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(54) OPERATIONAL STRUCTURE OF IMPELLER ASSEMBLY FOR AIR COOLER

(75) Inventor: **Soon Il Hong**, Suwon-Si (KR)

Correspondence Address:
Frank Chau
F. Chau & Associates, LLP
1900 Hempstead Turnpike, Suite 501
East Meadow, NY 11554 (US)

(73) Assignee: **PASECO CO., LTD.**

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(57) **ABSTRACT**

An operational structure of an impeller assembly for an air cooler is provided. The operational structure of an impeller assembly for an air cooler includes: a casing having a water collector provided on the bottom thereof; a moisture absorption pad provided in the casing, for absorbing water; an air blowing fan which is disposed in front of the moisture absorption pad and rotates; a water spreader provided in the upper portion of the casing, spraying water to the moisture absorption pad; a connection tube connecting the water spreader and the water collector with each other; and an impeller assembly supplying water contained in the water collector to the water spreader through the connection tube. The impeller assembly includes: impeller wings rotatably provided in the water collector; a rotational shaft whose one end is combined with the impeller wings to rotate the impeller wings and other end is disposed in the casing; a driven gear combined with the other end of the rotational shaft; and a driving gear integrally installed on the driving shaft of a driving motor rotating the air blowing fan, and mutually combined with the driven gear to rotate the driven gear. Accordingly, an air cooler adopting the operational structure of the impeller assembly can rotate impeller wings consistently irrespective of the temperature change in the atmosphere, which is advantageous for high-speed rotation of impeller wings, and which thus remarkably suppress its durability from lowering due to wear of the parts.

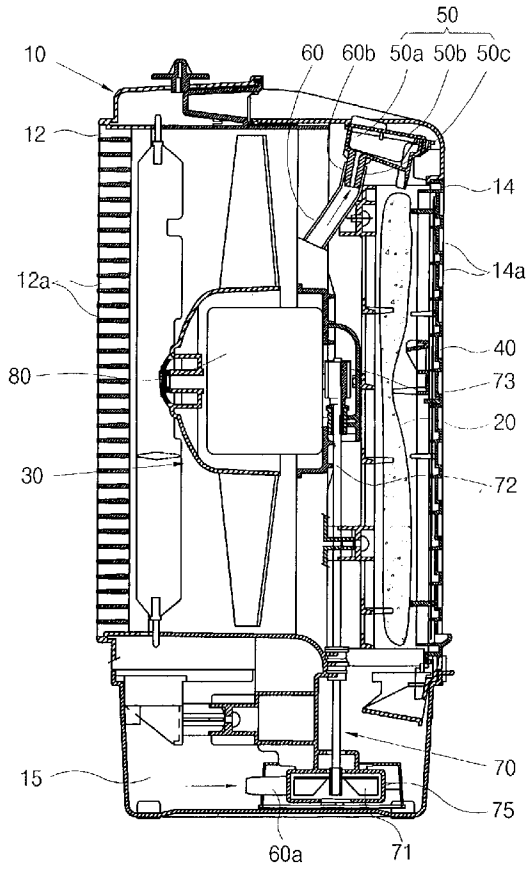


FIG. 1

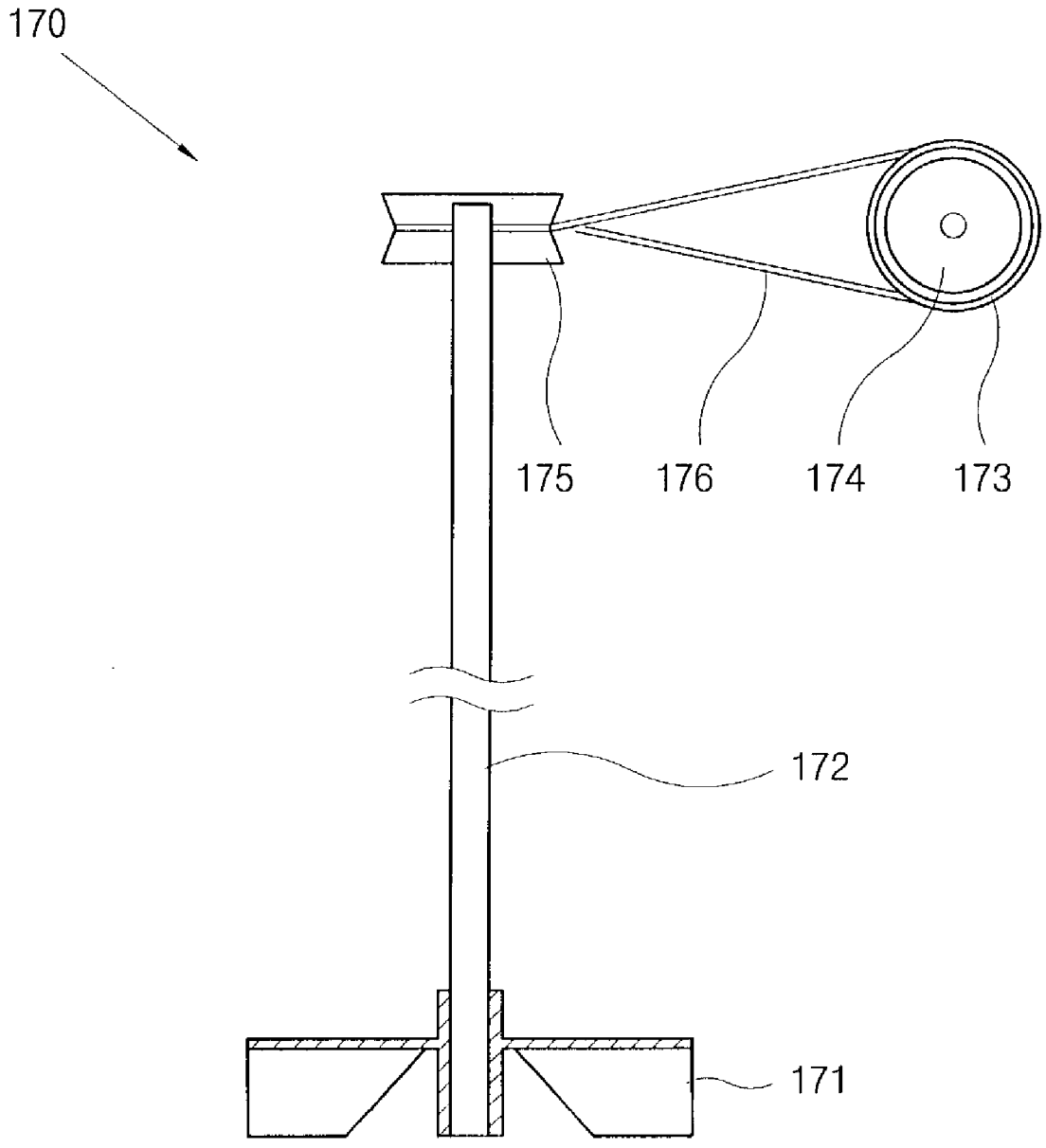
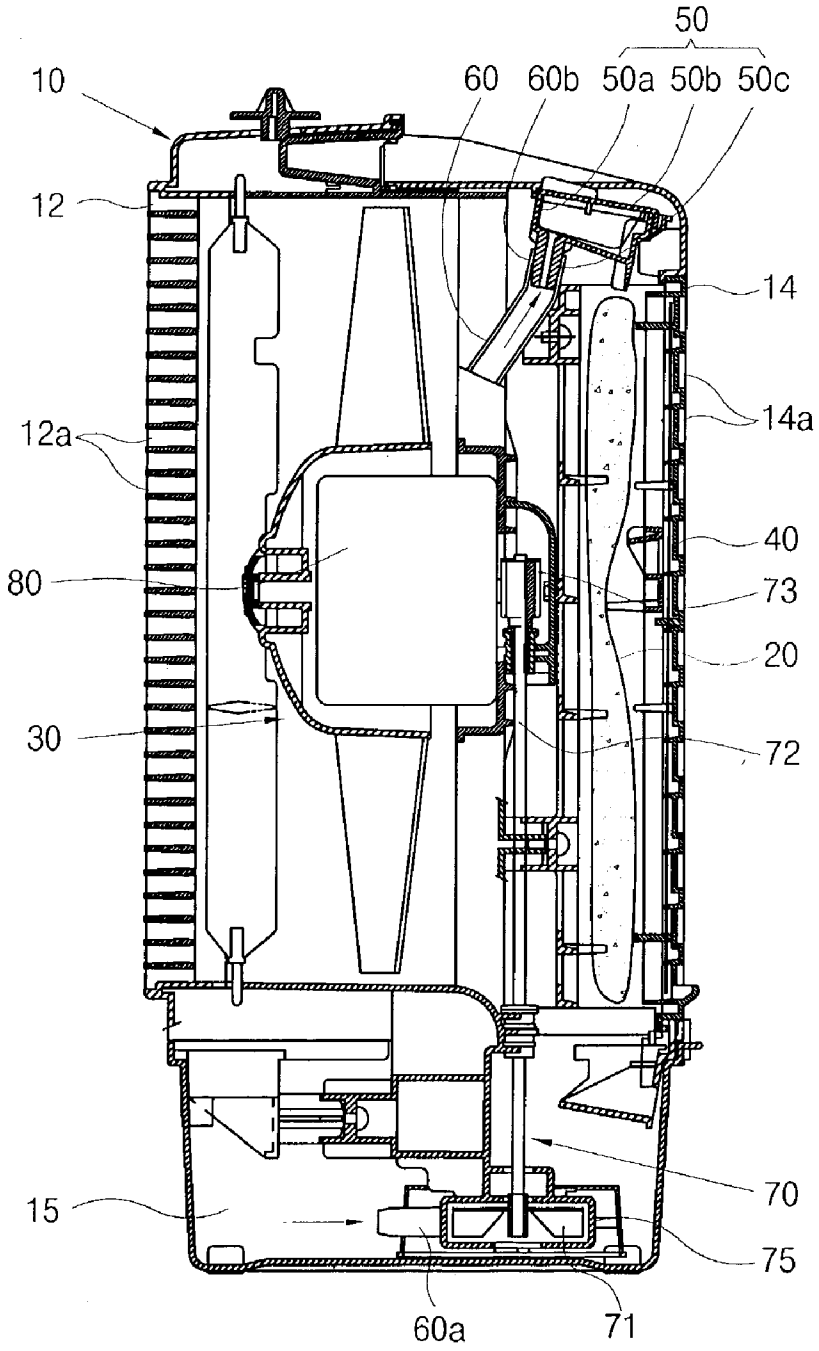


FIG. 2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60b
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50b
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FIG. 3

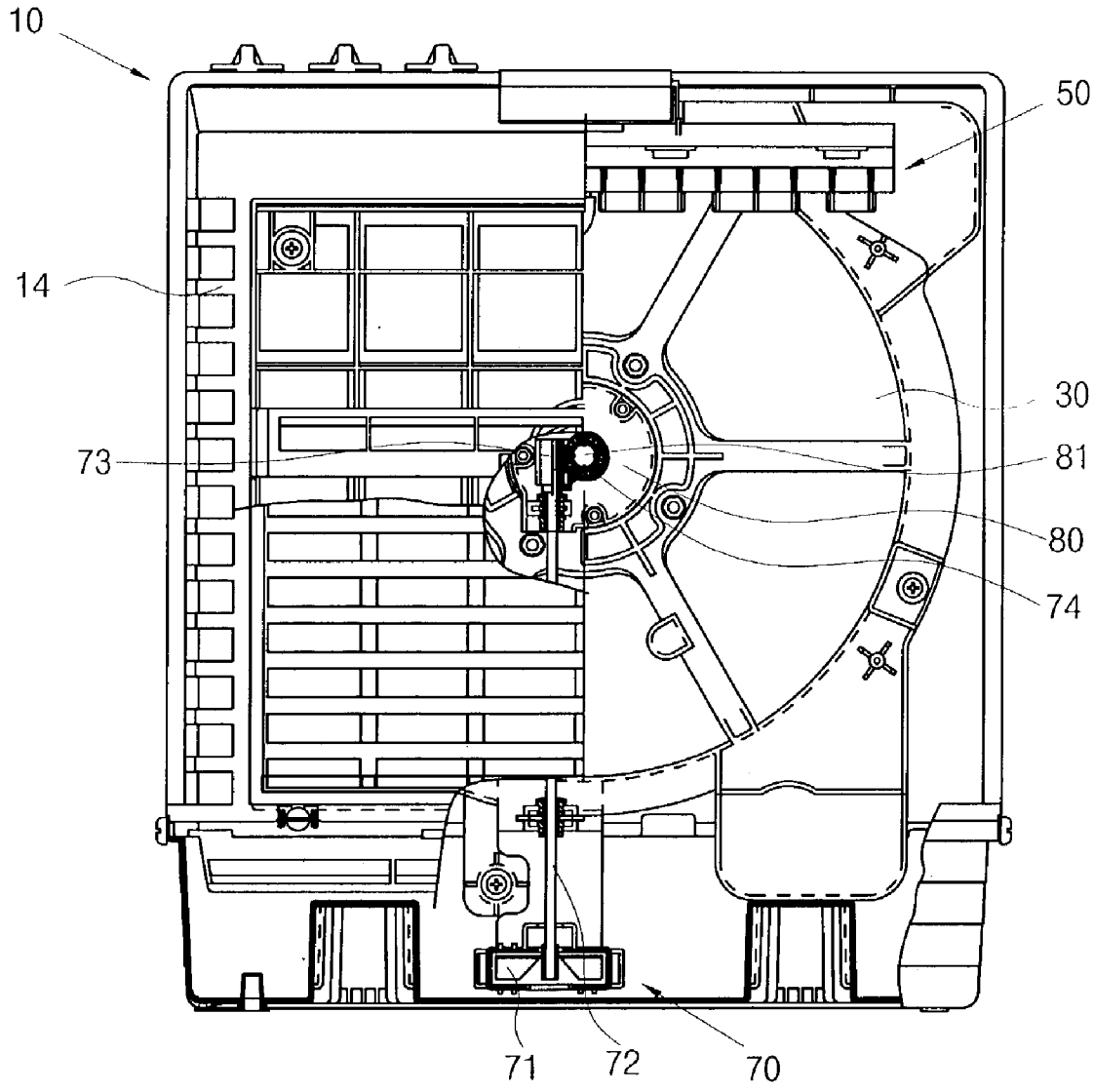


FIG. 4

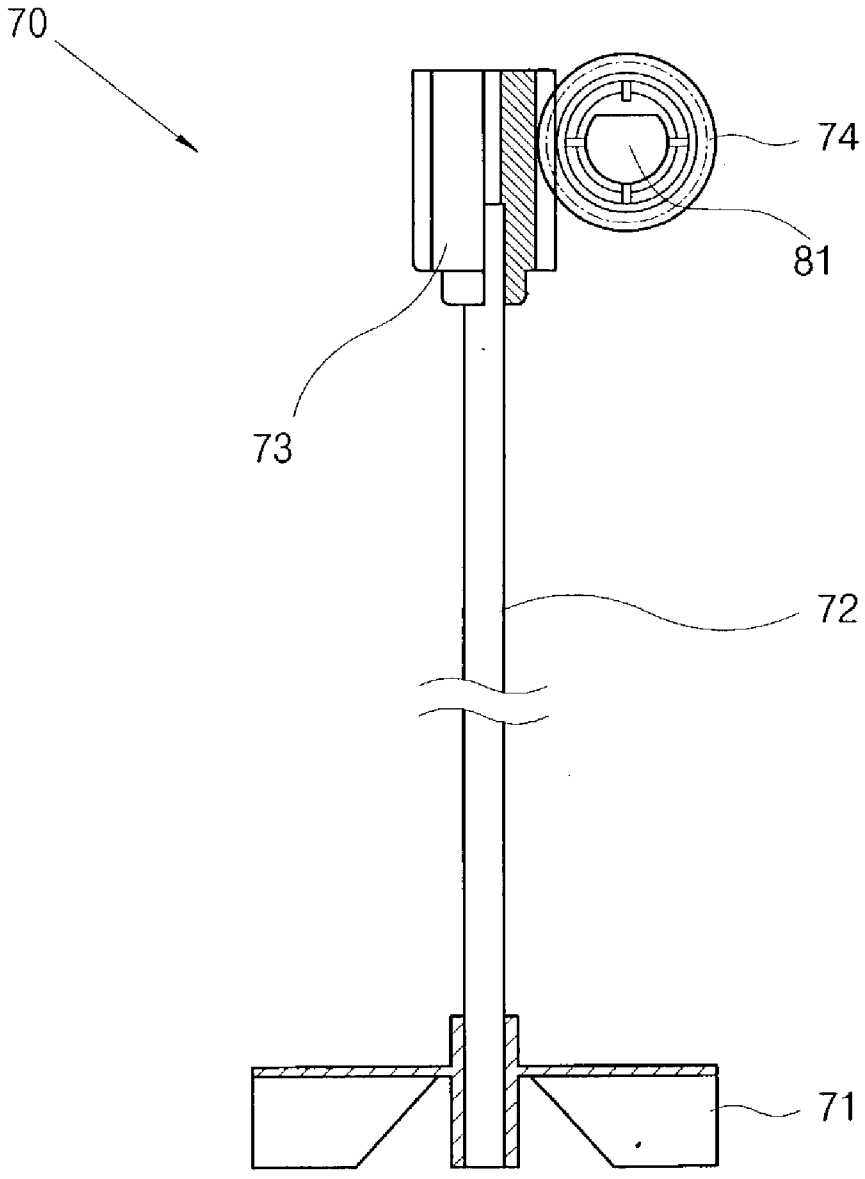
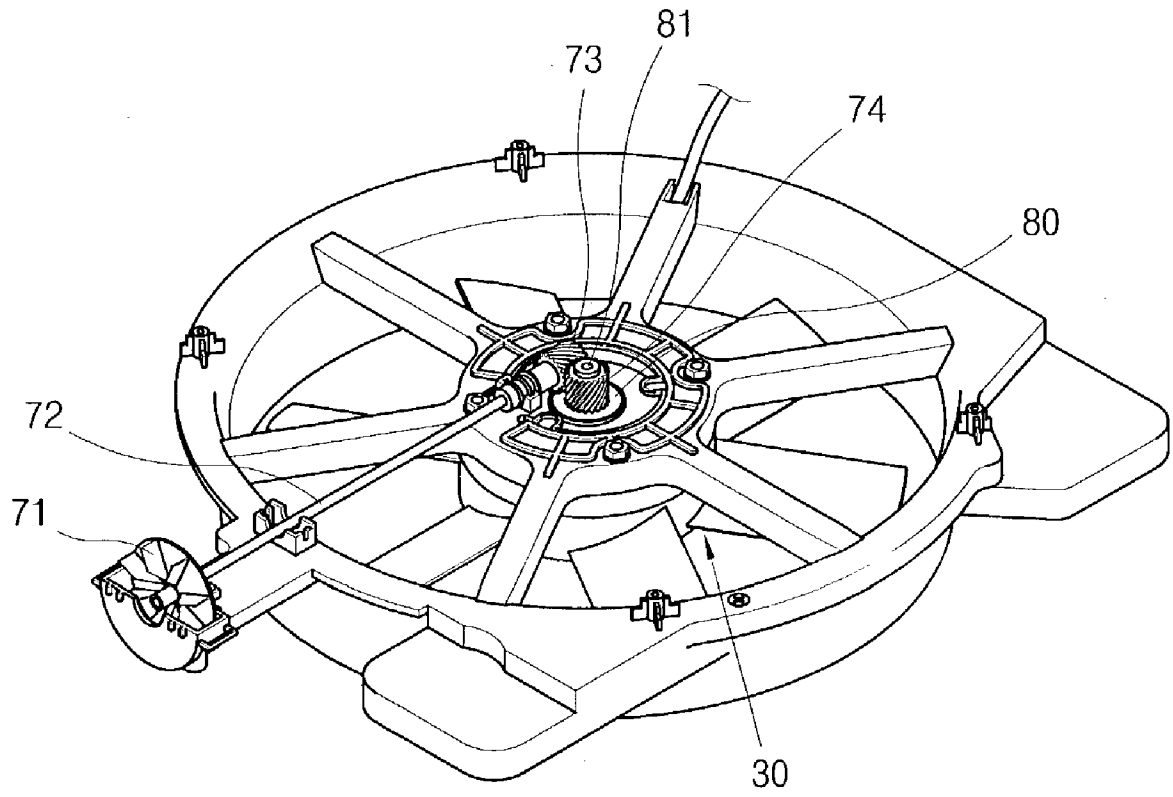


FIG. 5



OPERATIONAL STRUCTURE OF IMPELLER ASSEMBLY FOR AIR COOLER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to an operational structure of an impeller assembly for an air cooler, and more particularly, to an impeller assembly operational structure for an air cooler, which can rotate impeller wings consistently irrespective of the temperature change in the atmosphere, which is advantageous for high-speed rotation of impeller wings, and which thus remarkably suppress its durability from lowering due to wear of the parts.

[0003] 2. Description of the Related Art

[0004] As is well known, an air cooler uses a latent heat evaporated by water and air-blows cooled air whose temperature is lower than the normal temperature, through an air blower.

[0005] The air cooler includes: a casing having a water collector provided on the bottom thereof; a moisture absorption pad provided in the casing, for absorbing water; an air blowing fan which is disposed in front of the moisture absorption pad and rotates; a water spreader provided in the upper portion of the casing, spraying water to the moisture absorption pad; a connection tube connecting the water spreader and the water collector with each other; and an impeller assembly supplying water contained in the water collector to the water spreader through the connection tube.

[0006] The detailed description of the air cooler will be described later. Here, only an impeller assembly disclosed in a conventional air cooler will be described below.

[0007] As shown in **FIG. 1, a** conventional impeller assembly **170** includes: impeller wings **171** rotatably provided in a water collector (not shown); a rotational shaft **172** whose one end is combined with the impeller wings **171** and other end is disposed in a casing; a driven pulley **175** combined with the other end of the rotational shaft **172**; a driving motor **174**; and a driving pulley **173** installed on the driving shaft of the driving motor **174**; and a belt **176** mutually combining the driving pulley **173** and the driven pulley **175**.

[0008] When power is applied to the impeller assembly **170**, the driving motor **174** rotates, and then the driving pulley **173** coupled to the driving shaft of the driving motor **174** rotates. The rotational force of the driving pulley **173** is transferred to the driven pulley **175** via the belt **176**, and then makes the rotational shaft **172** rotate via the driven pulley **175**.

[0009] As the rotational shaft **172** rotates, the impeller wings **171** provided in the lower portion of the rotational shaft **172** also rotate. Then, water contained in the water collector is forwarded to a water spreader (not shown) via a connection tube (not shown) by a pumping method.

[0010] By the way, in the air cooler having the conventional impeller assembly, a belt can grow longer according to the temperature change in the atmosphere. As a result, the rotational speed of the impeller wings varies.

[0011] Also, since the conventional impeller assembly employs a pulley and belt structure, it is disadvantageous for high speed rotation because of the belt. Also, durability of the impeller assembly is lowered due to wear of the belt. Also, the belt may be cut off due to the internal vibration or other external factors.

[0012] Accordingly, an air cooler adopting a pump motor has been proposed in order to solve the above conventional problems. However, in the case of the air cooler having a pump motor, an impeller assembly should be additionally provided.

SUMMARY OF THE INVENTION

[0013] To solve the above problems, it is an object of the present invention to provide an operational structure of an impeller assembly for an air cooler, which can operate through driving of gears, which can rotate impeller wings consistently irrespective of the temperature change in the atmosphere, which is advantageous for high-speed rotation of impeller wings, and thus remarkably suppress its durability from lowering due to wear of the parts.

[0014] To accomplish the above object of the present invention, there is provided an operational structure of an impeller assembly for an air cooler including: a casing having a water collector provided on the bottom thereof; a moisture absorption pad provided in the casing, for absorbing water; an air blowing fan which is disposed in front of the moisture absorption pad and rotates; a water spreader provided in the upper portion of the casing, spraying water to the moisture absorption pad; a connection tube connecting the water spreader and the water collector with each other; and an impeller assembly supplying water contained in the water collector to the water spreader through the connection tube, wherein said impeller assembly comprises: impeller wings rotatably provided in the water collector; a rotational shaft whose one end is combined with the impeller wings to rotate the impeller wings and other end is disposed in the casing; a driven gear combined with the other end of the rotational shaft; and a driving gear integrally installed on the driving shaft of a driving motor rotating the air blowing fan, and mutually combined with the driven gear to rotate the driven gear.

[0015] Here, the driving gears on the driving shaft and the driven gear on the rotational shaft are made of a pair of bevel gears combined with each other so as to rotate mutually and whose rotational direction varies.

[0016] Also, a worm is provided in one side of the driving gear on the driving shaft and the driven gear on the rotational shaft, and a worm gear is provided in the other side thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The above and other objects and advantages of the present invention will become more apparent by describing the preferred embodiment thereof in more detail with reference to the accompanying drawings in which:

[0018] **FIG. 1** is a partially exploded sectional view of a conventional impeller assembly for an air cooler;

[0019] **FIG. 2** is a lateral sectional view of an air cooler according to the present invention;

[0020] **FIG. 3** is a partial rear view of the **FIG. 2** air cooler;

[0021] **FIG. 4** is a partial exploded sectional view of an impeller assembly according to the present invention; and

[0022] **FIG. 5** is a perspective view of the assembled state of the impeller assembly according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Preferred embodiments of the present invention will be described with reference to the accompanying drawings. The same or like elements are assigned with the same or like reference numerals.

[0024] **FIG. 2** is a lateral sectional view of an air cooler according to the present invention. **FIG. 3** is a partial rear view of the **FIG. 2** air cooler. **FIG. 4** is a partial exploded sectional view of an impeller assembly according to the present invention. **FIG. 5** is a perspective view of the assembled state of the impeller assembly according to the present invention.

[0025] As shown in **FIGS. 2 through 5**, an air cooler according to the present invention includes: a casing **10** forming an external appearance, having a water collector **15** provided on the bottom thereof; a moisture absorption pad **20** provided in the casing **10**, for absorbing water; an air blowing fan **30** which is disposed in front of the moisture absorption pad **20** and rotates by a driving motor **80**; a water spreader **50** provided in the upper portion of the casing **10**, spraying water to the moisture absorption pad **20**; a connection tube **60** connecting the water spreader **50** and the water collector **15** with each other; and an impeller assembly **70** supplying water contained in the water collector **15** to the water spreader **50** through the connection tube **60**.

[0026] A plurality of cooled air discharging exits **12***a* are formed in the front surface **12** of the casing **10**, and a plurality of air inhaling entrances **14***a* for inhaling external air into the casing **10** are formed in the rear surface **14** of the casing **10**.

[0027] The moisture absorption pad **20** is provided in the casing **10** to be adjacent to the air inhaling entrances **14***a*, and disposed lengthily along the up-and-down direction of the casing **10**.

[0028] The moisture absorption pad **20** is made of a material which possesses a property of easily absorbing moisture, for example, a synthetic fiber, sponge, etc.

[0029] An air filter **40** is mounted between the moisture absorption pad **20** and the rear surface **14** of the casing **10**.

[0030] The air filter **40** is provided to filter air inhaled into the casing **10** through a plurality of air inhaling entrances **14***a* formed on the rear surface **14** of the casing **10**.

[0031] Here, in order to prevent multiplication of bacteria and maintain cleanness of blown cooled air, the moisture absorption pad **20** and the air filter **40** should be washed or replaced every period since they can be detached from the casing **10**.

[0032] The one end of the connection tube **60** is connected to an inhaling nozzle **60***a* disposed in the water collector **15**, and the other end thereof is connected to a supply nozzle **60***b* connected to the water spreader **50**.

[0033] Also, the water spreader **50** includes a spreader body **50***a*, a cover member **50***b* opening and closing the upper opening surface of the spreader body **50***a*, a nozzle **50***c* provided in the spreader body **50***a*, and combined with the supply nozzle **60***b* of the connection tube **60**, and a plurality of spraying nozzles (not shown) provided in the side of the spreader body **50***a*, supplying water to the moisture absorption pad **20**.

[0034] Accordingly, when the impeller assembly **70** is activated, the water contained in the water collector **15** is introduced via the inhaling nozzle **60***a*, and then is introduced into the spreader body **50***a*. via the supply nozzle **60***b* and the nozzle **50***c* of the water spreader **50**, in turn.

[0035] The water introduced into the spreader body **50***a* is sprayed to the moisture absorption pad **20** via the plurality of spraying nozzles formed in the side of the spreader body **50***a*.

[0036] Meanwhile, the impeller assembly **70** for pumping the water contained in the water collector **15** into the spreader body **50***a* via the connection tube **60** is schematically shown in **FIGS. 4 and 5**.

[0037] As shown in **FIGS. 4 and 5**, the impeller assembly includes: impeller wings **71** rotatably provided in the water collector **15**; a rotational shaft **72** whose one end is combined with the impeller wings **71** to rotate the impeller wings **71** and other end is disposed at the central portion in the casing **10**; a driven gear **73** combined with the other end of the rotational shaft **72**; and a driving gear **74** integrally installed on the driving shaft **81** of a driving motor **80** rotating the air blowing fan **30**, and mutually combined with the driven gear **73** to rotate the driven gear **73**.

[0038] An impeller cap **75** is installed in the outer side of the impeller wings **71**.

[0039] In order to rotate the impeller wings **71**, the conventional art employs a pulley and belt structure. However, the air cooler adopting the operational structure of the impeller assembly according to the present invention connects the driven gear **73** directly with the driving gear **74** installed on the driving shaft **81** of the driving motor **80**, in order to rotate impeller wings **71** consistently irrespective of the temperature change in the atmosphere, which is advantageous for high-speed rotation of impeller wings **71**, and which thus remarkably suppress its durability from lowering due to wear of the parts.

[0040] As an embodiment, the driving gear **74** installed on the driving shaft **81** of the driving motor **80** and the driven gear installed on the rotational shaft **72** are rotatably combined with each other, and implemented by a pair of bevel gears whose rotational direction is varied.

[0041] In this case, when the driving motor **80** is driven, the driving gear **74** and the driven gear **73** which are implemented by a pair of bevel gears which are slantly engaged with each other are rotated directly, to thereby rotate the impeller wings **71**.

[0042] Also, as another embodiment of the present invention, a worm is provided in one side of the driving gear **74** installed on the driving shaft **81** of the driving motor **80** and the driven gear installed on the rotational shaft **72**, and a worm gear is provided in the other side thereof.

[0043] The worm and worm gear structure can also rotate the impeller wings **71** consistently by a gear operation of a mutual combination of a worm and a worm gear irrespective of the external air temperature change, and is advantageous for a high speed rotation of the impeller wings **71**.

[0044] As described above, since the present invention rotates the impeller wings by using the mutually engaged gears, it can remarkably suppress lowering of the durability due to wear of the belt occurring in the belt and pulley structure of the conventional art.

[0045] The operational process of the air cooler in which the present invention is applied will be described as follows.

[0046] First, when power is applied, the driving motor **80** is rotated, and then the driving shaft **81** of the driving motor **80** is rotated. Then, the driven gear **73** mutually engaged with the driving gear **74** integrally installed on the driving shaft **81** is rotated.

[0047] Accordingly, the rotational shaft **72** supported and engaged with the driven gear **73** is also rotated together with the driven gear **73**.

[0048] As a result, as the rotational shaft **72** rotates, the impeller wings **71** provided in the lower portion of the rotational shaft **72** also start to rotate.

[0049] Thus, when the impeller wings **71** starts to rotate, the water contained in the water collector **15** is introduced via the inhaling nozzle **60***a*, and then is introduced via the supply nozzle **60***b* and the nozzle **50***c* of the water spreader **50**, in turn.

[0050] As the water introduced into the spreader body **50***a* is sprayed into the moisture absorption pad **20** via the plurality of spraying nozzles formed in the side of the spreader body **50***a*, the moisture absorption pad **20** is soaked by the sprayed water.

[0051] Meanwhile, as an air blowing fan **30** provided in the casing **10** rotates according to rotation of the driving motor **80**, the external air is inhaled via the air inhaling entrances **14***a* formed in the rear surface **14** of the casing **10** according to the rotational force of the air blowing fan **30**.

[0052] The inhaled air is filtered by the air filter **40**, and then is transferred to the moisture absorption pad **20**.

[0053] When air is supplied to the moisture absorption pad **20** via the air inhaling entrances **14***a*, an evaporation phenomenon occurs on the outer surface of the moisture absorption pad **20** by the supplied air, to thereby deprive the peripheral portion of latent heat.

[0054] The cooled air in the periphery of the moisture absorption pad **20** owing to the evaporated latent heat is discharged into the cooled air discharging exits **12***a* formed in the front surface **12** of the casing **10** by the air blowing fan **30**. As a result, users can feel the cooled air.

[0055] As described above, the air cooler adopting the operational structure of the impeller assembly according to the present invention can rotate the impeller wings **71** consistently by improving the structure of the impeller assembly **71**, irrespective of the external air temperature change, and is advantageous for a high speed rotation of the impeller wings **71**. Also, the present invention can remarkably suppress lowering of the durability due to wear of parts.

[0056] As described above, the present invention drives an impeller assembly of an air cooler through a gear structure, and provides an effect of maintaining a consistent rotation of the impeller wings irrespective of the external air temperature change, providing an advantageous high speed rotation thereof, and a remarkable suppression of its durability due to wear of parts, in comparison of the case that the impeller assembly is driven by using a conventional belt and pulley assembly.

[0057] The present invention is not limited in the above-described embodiments. It is apparent to one who is skilled in the art that there are many variations and modifications without departing off the spirit of the present invention and the scope of the appended claims.

What is claimed is:

1. An operational structure of an impeller assembly for an air cooler comprising: a casing having a water collector provided on the bottom thereof; a moisture absorption pad provided in the casing, for absorbing water; an air blowing fan which is disposed in front of the moisture absorption pad and rotates; a water spreader provided in the upper portion of the casing, spraying water to the moisture absorption pad; a connection tube connecting the water spreader and the water collector with each other; and an impeller assembly supplying water contained in the water collector to the water spreader through the connection tube,

wherein said impeller assembly comprises:

impeller wings rotatably provided in the water collector;

a rotational shaft whose one end is combined with the impeller wings to rotate the impeller wings and other end is disposed in the casing;

a driven gear combined with the other end of the rotational shaft; and

a driving gear integrally installed on the driving shaft of a driving motor rotating the air blowing fan, and mutually combined with the driven gear to rotate the driven gear.

2. The operational structure of an impeller assembly for an air cooler as claimed in claim 1, wherein the driving gear on the driving shaft and the driven gear on the rotational shaft are made of a pair of bevel gears combined with each other so as to rotate mutually and whose rotational direction varies.

3. The operational structure of an impeller assembly for an air cooler as claimed in claim 1, wherein a worm is provided in one side of the driving gear on the driving shaft and the driven gear on the rotational shaft, and a worm gear is provided in the other side thereof.

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