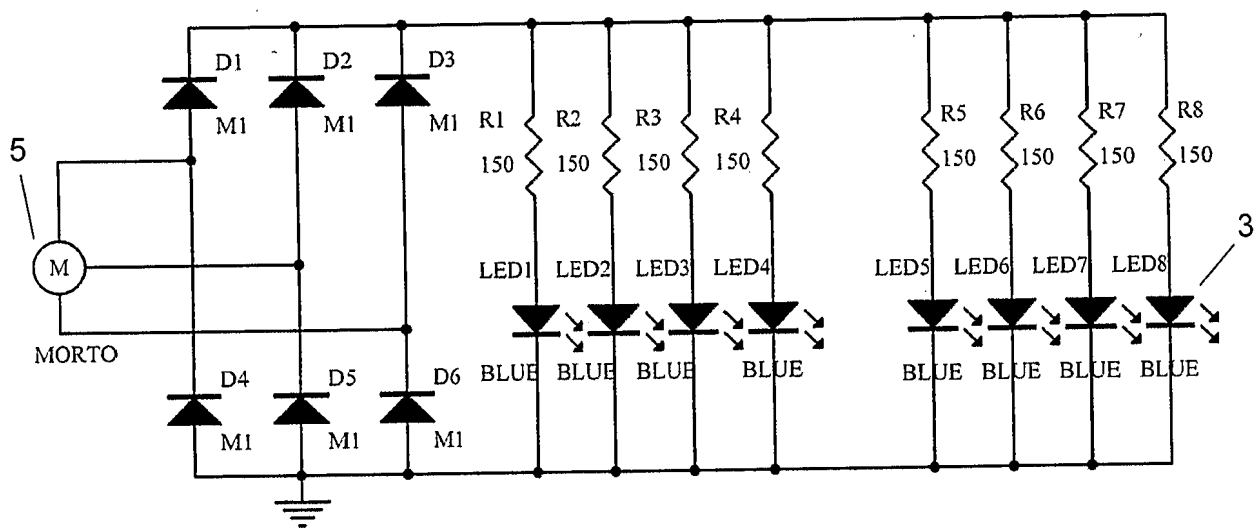


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/002008

A. CLASSIFICATION OF SUBJECT MATTER

See Extra Sheet

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)

IPC B05B1, A47K3/28, F21V33

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)

WPI, EPODOC, PAJ, CNPAT shower, light w emit+, LED, LEDs, turbine, hydroelectric+, water

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN2910369Y (LI, Zhen et al.) 13 Jun. 2007(13.06.2007) page 2 line 26- page 4 line 2 of the description, Figs. 1 and 2	1-14
X	CN2850707Y (QI, Zhan sheng) 27 Dec. 2006(27.12.2006) pages 5-6 of the description, Fig. 1	1-14
X	CN1931443A (SI, Shibin) 21 Mar. 2007(21.03.2007) pages 2-3 of the description, Fig. 2	1-14
X	CN2770792Y (LONGHUA DECHENG PRODUCT PLANT) 12 Apr. 2006 (12.04.2006) page 3 of the description, Fig. 3	1-14
X	CN2841159Y (CHEN, Xiaoming) 29 Nov.2006(29.11.2006) pages 3-4 of the description, Fig. 2	1-14
X	US4564889A (BOLSON FRANK J) 14 Jan. 1986(14.01.1986) column 2, line 66 – column 3 line 28, of the description, Fig. 2	1-14

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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“&” document member of the same patent family

Date of the actual completion of the international search

20 Mar.2008 (20.03.2008)

Date of mailing of the international search report

10 Apr. 2008 (10.04.2008)

Name and mailing address of the ISA/CN

The State Intellectual Property Office, the P.R.China
6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China
100088

Facsimile No. 86-10-62019451

Authorized officer

KE Jingjie

Telephone No. (86-10)62085824

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/002008

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP2005-204957A (NISSHO ENGINEERING KK) 4 Aug.2005 (04.08.2005), Paragraph [0011]-[0012], of the description, Fig. 2	1-14
X	DE20101460U1 (JEZEWSKI LARS) 30 Aug.2001 (30.08.2001), Fig. 1	1-14
X	US2005/0157493A1 (CLARK F) 21 Jul.2005 (21.07.2005), Paragraph [0023]-[0033], of the description	1-14

Form PCT/ISA/210 (continuation of second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2007/002008

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN2910369Y	13.06.2007	NONE	
CN2850707Y	27.12.2006	NONE	
CN1931443A	21.03.2007	NONE	
CN2770792Y	12.04.2006	NONE	
CN2841159Y	29.11.2006	NONE	
US4564889A	14.01.1986	NONE	
JP2005-204957A	04.08.2005	NONE	
DE20101460U1	30.08.2001	NONE	
US2005/0157493A1	21.07.2005	NONE	

Form PCT/ISA/210 (patent family annex) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2007/002008

CLASSIFICATION OF SUBJECT MATTER

B05B1/14 (2006.01) i

A47K3/28 (2006.01) i