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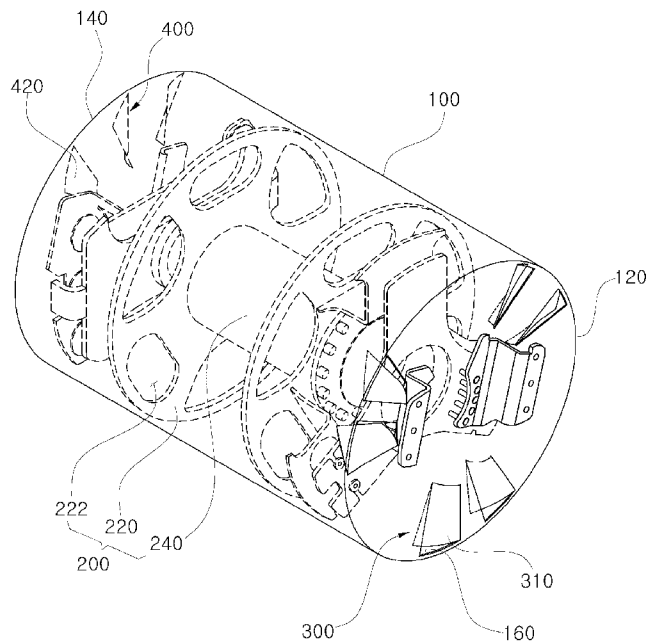
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[Continued on next page]

(54) Title: ROAD COMPACTOR HAVING DRUM COOLING FUNCTION

FIG. 1



(57) Abstract: The present disclosure relates to a road compactor. A road compactor according to the present disclosure includes an air circulation inducing member formed at both sides of a drum shell so as to allow cooled air to be supplied to an eccentric assembly that generates a vibration during the rotation of the drum shell. The air circulation inducing member includes a first guide fin formed at one side of the drum shell and a second guide fin formed at the other side of the drum shell, so that when the drum shell is rotated, the inflow of air from the outside of the drum shell and the outflow of air from the inside of the drum shell can be performed by the air circulation inducing member to cool the eccentric assembly.



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ROAD COMPACTOR HAVING DRUM COOLING FUNCTION

TECHNICAL FIELD

The present disclosure relates to a road compactor, and more particularly, to a
5 road compactor including a cooling means for an eccentric assembly disposed in a drum
shell.

BACKGROUND SURFACE OF THE INVENTION

In general, a road compactor is used to compact various ground surfaces including
10 an asphalt or soil surface.

The road compactor is provided with one or more drums, each of which includes
an eccentric assembly built therein to generate a vibration while being rollingly
eccentrically rotated so as to compact the ground surfaces. A compaction operation is
15 performed by the vibration generated through the high-speed rotation of the eccentric
assembly.

Thus, a plurality of head plates and an eccentric tube for interconnecting the
plurality of head plates are mounted in the drum.
20

The eccentric tube includes an eccentric mass formed therein. The eccentric tube
supplies lubricating oil and includes a bearing to cool heat generated during the high-speed
eccentric rotation of the eccentric assembly and reduce a frictional impact.

25 In regard to the road compactor, there has been disclosed a vibratory system for a
compacting vehicle of U.S. Patent No. 7,674,070 B2. This patent is directed to a
compacting vehicle including a frame and at least one compacting drum rotatably
connected with the frame.

30 The vibratory system for a compacting vehicle includes a plurality of weights
disposed within the drum so as to allow the rotation of the weights about an axis to be
induced, and a sensor configured to sense at least one of the weights.

The conventional road compactor permits the eccentric mass disposed within the eccentric tube to be rotated at high speed, resulting in generation of an excessive amount of heat. In order to cool the heated eccentric tube, lubricating oil is supplied to the eccentric assembly to help with cooling and lubrication of the bearing and the eccentric assembly.

The conventional road compactor, however, has a limitation in the cooling of the eccentric assembly by the lubricating oil, and the driving parts including the bearing may be damaged due to the high-speed rotation of the eccentric tube for a long period of time. Therefore, there is a need for a cooling system that can rapidly release the high-temperature heat generated in the drum.

SUMMARY OF THE INVENTION

The present disclosure has been made to solve the above-mentioned problems, and an objective of the present disclosure is to provide a road compactor that can cool an eccentric assembly even without using a separate energy and thus extend the lifespan of lubricating oil, a bearing, or the like.

A road compactor in accordance with an embodiment of the present disclosure includes an air circulation inducing member formed at both sides of a drum shell so as to allow cooled air to be supplied to an eccentric assembly that generates a vibration during the rotation of the drum shell. The air circulation inducing member includes a first guide fin formed at one side of the drum shell and a second guide fin formed at the other side of the drum shell, so that when the drum shell is rotated, the inflow of air from the outside of the drum shell and the outflow of air from the inside of the drum shell can be performed by the air circulation inducing member to cool the eccentric assembly.

ADVANTAGEOUS EFFECTS OF THE INVENTION

In accordance with an embodiment of the present disclosure, the eccentric assembly disposed within the drum shell is cooled using air introduced into the drum shell from the outside in the process of rotation of the drum shell on the ground surface so that

the cooling efficiency can be improved even without consuming any separate external power.

As such, the cooling efficiency is improved, thereby extending the lifespan of the lubricating oil, the bearing or the like.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a drum shell in accordance with an embodiment of the present disclosure.

FIG. 2 is a cross-sectional view showing a drum assembly in accordance with an embodiment of the present disclosure.

FIG. 3 is a right side view showing a drum assembly in accordance with an embodiment of the present disclosure.

FIG. 4 is a perspective view of FIG. 3.

FIG. 4 is a left side view showing a drum assembly in accordance with an embodiment of the present disclosure.

FIG. 6 is a perspective view of FIG. 5.

FIG. 7 is a perspective view showing a state in which a road compactor including a drum assembly in accordance with an embodiment of the present disclosure is driven forwardly.

FIG. 8 is a perspective view showing a state in which a road compactor including a drum assembly in accordance with an embodiment of the present disclosure is driven reversely.

Explanation on symbols

100: drum shell

160: opening

200: eccentric assembly

220: head plate

240: eccentric tube

300: first guide fin

400: second guide fin

310, 420: vane

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. While the present disclosure will be described in conjunction with the following embodiments, it will be understood that they are not intended to limit the present disclosure to these embodiments alone. On the contrary, the present disclosure is intended to cover alternatives, modifications, and equivalents which may be included within the spirit and scope of the present disclosure as defined by the appended claims. Furthermore, in the following detailed description of the present disclosure, numerous specific details are set forth in order to provide a thorough understanding of the present disclosure. However, embodiments of the present disclosure may be practiced without these specific details.

In the drawings, for the sake of a clearer understanding of the present invention, sizes or shapes of elements illustrated in the drawings may be exaggerated for clarity and convenience of explanation. Also, the following terms particularly defined in consideration of the configuration and function of the present invention may vary according to an intention of a user or an operator or according to custom. Therefore, definition of such terms should be made based on overall contents of the specification.

FIG. 1 is a perspective view showing a drum shell in accordance with an embodiment of the present disclosure, FIG. 2 is a cross-sectional view showing a drum assembly in accordance with an embodiment of the present disclosure, FIG. 3 is a right side view showing a drum assembly in accordance with an embodiment of the present disclosure, FIG. 4 is a perspective view of FIG. 3, FIG. 4 is a left side view showing a drum assembly in accordance with an embodiment of the present disclosure, FIG. 6 is a perspective view of FIG. 5, FIG. 7 is a perspective view showing a state in which a road compactor including a drum assembly in accordance with an embodiment of the present disclosure is driven forwardly, and FIG. 8 is a perspective view showing a state in which a road compactor including a drum assembly in accordance with an embodiment of the present disclosure is driven reversely.

As shown in FIGs. 1 to 8, a road compactor according to the present disclosure includes a drum shell 100 mounted on a vehicle body, an eccentric assembly 200 mounted in the drum shell to generate a vibration, and an air circulation inducing member formed at both sides of the drum shell to induce the flow of cooled air.

5

The drum shell 100 is rotatably coupled to a frame 920 formed at both sides of a vehicle body 900. A shaft respectively formed at both sides of the drum shell 100 is coupled to the frame 920 by means of bearings.

10

The drum shell 100 is formed in a generally cylindrical shape and has a heavy weight so that it compacts the ground surface by its weight and vibration while being rollingly rotated on the ground surface.

15

The drum shell 100 has a plurality of openings 160 formed on both sides thereof so as to allow air to flow in or out therethrough.

The openings 160 are formed by partially incising each of the both sides of the drum shell 100 to form vanes 310 and 420, which will be described later.

20

The eccentric assembly 200 is mounted in the drum shell 100 to generate a vibration for application to the drum shell 100 to provide a compacting force.

25

The eccentric assembly 200 includes: a plurality of head plates 220 mounted in the drum shell in such a manner as to be spaced apart from each other by a predetermined distance, each head plate having a plurality of vent holes 222 formed thereon; and an eccentric tube having an eccentric mass formed therein, the eccentric tube being configured to interconnect the plurality of head plates 220.

30

The detailed configuration of the eccentric assembly 200 is well-known in the art, and thus the detailed description thereof will be omitted to avoid redundancy.

The present disclosure enables the flow of air for cooling to be induced to the eccentric assembly 200, and includes a configuration for promoting the cooling of the eccentric assembly 200 through an increase in the amount of air.

5 As an example, an air circulation inducing member is provided at both sides of the drum shell 100.

 The air circulation inducing member includes a first guide fin 300 formed at one side of the drum shell 100 and a second guide fin 400 formed at the other side of the drum
10 shell 100.

 Thus, although the drum shell 100 is rotated in a clockwise or counterclockwise direction along with the forward or reverse driving of a vehicle, the inflow of air from the outside of the drum shell and the outflow of air from the inside of the drum shell is
15 performed by the air circulation inducing member so that the eccentric assembly 200 can be cooled.

 The first guide fin 300 and the second guide fin 400 are formed radially in proximity to the openings 160 formed on both sides of the drum shell 100, respectively.
20

 The first guide fin 300 and the second guide fin 400 are formed bent inwardly of the drum shell, respectively.

 The first guide fin 300 and the second guide fin 400 include a plurality of vanes
25 310 and 420 that is formed opposed to each other in such a manner as to be bent and inclined, respectively.

 The plural vanes 310 and 420 are formed to have a twisting angle to promote the inflow and outflow of air.

30 The first guide fin 300 includes a first vane 310 that is formed in proximity to the openings 160 formed on one side 120 of the drum shell 100 in such a manner as to be

inclined in a direction of inducing the inflow of air from the outside during the forward driving of the drum shell 100.

As an example, the first vane 310 is configured such that three sets of first vanes 310 are arranged radially and equidistantly in a circumferential direction on one side 120 of the drum shell 100 with two first vanes making a set. It is, of course, to be noted that the first guide fin 300 is formed at an edge of one side 120 of the drum shell, but not at the central portion of the drum shell, which is coupled to the frame.

As shown in FIGs. 3 and 4, the first vane 310 is formed to have an inclined angle by being bent inwardly of the drum shell based on a right vertical line.

A portion indicated by a shadow line in FIG. 4 is the first vane 310 to facilitate distinction from the openings 160.

When the drum shell 100 is driven forwardly, the outside air can be introduced into the drum shell by the first guide fin 300 including the thus formed first vane 310.

Meanwhile, the second guide fin 400 includes a second vane 420 that is formed in proximity to the openings 160 formed on the other side 140 of the drum shell 100 in such a manner as to be inclined in a direction of inducing the inflow of air from the outside during the reverse driving of the drum shell 100.

As an example, the second vane 420 is configured such that two sets of second vanes 420 are arranged radially in a circumferential direction so as to be opposed to each other on the other side 140 of the drum shell 100 with three second vanes making a set. It is, of course, to be noted that the second guide fin 400 is formed at an edge of the other side 140 of the drum shell, but not at the central portion of the drum shell, which is coupled to the frame.

As shown in FIGs. 5 and 6, the second vane 420 is formed to have an inclined angle by being bent inwardly of the drum shell based on a right vertical line.

A portion indicated by a shadow line in FIG. 6 is the second vane 420 to facilitate distinction from the openings 160.

5 When the drum shell 100 is driven reversely, the outside air can be introduced into the drum shell by the second guide fin 400 including the thus formed second vane 420.

The operation of the present disclosure as constructed above will be described hereinafter.

10

As shown in FIG. 7, at least one drum shell 100 is mounted on a vehicle body 900. The drum shell 100 is rotatably coupled to a frame 920 in a state in which the first guide fin 300 and the second guide fin 400 are formed at both sides of the drum shell.

15 Then, when the forward driving of the vehicle is started, the eccentric assembly 200 disposed within the drum shell 100 is driven to generate a vibration so that a compacting operation is performed while the surface of the drum shell 100 is brought into close contact with the ground surface.

20 Further, a spiral shaped vortex generated by the first guide fin 300 formed at one side, i.e., the right side surface of the drum shell acts as an air suction force so that the outside air is introduced into the drum shell 100 through the openings 160 formed on one side 120 of the drum shell 100.

25 The air introduced into the drum shell 100 is moved while passing through the plural vent holes 222 of the right head plate 220, and cools the eccentric assembly 200 while coming into close contact with the outer surface of the eccentric assembly 200.

30 On the contrary, a spiral shaped vortex generated by the second guide fin 400 formed at the other side, i.e., the left side surface of the drum shell acts as an air discharge force so that the inside air is discharged to the outside of the drum shell 100 through the openings 160 formed on the other side 140 of the drum shell 100.

Meanwhile, as shown in FIG. 8, when the reverse driving of the vehicle is started, the eccentric assembly 200 disposed within the drum shell 100 is driven to generate a vibration so that a compacting operation is performed while the surface of the drum shell 100 is brought into close contact with the ground surface.

Further, a spiral shaped vortex generated by the second guide fin 400 formed at the other side, i.e., the left side surface of the drum shell acts as an air suction force so that the outside air is introduced into the drum shell 100 through the openings 160 formed on the other side 140 of the drum shell 100.

The air introduced into the drum shell 100 is moved while passing through the plural vent holes 222 of the left head plate 220, and cools the eccentric assembly 200 while coming into close contact with the outer surface of the eccentric assembly 200. In this case, the flow direction of air during the reverse driving of the vehicle is opposite to that of air during the forward driving of the vehicle.

On the contrary, a spiral shaped vortex generated by the first guide fin 300 formed at one side, i.e., the right side surface of the drum shell acts as an air discharge force so that the inside air is discharged to the outside of the drum shell 100 through the openings 160 formed on one side 120 of the drum shell 100.

While the present invention has been described in connection with the exemplary embodiments illustrated in the drawings, they are merely illustrative and the invention is not limited to these embodiments. It will be appreciated by a person having an ordinary skill in the art that various equivalent modifications and variations of the embodiments can be made without departing from the spirit and scope of the present invention. It is obvious that such modifications and variations fall within the spirit and scope of the appended claims.

Claims

1. A road compactor comprising:

5 a drum shell including a plurality of openings formed on both sides thereof so as to allow air to flow in or out therethrough, and configured to compact a ground surface while being rollingly rotated on the ground surface;

a plurality of head plates mounted in the drum shell in such a manner as to be spaced apart from each other by a predetermined distance, each head plate having a plurality of vent holes formed thereon;

10 an eccentric assembly comprising an eccentric tube having an eccentric mass formed therein to provide a vibration, the eccentric tube being configured to interconnect the plurality of head plates; and

an air circulation inducing member formed at both sides of the drum shell to allow the flow of air for cooling to be induced to the eccentric assembly, the air circulation inducing member comprising a first guide fin formed at one side of the drum shell and a
15 second guide fin formed at the other side of the drum shell,

whereby when the drum shell is rotated, the inflow of air from the outside of the drum shell and the outflow of air from the inside of the drum shell are performed by the air circulation inducing member to cool the eccentric assembly.

20

2. The road compactor according to claim 1, wherein the first guide fin and the second guide fin are formed radially in proximity to the openings of the drum shell, respectively.

25 3. The road compactor according to claim 2, wherein the first guide fin and the second guide fin are formed bent inwardly of the drum shell, respectively.

4. The road compactor according to claim 3, wherein each of the first guide fin and the second guide fin comprises a plurality of vanes that is formed opposed to each
30 other in such a manner as to be bent and inclined, respectively.

5. The road compactor according to claim 4, wherein the first guide fin comprises a first vane that is formed in proximity to the openings formed on one side of the drum shell in such a manner as to be inclined in a direction of inducing the inflow of air from the outside during the forward driving of the drum shell, and

5 the second guide fin comprises a second vane that is formed in proximity to the openings formed on the other side of the drum shell in such a manner as to be inclined in a direction of inducing the inflow of air from the outside during the reverse driving of the drum shell.

10 6. The road compactor according to claim 5, wherein the first vane is configured such that three sets of first vanes are arranged radially and equidistantly in a circumferential direction on one side of the drum shell with two first vanes making a set.

15 7. The road compactor according to claim 5, wherein the second vane is configured such that two sets of second vanes are arranged radially in a circumferential direction so as to be opposed to each other on the other side of the drum shell with three second vanes making a set.

FIG. 1

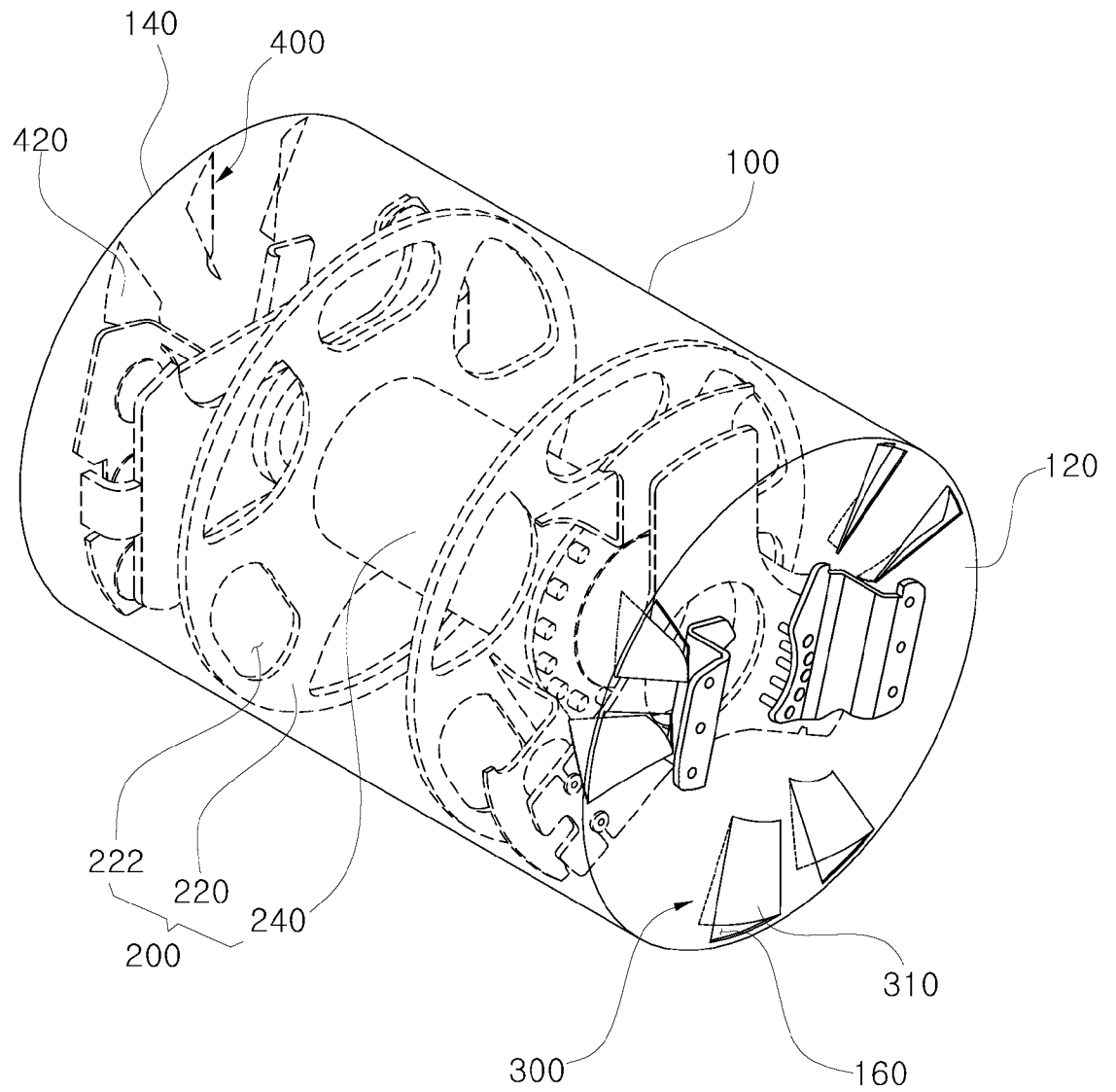


FIG. 2

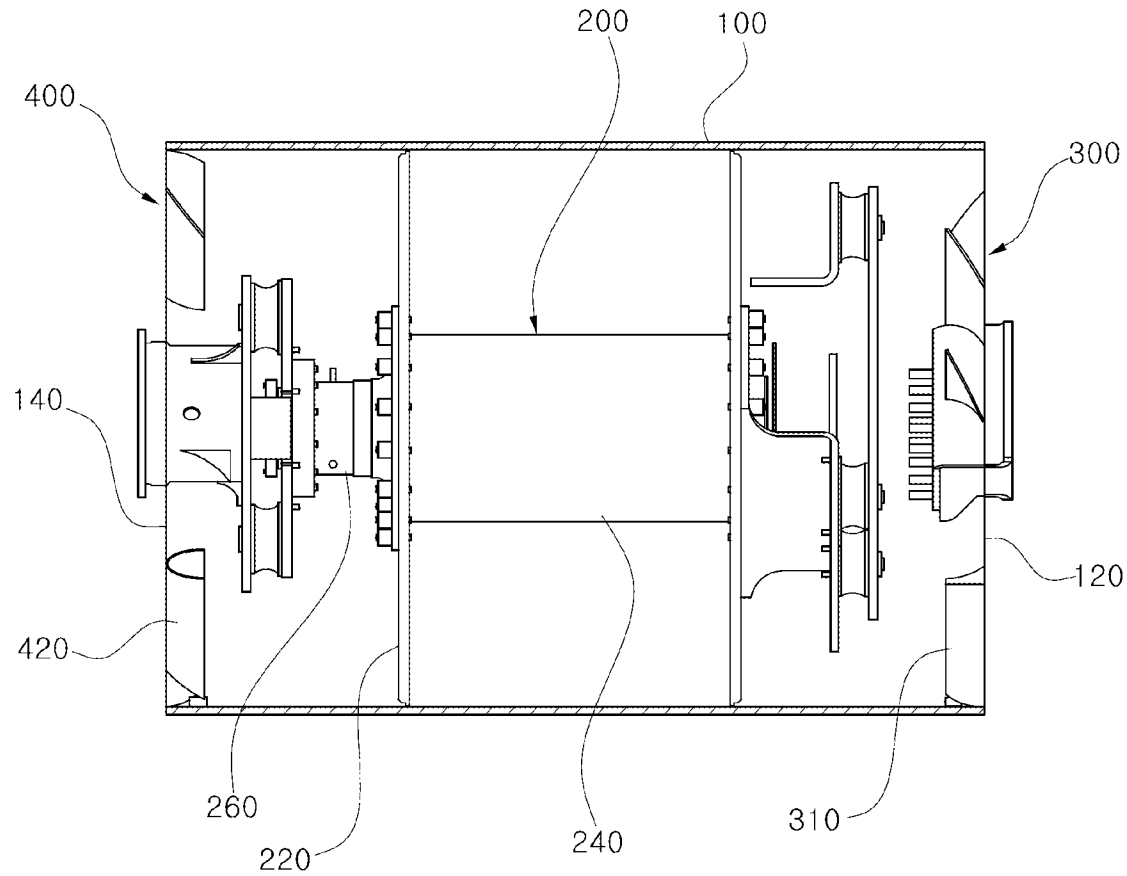


FIG. 3

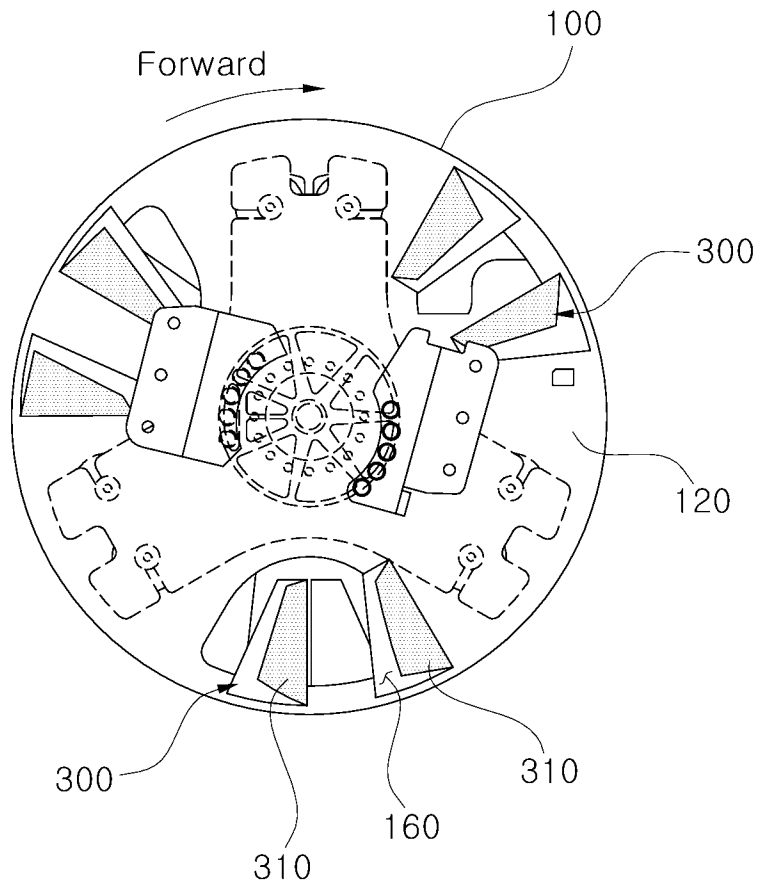


FIG. 4

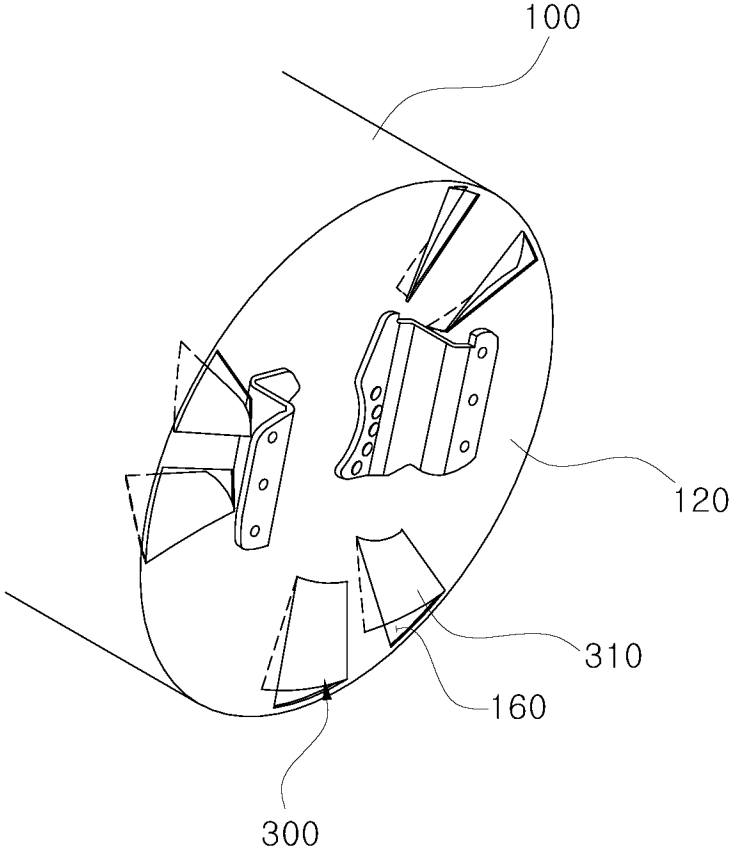


FIG. 5

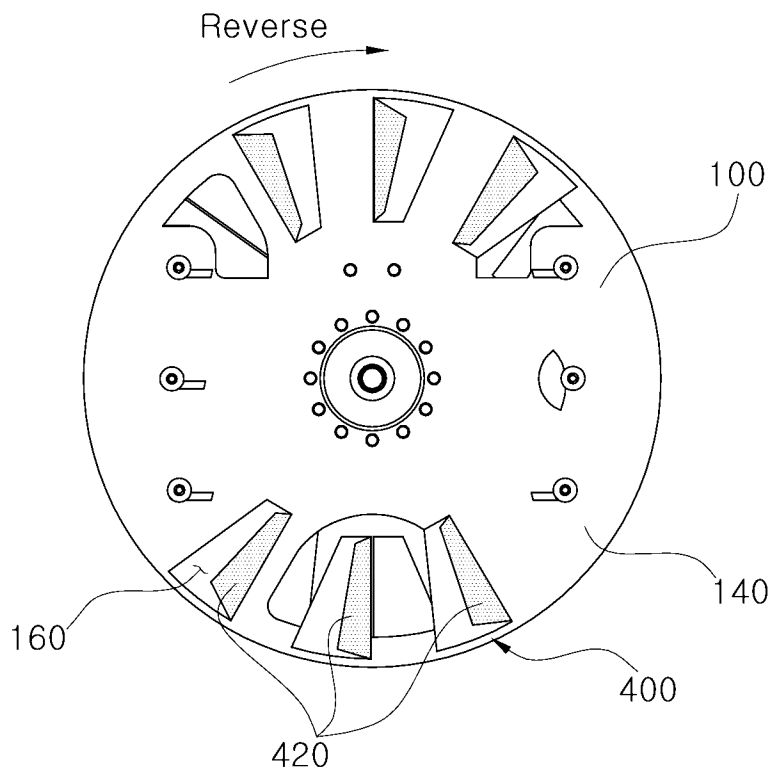


FIG. 6

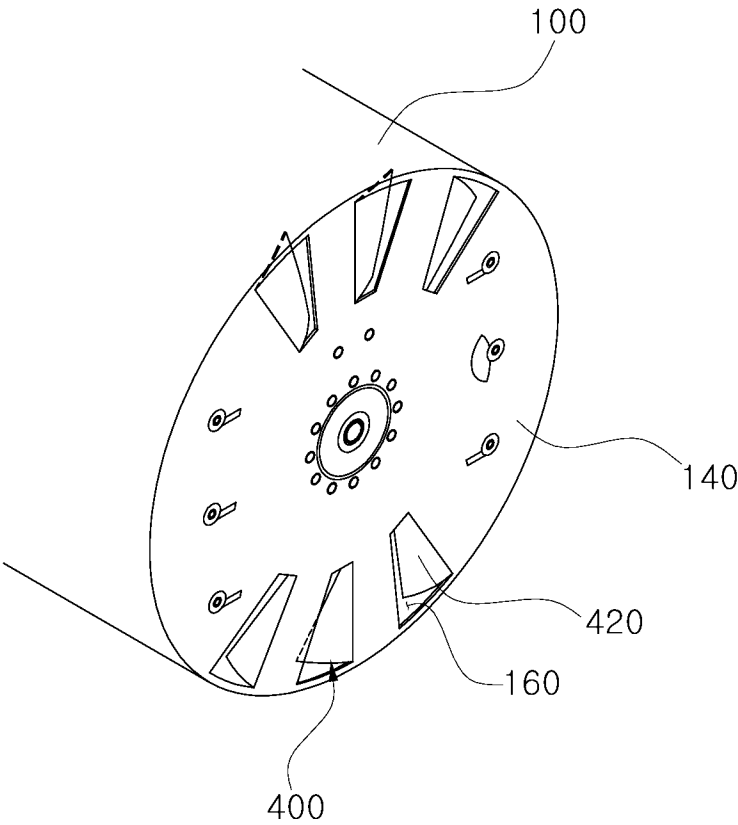


FIG. 7

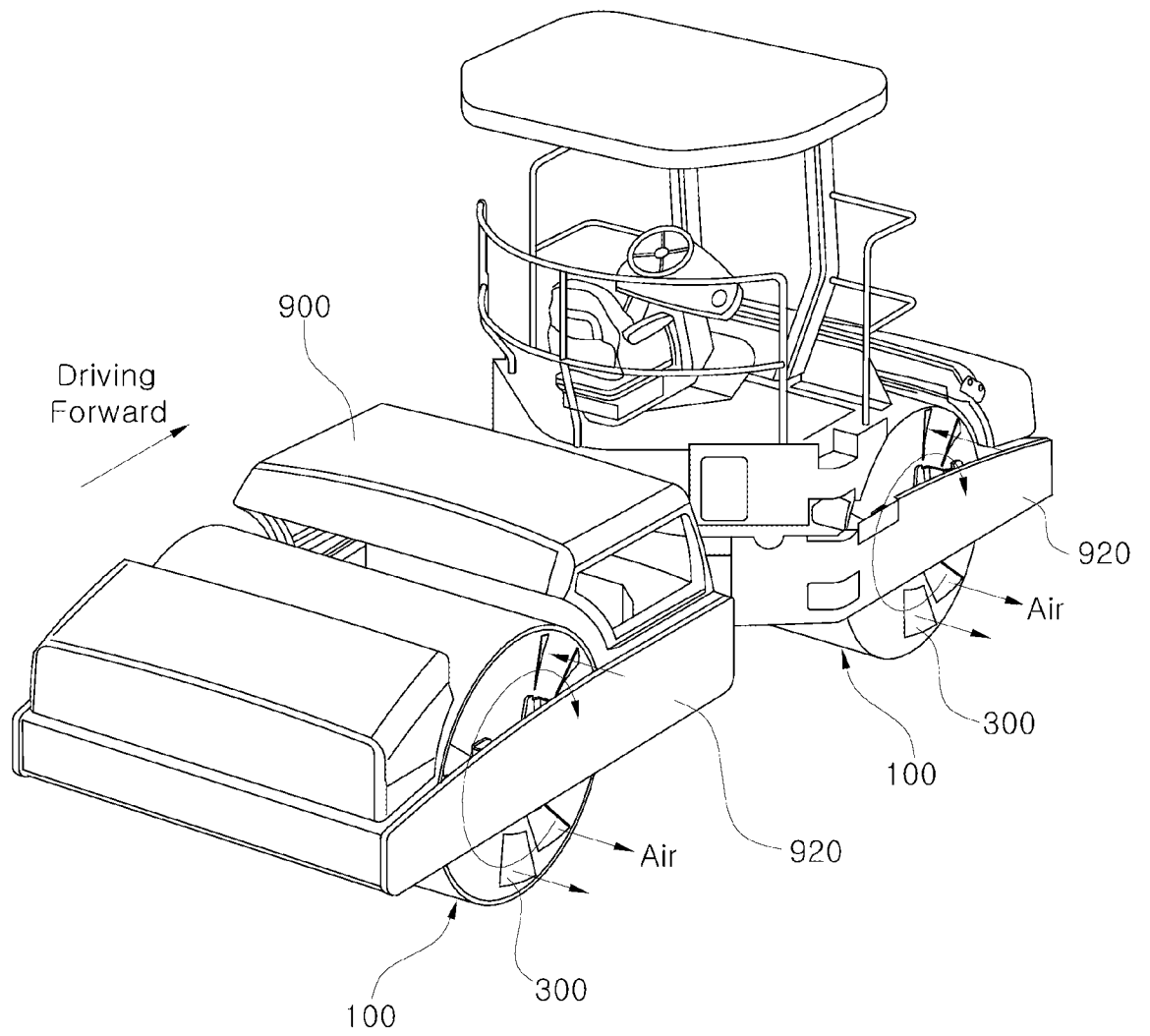
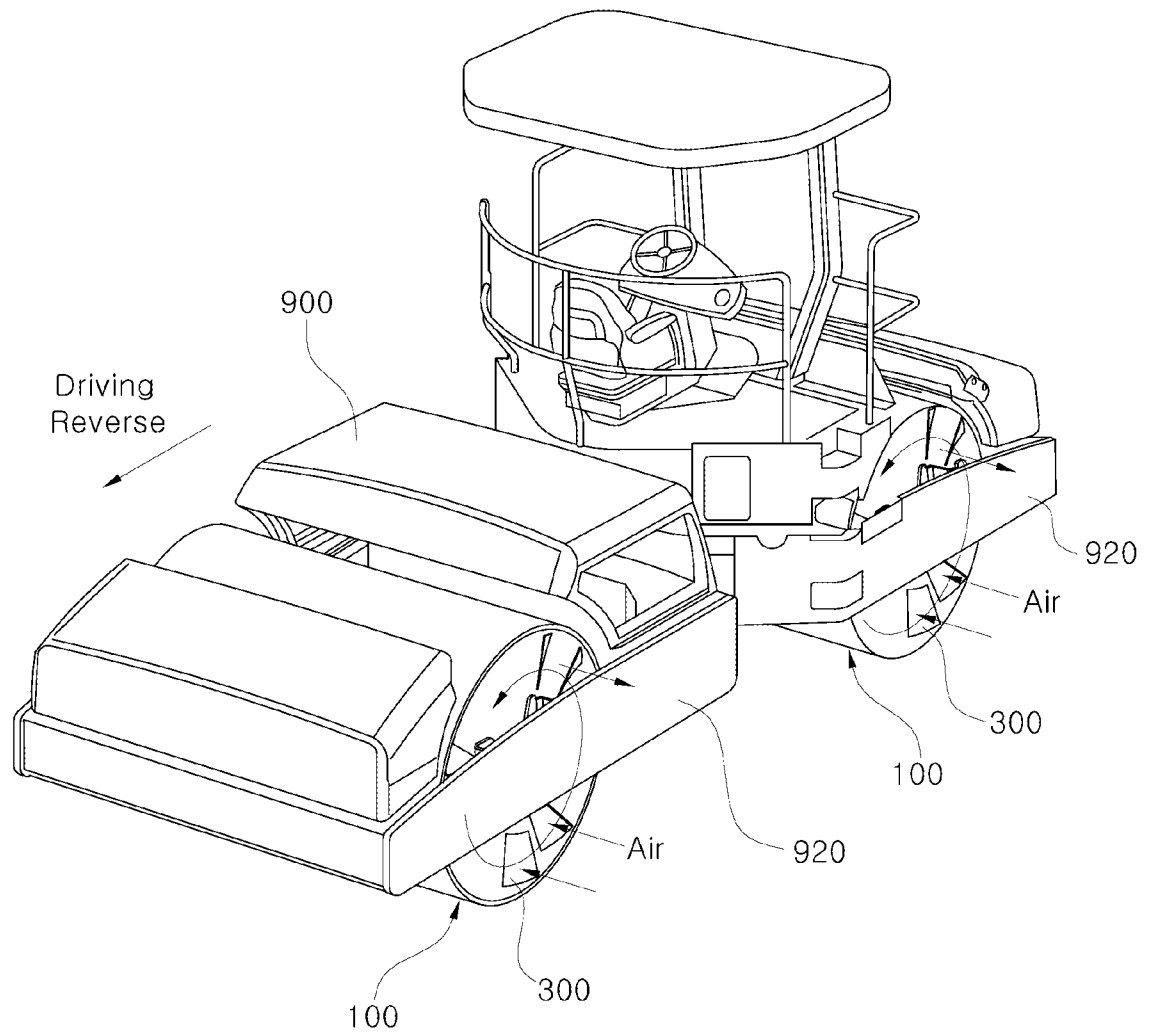


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/047139**A. CLASSIFICATION OF SUBJECT MATTER****E01C 19/28(2006.01)i**

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)

E01C 19/28; E01C 19/34; E01C 19/38

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: road compactor, drum, cooling, opening, vent hole, eccentric mass, vibration, eccentric tube, air circulation inducing member, and guide fin

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011-0158745 A1 (OETKEN et al.) 30 June 2011 See paragraphs [0017]–[0022] and figures 1–4.	1–7
A	US 6551020 B2 (SWANSON et al.) 22 April 2003 See paragraphs [0017], [0019], [0023], [0027] and figures 1–3.	1–7
A	US 2004-0120767 A1 (POTTS et al.) 24 June 2004 See abstract, paragraphs [0022]–[0024], and figures 1–4.	1–7
A	JP 06-287908 A (SAKAI JUKOGYO K.K.) 11 October 1994 See paragraphs [0011]–[0012] and figures 1–2.	1–7
A	JP 10-266116 A (MIKASA SANGYO K.K.) 06 October 1998 See paragraphs [0028]–[0030] and figures 1–3.	1–7

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

13 April 2015 (13.04.2015)

Date of mailing of the international search report

16 April 2015 (16.04.2015)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2014/047139

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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