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(54) Title: A SYSTEM FOR IMPARTING ROTARY MOTION TO A WHEEL

(57) Abstract: A wheel (302) and a system (300) for generating torque at the wheel (302) is disclosed. In some embodiments, the wheel (302) may include a plurality of chambers (304) positioned along the circumference of the wheel (302). Each of the plurality of chambers (304) may be fluidically coupled to at least one of the remaining plurality of chambers (304) via one or more associated fluid passageways, to allow a fluid to traverse therebetween. The wheel (302) may further include a fluid pumping system comprising one or more pumps. Each of the one or more pumps may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers (304) via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers (304), to generate torque at the wheel (302).

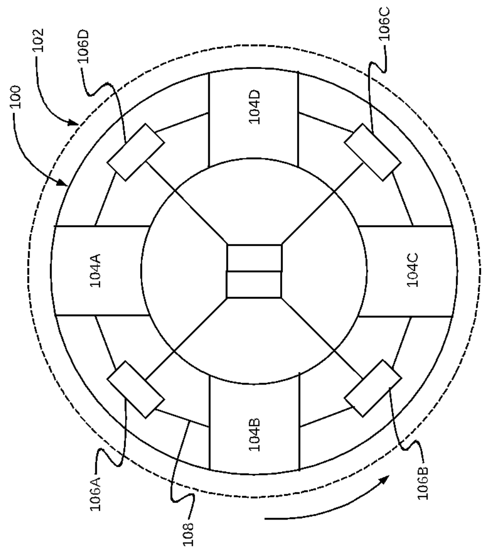

FIG. 1

<u>FORM 2</u>

THE PATENTS ACT 1970

(39 Of 1970)

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The Patent Rules, 2003

Complete Specification

(See Section 10 and Rule 13)

1. TITLE OF THE INVENTION

A System for Imparting Rotary Motion to a Wheel

2. APPLICANT(S)

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3. PREAMBLE TO THE DESCRIPTION

COMPLETE

The following specification particularly describes the invention and the manner in which it is performed.

DESCRIPTION

Technical Field

[001] This disclosure relates generally to generating torque, and more particularly to a system and a wheel for generating torque to therefore impart rotary motion to the wheel, or assist or resist rotary motion of the wheel.

BACKGROUND

[002] Some vehicles like heavy vehicles and smart vehicles, or movable machinery like oil drilling apparatus, may require special mechanisms for performing movement. The conventional mechanisms, for example, internal combustion engines may not be apt or enough for these vehicles or movable machinery for various reasons including requirement of high torque and power, high maintenance, and shortage of space.

[003] It may be desirable to have a system capable of generating torque, and therefore, imparting rotary motion to one or more wheels of these vehicles or movable machinery. Further, it may be advantageous if mechanisms implemented by these systems for causing movement in the heavy vehicles or movable machinery are simple mechanisms, which are easy and safe to use and maintain, economical, and highly effective.

SUMMARY

[004] In one embodiment, a wheel is disclosed. The wheel may include a plurality of chambers positioned along the circumference of the wheel. Each of the plurality of chambers may include one or more passageways. Each of the plurality of chambers may be fluidically coupled to at least one of the remaining plurality of chambers via the one or more associated fluid passageways, to allow a fluid to traverse therebetween. The wheel may further include a fluid pumping system comprising one or more pumps. Each of the one or more pumps may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers, to generate torque at the wheel.

[005] In another embodiment, a system for generating torque at a wheel is disclosed. The system may include a plurality of chambers configured to be fitted along the circumference of the wheel. Each of the plurality of chambers may include one or more passageways. Each of the plurality of chambers may be fluidically coupled to at least one of the remaining plurality of chambers via the one or more associated fluid passageways, to allow a fluid to traverse therebetween. The system may further include one or more pumps. Each of the one or more pumps may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers, to generate torque at the wheel.

[006] In another embodiment, a vehicle is disclosed. The vehicle may include one or more wheels. The vehicle may further include one or more systems for generating torque at the one or more wheels. Each of the one or more systems may be coupled to an associated wheel of the one or more wheels. Further, each of the one or more systems may include a plurality of chambers positioned along the circumference of the wheel. Each of the plurality of chambers may include comprising one or more passageways. Each of the plurality of chambers may be fluidically coupled to at least one of the remaining plurality of chambers via the one or more associated fluid passageways, to allow a fluid to traverse therebetween. The vehicle may further include one or more pumps. Each of the one or more pumps may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers, to generate torque at the wheel.

BRIEF DESCRIPTION OF THE DRAWINGS

[007] The accompanying drawings, which are incorporated in and constitute a part of this disclosure, illustrate exemplary embodiments and, together with the description, serve to explain the disclosed principles.

[008] **FIG. 1** illustrates a system for generating torque at a wheel, in accordance with an embodiment of the present disclosure.

[009] **FIG. 2** illustrates a wheel capable of generating torque, in accordance with an embodiment of the present disclosure.

[010] **FIG. 3** illustrates a system for generating torque at a wheel, in accordance with another embodiment of the present disclosure.

[011] **FIG. 4** illustrates a process of generating torque at the wheel, in accordance with another embodiment of the present disclosure.

DETAILED DESCRIPTION

[012] Exemplary embodiments are described with reference to the accompanying drawings. Wherever convenient, the same reference numbers are used throughout the drawings to refer to the same or like parts. While examples and features of disclosed principles are described herein, modifications, adaptations, and other implementations are possible without departing from the spirit and scope of the disclosed embodiments. It is intended that the following detailed description be considered as exemplary only, with the true scope and spirit being indicated by the following claims. Additional illustrative embodiments are listed below.

[013] Referring to FIG. 1, a system 100 for generating torque at a wheel is illustrated, in accordance with an embodiment of the present disclosure. The system 100 may be configured to be fitted to a wheel 102 (shown in dotted line in FIG. 1), for example, a wheel of a vehicle.

[014] The system 100 may include a plurality of chambers 104A, 104B, 104C, … (hereinafter, collectively, referred to as plurality of chambers 104). In some embodiments, the plurality of chambers 104 may be defined along an outer periphery of system 100. In other words, the plurality of chambers 104 may be defined along circumference of the wheel 102 on which the system 100 may be implemented. By way of an example, as shown in FIG. 1, the system 100 may include four chambers, i.e., a first chamber 104A, a second chamber 104B, a third chamber

104C, and a fourth chamber 104D. It may be further noted that the plurality of chambers 104 may be fluidically coupled to each other, via one or more associated fluid passageways 108, to allow a fluid to traverse between the plurality of chambers 104.

[015] It may be noted that in some embodiments, the fluid may be a high viscosity liquid metal. For example, the fluid may be a liquid metal having a viscosity higher than that of mercury (metal).

[016] The system 100 may further include a fluid pumping system. The fluid pumping system may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers 104, to dynamically change distribution of the fluid in the plurality of chambers 104. It may be understood that by way of dynamically changing distribution of the fluid in the plurality of chambers 104, weight concentration in the plurality of chambers 104 may also be dynamically changed. This dynamic change in the weight concentration along the circumference of the wheel 102 may generate torque at the wheel 102, thereby causing the wheel 102 to rotate about its center.

[017] In some embodiments, the fluid pumping system may include a plurality of fluid pumps 106A, 106B, 106C, … (hereinafter, collectively, referred to as plurality of fluid pumps 106). As shown in the FIG. 1, the plurality of fluid pumps 106 may include four fluid pumps viz. a first fluid pump 106A, a second fluid pump 106B, a third fluid pump 106C, and a fourth fluid pump 106D. Each of these plurality of fluid pumps 106 may be associated with at least one of the plurality of chambers 104.

[018] It may be noted that each of the plurality of fluid pumps 106 may be configured to selectively pump the fluid into an associated chamber from at least one of the remaining chambers of the plurality of chambers 104, to increase the fluid volume in the associated chamber. Further, each of the plurality of fluid pumps 106 may be configured to selectively pump out the fluid from an associated chamber to decrease fluid volume in that associated chamber. To this end, the each of the plurality of fluid pumps 106 may be fluidically coupled to associated one or more chambers 104 via fluid passageways 108.

[019] By way of an example, the first fluid pump 106A may be associated with the first chamber 104A and the second chamber 104B. Further, this first fluid pump 106A may selectively pump the fluid into an associated chamber from at least one of the remaining chambers of the plurality of chambers 104, to increase the fluid volume in the associated chamber. Further, the first fluid pump 106A may selectively pump out the fluid from the associated chambers, i.e., the first chamber 104A and the second chamber 104B, to decrease fluid volume in the first chamber 104A and the second chamber 104B. Further, in some embodiments, the entire volume of the fluid may be distributed within the plurality of chambers 104 at any given point of time.

[020] For example, at one point of time, the volume of fluid in the second chamber 104B may be 60% of the total volume of fluid. Further, at this point of time, the volume of fluid in the first chamber 104A, the third chamber 104C, and the fourth chamber 104D may be 20%, 10%, and 10%, of the total volume of fluid, respectively. Further, it may be understood that the weight concentration in the plurality of chambers 104 may be in proportion to the fluid volume distribution. As such, weight concentration in the second chamber 104B may be more than the weight concentration in the first chamber 104B, the third chamber 104C, and the fourth chamber 104D. This higher weight concentration in the second chamber 104B, under the influence of gravitation force, may generate a torque at the wheel 102 (to which the system 100 is fitted) to thereby rotate the wheel 102 in an anti-clockwise direction.

[021] It may be understood that the once the wheel 102 starts rotating in the anti-clockwise direction, position of each of the plurality of chambers 104 may start shifting. For example, after a period of time, when the wheel 102 has rotated 90 degrees anti-clockwise, the second chamber 104B may take position of the third chamber 104C, the first chamber 104A may take the position of the second chamber 104B, and so on. In order to continue the rotary movement of the wheel 102, the fluid may be redistributed among the plurality of chambers 104. As such, when the wheel 102 has rotated 90 degrees, fluid may be pumped into the first chamber 104A, and simultaneously fluid may be removed from the second chamber 104B, to increase the fluid concentration in the first chamber 104A, and decrease the fluid concentration in the second chamber 104B. This process of redistribution of the fluid may be continued as long as the rotary motion is desired.

[022] Referring now to FIG. 2, a wheel 202 capable of generating torque is illustrated, in accordance with an embodiment of the present disclosure. The wheel 202 may include a plurality of chambers 204, for example chambers 204A, 204B, 204C, 204D. In some embodiments, the plurality of chambers 204 may be defined along circumference of the wheel 202. By way of an example, the plurality of chambers 204 may be built into the rim of the wheel 202. The plurality of chambers 204 may be fluidically coupled to each other, via one or more associated fluid passageways 208, to allow a fluid to traverse between the plurality of chambers 204.

[023] The wheel 202 may further include a fluid pumping system which may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers 204, to dynamically change distribution of the fluid in the plurality of chambers 204, and therefore dynamically change weight concentration in the plurality of chambers 204. This dynamic change in the weight concentration along the circumference of the wheel 202 may generate torque at the wheel 202, thereby causing the wheel 202 to rotate about its center. The fluid pumping system may include a plurality of fluid pumps 206, for example, a first fluid pump 206A, a second fluid pump 206B, a third fluid pump 206C, and a fourth fluid pump 206D. Each of these plurality of fluid pumps 206 may be associated with at least one of the plurality of chambers 204. Each of the plurality of fluid pumps 206 may be configured to selectively pump the fluid into an associated chamber from at least one of the remaining chambers of the plurality of chambers 204, to increase the fluid volume in the associated chamber. Further, each of the plurality of fluid pumps 206 may be configured to selectively pump out the fluid from an associated chamber to decrease fluid volume in that associated chamber. To this end, the each of the plurality of fluid pumps 206 may be fluidically coupled to associated one or more chambers 204 via fluid passageways 208.

[024] In some embodiments, the diameter of the wheel 202 may be 24.5 inches (i.e., about 62 centimeters). However, the wheel may have a higher or a lower diameter as well.

[025] Referring now to FIG. 3, a system 300 (corresponding to system 100) for generating torque at a wheel 302 is illustrated, in accordance with another embodiment of the present disclosure. The system 300 may include a plurality of chambers 304A, 304B, 304C, …

(hereinafter, collectively, referred to as plurality of chambers 304). For example, the system 300 may include four chambers viz. a first chamber 304A, a second chamber 304B, a third chamber 304C, and a fourth chamber 304D. In some embodiments, the plurality of chambers 304 may be fluidically coupled to each other, via one or more associated fluid passageways, to allow a fluid to traverse therebetween.

[026] The system 300 may further include a fluid pumping system. The fluid pumping system may include a set of internal fluid pumps 306A, 306B, 306C, … (hereinafter, collectively, referred to as set of internal fluid pumps 306), and a set of external fluid pumps 312A, 312B, 312C, … (hereinafter, collectively, referred to as set of external fluid pumps 312). By way of an example, as shown in FIG. 3, the set of internal fluid pumps 306 may include four internal fluid pumps 306A-306D, and the set of external fluid pumps 312 may include four external fluid pumps 312A-312D.

[027] It may be noted that each of the set of internal fluid pumps 206 may be configured to selectively pump the fluid into an associated chamber from at least one of the remaining chambers of the plurality of chambers 304 to increase the fluid volume in the associated chamber. Each of the set of internal fluid pumps 306 may be further configured to selectively pump out the fluid from an associated chamber and transfer the fluid to at least one of the remaining chambers of the plurality of chambers 304 to decrease the fluid volume in the associated chamber. For example, the adjacent chambers of the plurality of chambers 304 may be separated by a wall 308, with an associated internal fluid pump positioned at the wall 308. The associated chamber may, therefore, cause the fluid in one chamber to flow across the wall 308 into the adjacent chamber. A passageway may, therefore, be provided through the wall 308 in form of a channel created through the wall 308. Further, the associated fluid pump may be fitted on this channel.

[028] As shown in FIG. 3, the system 300 may further include an accumulator 310 configured to store at least a portion of the fluid. In some embodiments, the accumulator 310 may be positioned substantially at the center of the wheel 102. The accumulator 310 may store a part volume of the total volume of the fluid in the system 300. In some embodiments, each of the set of external fluid pumps 312 may selectively pump the fluid into an associated chamber from the accumulator 310 to increase the fluid volume in an associated chamber. Further, each of the set of external fluid pumps 312 may selectively pump out the fluid from an associated chamber to decrease fluid volume in that associated chamber. To this end, in some embodiments, the set of external fluid pumps 312 may be coupled to a plurality of switches 314A, 314B, … (hereinafter, collectively, referred to as plurality of switches 314). By way of an example, each of the plurality of switches 314 may include a metal–oxide–semiconductor field-effect transistor (MOSFET).

[029] For example, an external fluid pump 312A may be coupled to an associated switch 314A, an external fluid pump 312B may be coupled to an associated switch 314B, and so on. Each of the plurality of switches 314 may electrically engage or disengage an associated external fluid pump 312A with electrical supply. By way of engaging and disengaging, each of the plurality of switches 314 may cause the associated external fluid to pump or not pump the fluid from the accumulator 310 to the associated chamber. For example, when the switch 314A is closed, the switch 314A may electrically engage the associated external fluid pump 312A with the electrical supply. Accordingly, the associated external fluid pump 312A may pump the fluid from the accumulator 310 into the associated chamber 304A. However, when the switch 314A is open, the switch 314A may electrically disengage the associated external fluid pump 312A from the electrical supply, and accordingly, the associated external fluid pump 312A may not operate and, therefore, may not pump the fluid from the accumulator 310 into the associated chamber 304A. By way of an example, the electrical supply may be direct current (DC) and each of the set of internal fluid pumps 306 and the set of external fluid pumps 312 may be powered by a direct current (DC) motor. Further, in some embodiments, each of the plurality of switches 314 may reverse the functionality of the associated external fluid pump. By way of reversing the functionality, each of the plurality of switches 314 may cause the associated external fluid to pump the fluid from the associated chamber and into the accumulator 310. For example, when the switch 314A is reversed, switch 314A may electrically engage the associated external fluid pump 312A with the electrical supply in a reverse functionality, and may cause the associated external fluid pump 312A to pump the fluid the chamber 304A into the accumulator 310.

[030] In some embodiments, the system 300 may further include an electronic control unit (ECU) (not shown in FIG. 3) which may monitor the position of the plurality of chambers 304.

The ECU may further control the operation of the plurality of switches 314 and control the pulse width modulation (PWM) of the set of external fluid pumps 312. The ECU may be programmed in order to selectively open or close the switches or reverse the switches, based on the position of each of the plurality of chambers 304, to selectively pump in or not pump in or pump out the fluid from an associated chamber. As such, the system 300 may be configured to redistribute the fluid within the plurality of chambers 304 through a combination of the set of internal fluid pumps 306, the set of external fluid pumps 312, and the accumulator 310.

[031] As mentioned above, the combination of the set of internal fluid pumps 306 and the set of external fluid pumps 312 may selectively pump in and selectively pump out the fluid from each of the plurality of chambers 304, to dynamically change distribution of the fluid in the plurality of chambers 304. By way of dynamically changing distribution of the fluid in the plurality of chambers 304, weight concentration in the plurality of chambers 304 may also change dynamically, which may cause the wheel 302 to rotate about its center.

[032] Referring now to FIG. 4, a process 400 of generating torque at the wheel 302 is illustrated, in accordance with an embodiment of the present disclosure. It may be desired to rotate the wheel 302 or assist in rotation of the wheel 302. In other words, it may be desired to generate the entire torque or a part of torque required to rotate the wheel 302.

[033] As such, in an initial stage 402, the wheel 302 may be at a first position undergoing or attempting to undergo a rotation in the clockwise direction (as shown by an arrow). In this stage 402, the volume of fluid in the first chamber 304A, the second chamber 304B, the third chamber 304C, and the fourth chamber 304D may be 5%, 5%, 60%, and 30%, respectively. As it will be understood, due to a relatively higher amount of volume of fluid in the third chamber 304C, the weight concentration in the third chamber 304C may be relatively higher. As a result of this weight distribution, a torque may be generated causing or assisting in rotation of the wheel 302 in the clockwise direction.

[034] In order to continue the generation of torque, it is there essential to re-establish a similar weight distribution in the chambers as in the initial stage 402. As such, the fluid may have to be redistributed in the chambers. To this end, by way of an example, in an intermediate stage 404, the fluid may be removed from the third chamber 304C by the associated internal pump 306D.

As such, the internal pump 306D may pump the fluid from the third chamber 304C into the fourth chamber 304D. Further, the fluid may be removed from the third chamber 304C by the associated external pump 312C. The external pump 312C may pump out the fluid from the third chamber 304C and transfer the fluid to the accumulator 310, to thereby decrease the fluid volume in the third chamber 304C. Furthermore, in the intermediate stage 404, the fluid may be added to the first chamber 304A. As such, the fluid may be added to the first chamber 304A by the associated external pump 312A. The external pump 312A may pump fluid into the first chamber 305A from the accumulator 310 to thereby increase the fluid volume in the first chamber 304A. Moreover, in the intermediate stage 404, the fluid may be added to the fourth chamber 304D. As mentioned above, the fluid may be added to the fourth chamber 304D by the associated internal pump 306D which may pump the fluid from the third chamber 304C into the fourth chamber 304D.

[035] As a result of this fluid distribution in the intermediate stage 404, the wheel 302 may assume a final stage 406. As shown in FIG. 4, in the final stage 406 upon undergoing rotation of about 90°. In the final stage 406, the weight distribution in the chambers similar to the initial stage 402 is re-established. Therefore, in the final stage 406, the volume of fluid in the first chamber 304A, the second chamber 304B, the third chamber 304C, and the fourth chamber 304D may be 30%, 5%, 5%, and 60%, respectively. Due to a relatively higher amount of volume of fluid in the fourth chamber 304D, the weight concentration in the fourth chamber 304D may be relatively higher, and as a result, a torque may be generated causing or assisting in further rotation of the wheel 302 in the clockwise direction. As such, this cycle of weight distribution through stages 402-406 may be repeated as long as it is desired to generate torque at the wheel 302.

[036] In some embodiments, the system 300 may be configured to provide braking functionality to the wheel 302. To this end, the system 300 may be configure to generate torque at the wheel to restrict rotation of the wheel 302 (instead of assisting the rotation of the wheel 302). For example, system 300 may generate torque in the opposite direction to which the wheel may be already rotating, in order to counter the torque already acting on wheel to rotate the wheel.

[037] It may be noted that the above wheel and the system may be implemented in a body which is required to perform movement from one place to another. For example, such body could be a vehicle, particularly, a heavy-duty vehicle required to perform tasks requiring high torque generation, such as towing, loading, excavating, etc.

[038] In some embodiments, the vehicle may include one or more wheels 102. For example, the vehicle may include four such wheels 102. The vehicle may further include one or more systems 100 for generating torque at the one or more wheels 102. Each of these one or more systems 100 may be coupled to an associated wheel of the one or more wheels 102. Further, each of the one or more systems 100 may include a plurality of chambers 104 positioned along the circumference of the wheel 102. Each of the plurality of chambers 104 may include one or more passageways, such that each of the plurality of chambers 104 may be fluidically coupled to at least one of the remaining plurality of chambers 104 via the one or more associated fluid passageways, to allow a fluid to traverse therebetween. The vehicle may further include one or more pumps. Each of the one or more pumps may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers 104 via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers 104 to generate torque at the wheel 102. The wheel is already explained in conjunction with FIG. 2.

[039] The techniques described above relate to a system for generating torque at a wheel for assisting or resisting rotary motion of the wheel. The above techniques provide for an alternative and convenient way of generating torque at the wheel. The system can be used to impart rotary motion to the wheel. Further, the system can used to assist in rotary motion of the wheel when the wheel is already performing rotary motion, by generating torque in the same orientation as of the initial torque acting on the wheel. Furthermore, the system can be used to apply brakes to the wheel, i.e., resist rotary motion of the wheel, by generating torque in the opposite orientation as of the initial torque acting on the wheel. The techniques provide for a more efficient way of generating torque with lower losses as compared to the conventional torque generating techniques, like using IC engine. Further, the techniques provide for a high torque and power, low maintenance, simple construction, low cost, and a compact solution for assisting or resisting motion of heavy vehicles or movable machinery.

[040] It is intended that the disclosure and examples be considered as exemplary only, with a true scope and spirit of disclosed embodiments being indicated by the following claims.

<u>We Claim</u>:

1. A wheel (302) comprising:

a plurality of chambers (304) positioned along the circumference of the wheel (302), each of the plurality of chambers (304) comprising one or more passageways, wherein each of the plurality of chambers (304) is fluidically coupled to at least one of the remaining plurality of chambers (304) via the one or more associated fluid passageways, to allow a fluid to traverse therebetween; and

a fluid pumping system comprising one or more pumps, wherein each of the one or more pumps is configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers (304) via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers (304), to generate torque at the wheel (302).

2. The wheel (302) as claimed in claim 1, wherein each of the one or more fluid pumps of the fluid pumping system is associated with one or more chambers of the plurality of chambers (304), wherein each of the one or more fluid pumps is configured to:

selectively pump the fluid into an associated chamber from at least one of remaining chambers of the plurality of chambers (304), via the one or more associated fluid passageways, to increase the fluid volume in the associated chamber; and

selectively pump out the fluid from an associated chamber to at least one of remaining chambers of the plurality of chambers (304), via the one or more associated fluid passageways, to decrease the fluid volume in the associated chamber.

3. The wheel (302) as claimed in claim 1, wherein the fluid is a high viscosity liquid metal.

4. The wheel (302) as claimed in claim 1, wherein the fluid pumping system comprises an accumulator (310) configured to store at least a portion of the fluid,

wherein the accumulator (310) is positioned substantially at the center of the wheel (302).

5. The wheel (302) as claimed in claim 2, wherein the one or more pumps of the fluid pumping system comprise at least one of:

a set of internal fluid pumps (306), wherein each of the set of internal fluid pumps (306) is configured to:

selectively pump the fluid into an associated chamber from at least one of the remaining chambers of the plurality of chambers (304) to increase the fluid volume in the associated chamber; or

selectively pump out the fluid from an associated chamber and transfer the fluid to at least one of the remaining chambers of the plurality of chambers (304) to decrease the fluid volume in the associated chamber; and

a set of external fluid pumps (312), wherein each of the set of external fluid pumps (312) is configured to:

selectively pump the fluid into an associated chamber from the accumulator (310) to increase the fluid volume in the associated chamber; or

selectively pump out the fluid from an associated chamber and transfer the fluid to the accumulator (310) to decrease the fluid volume in the associated chamber.

6. The wheel (302) as claimed in claim 1, wherein the plurality of chambers (304) is built into the rim of the wheel (302).

7. The wheel (302) as claimed in claim 1, wherein the torque generated at the wheel (302) is to at least:

impart rotary motion to the wheel (302), when the wheel (302) is stationary, or

assist in rotary motion of the wheel (302), when the wheel is undergoing rotary motion, or

resist the rotary motion of the wheel (302), when the wheel is undergoing rotary motion.

8. A system (300) for generating torque at a wheel (302), the system (300) comprising:

a plurality of chambers (304) configured to be fitted along the circumference of the wheel (302), each of the plurality of chambers (304) comprising one or more passageways, wherein each of the plurality of chambers (304) is fluidically coupled to at least one of the remaining plurality of chambers (304) via the one or more associated fluid passageways, to allow a fluid to traverse therebetween; and

one or more pumps, wherein each of the one or more pumps is configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers (304) via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers (304), to generate torque at the wheel (302).

9. The system (300) as claimed in claim 8, wherein each of the one or more pumps is associated with one or more chambers of the plurality of chambers (304), and wherein the one or more pumps comprise at least one of:

a set of internal fluid pumps (306), wherein each of the set of internal fluid pumps (306) is configured to:

selectively pump the fluid into an associated chamber from at least one of the remaining chambers of the plurality of chambers (304) to increase the fluid volume in the associated chamber; or

selectively pump out the fluid from an associated chamber and transfer the fluid to at least one of the remaining chambers of the plurality of chambers (304) to decrease the fluid volume in the associated chamber; and

a set of external fluid pumps (312), wherein each of the set of external fluid pumps (312) is configured to:

selectively pump the fluid into an associated chamber from an accumulator (310) to increase the fluid volume in the associated chamber; or

selectively pump out the fluid from an associated chamber and transfer the fluid to the accumulator (310) to decrease the fluid volume in the associated chamber.

10. A vehicle comprising:

one or more wheels (302); and

one or more systems (300) for generating torque at the one or more wheels (302), each of the one or more systems (300) coupled to an associated wheel of the one or more wheels (302), wherein each of the one or more systems (300) comprise:

a plurality of chambers (304) positioned along the circumference of the wheel (302), each of the plurality of chambers (304) comprising one or more passageways, wherein each of the plurality of chambers (304) is fluidically coupled to at least one of the remaining plurality of chambers (304) via the one or more associated fluid passageways, to allow a fluid to traverse therebetween; and

one or more pumps, wherein each of the one or more pumps is configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers (304) via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers (304), to generate torque at the wheel (302).

Dated this 11th day of March 2020

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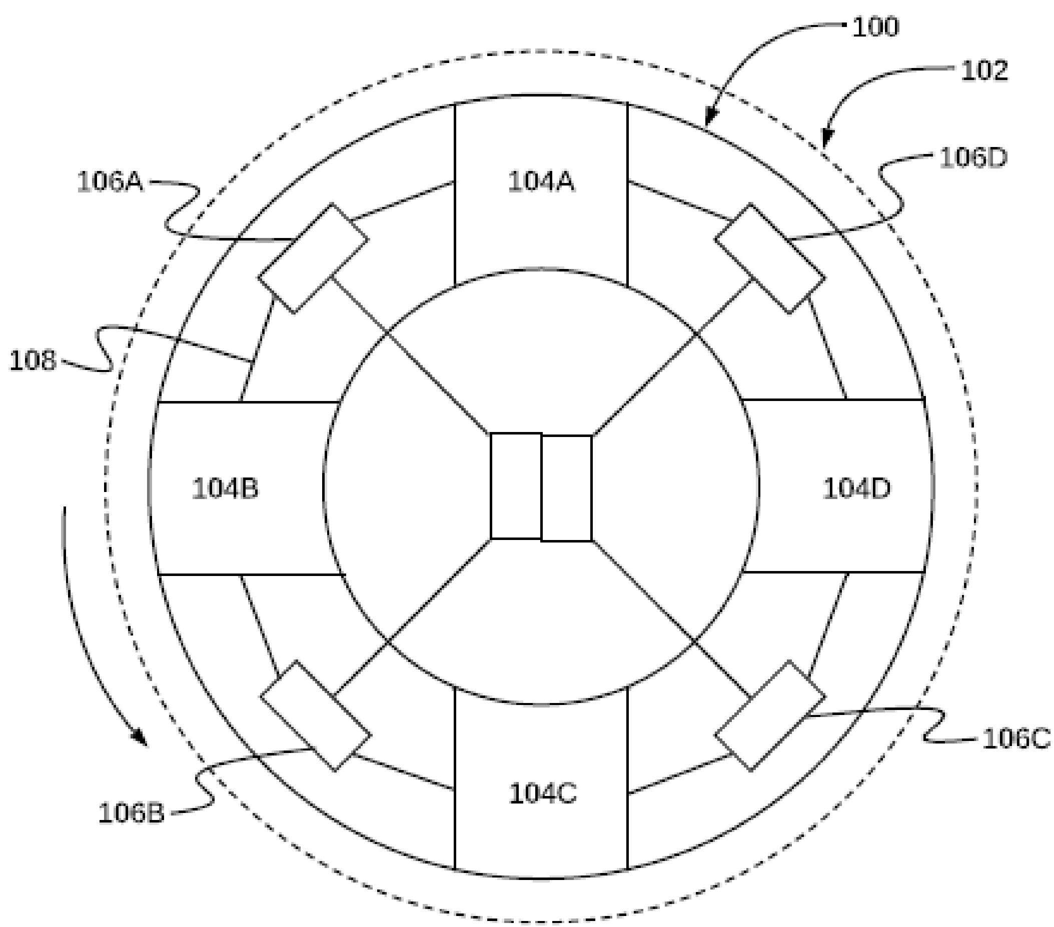
A SYSTEM FOR IMPARTING ROTARY MOTION TO A WHEEL

ABSTRACT

A wheel (302) and a system (300) for generating torque at the wheel (302) is disclosed. In some embodiments, the wheel (302) may include a plurality of chambers (304) positioned along the circumference of the wheel (302). Each of the plurality of chambers (304) may be fluidically coupled to at least one of the remaining plurality of chambers (304) via one or more associated fluid passageways, to allow a fluid to traverse therebetween. The wheel (302) may further include a fluid pumping system comprising one or more pumps. Each of the one or more pumps may be configured to selectively pump in and selectively pump out the fluid from each of the plurality of chambers (304) via the one or more associated fluid passageways, to dynamically change distribution of the fluid in the plurality of chambers (304), to generate torque at the wheel (302).



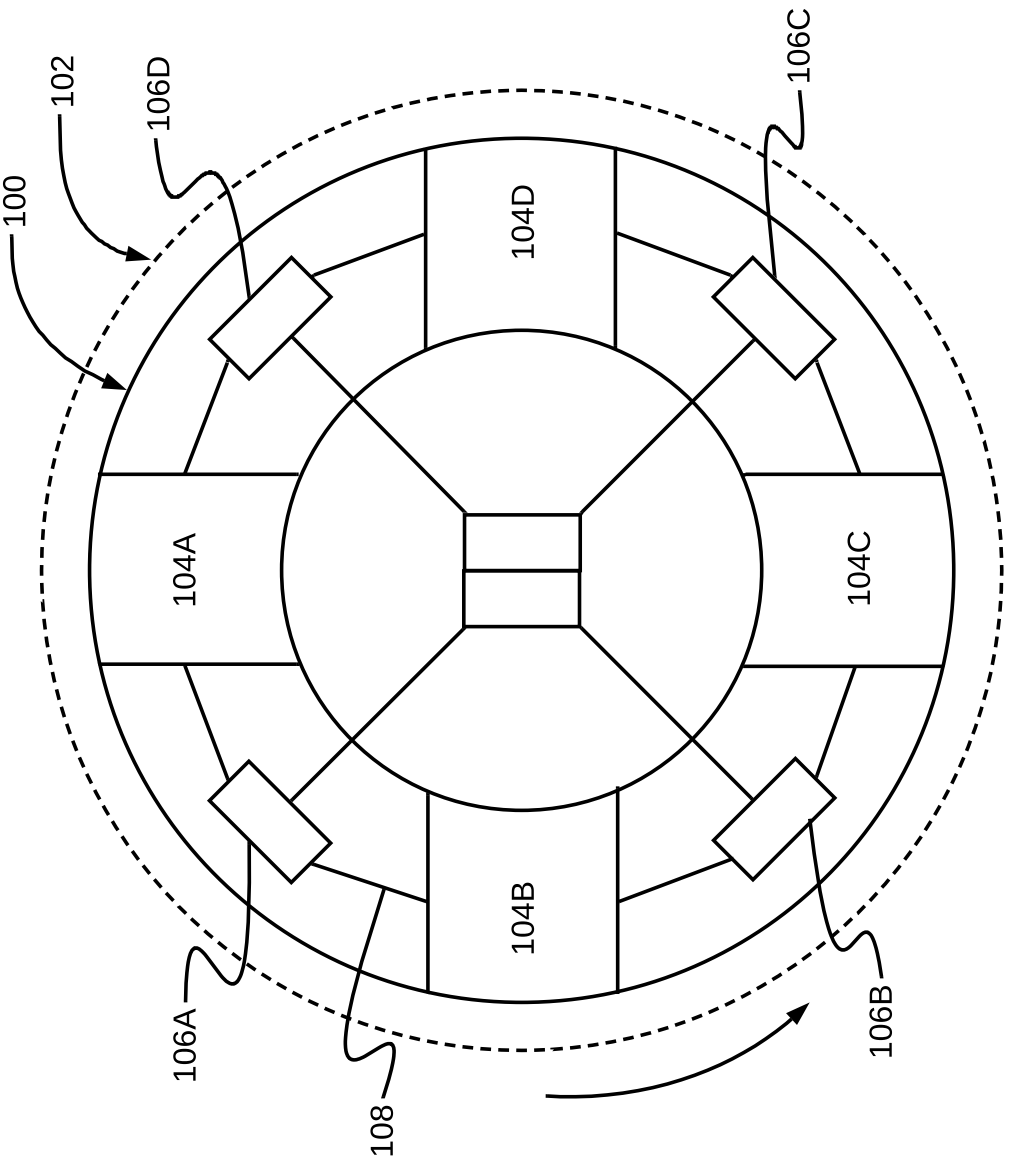


FIG. 1

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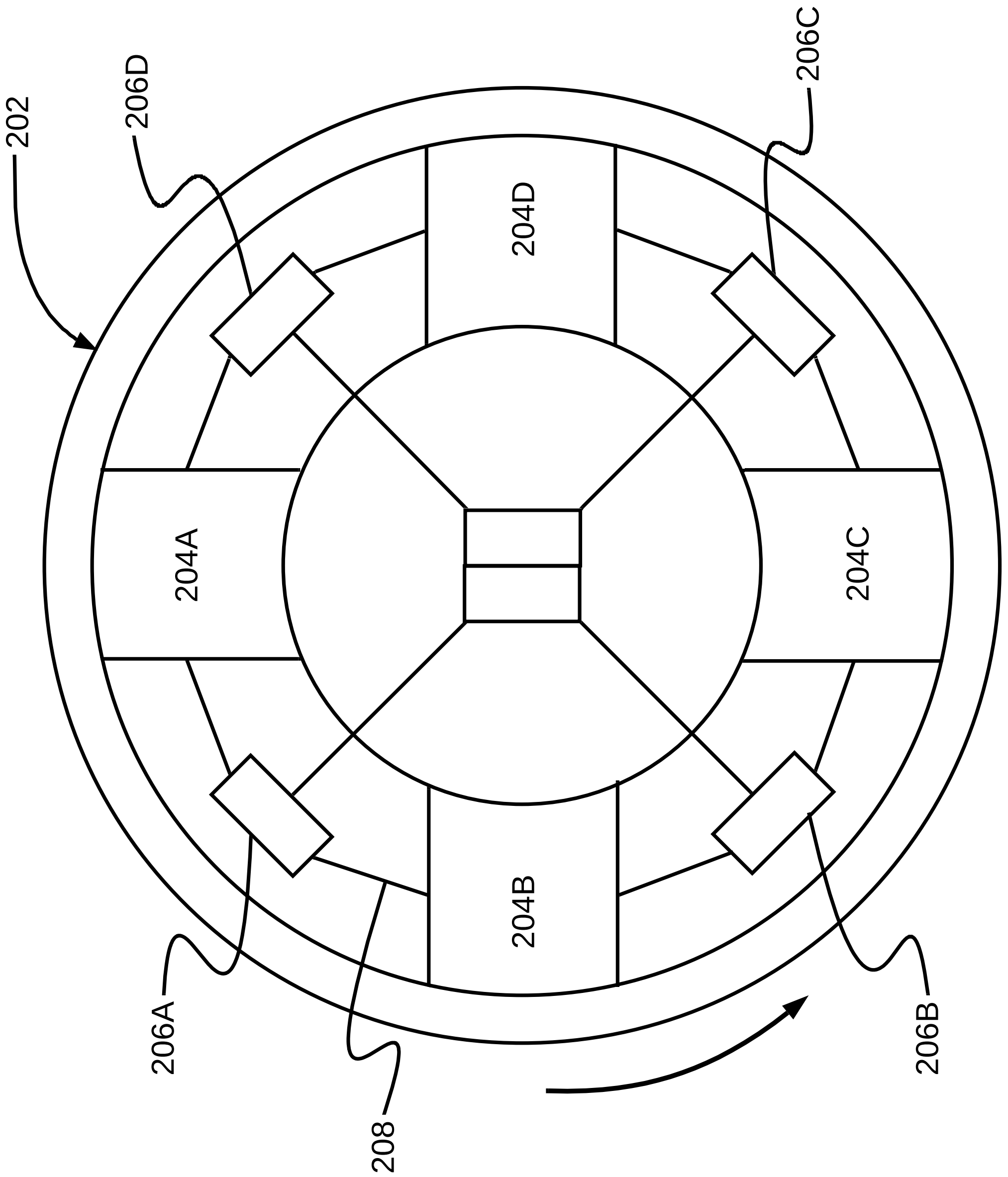

FIG. 2

Mohammed Faisal (INPA No: 1941)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

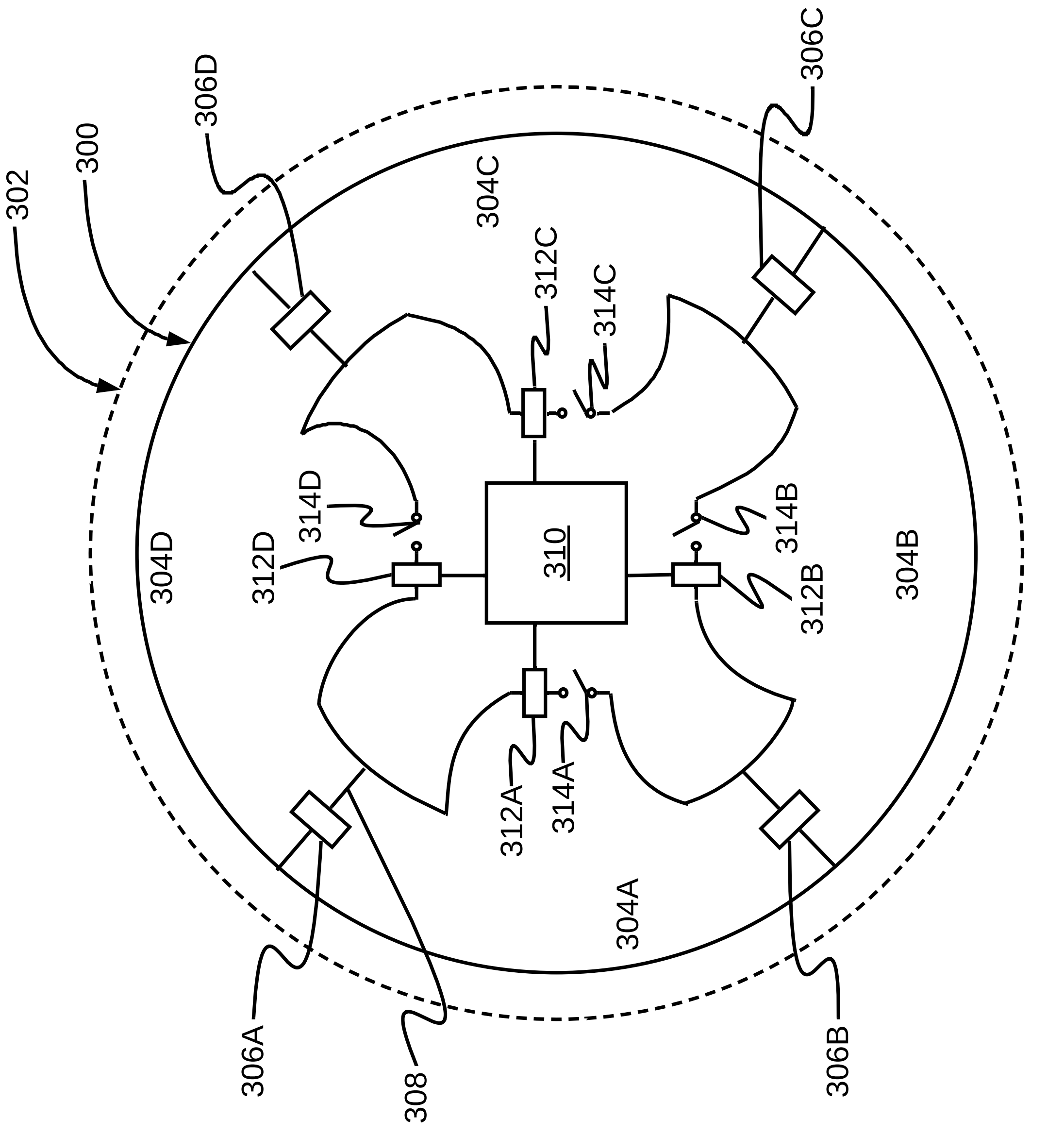

FIG. 3

Mohammed Faisal (INPA No: 1941)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

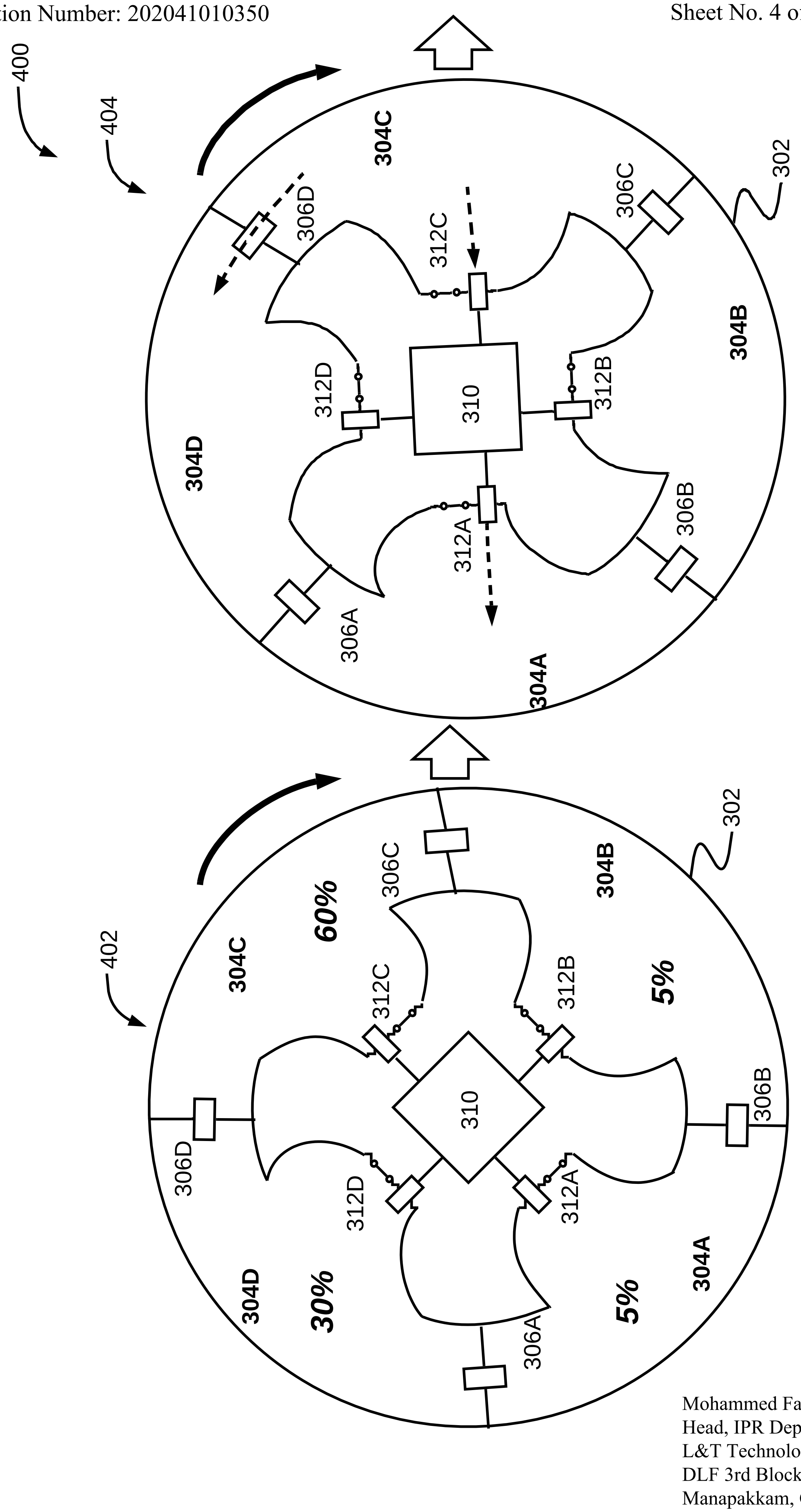

FIG. 4

Mohammed Faisal (INPA No: 1941)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.

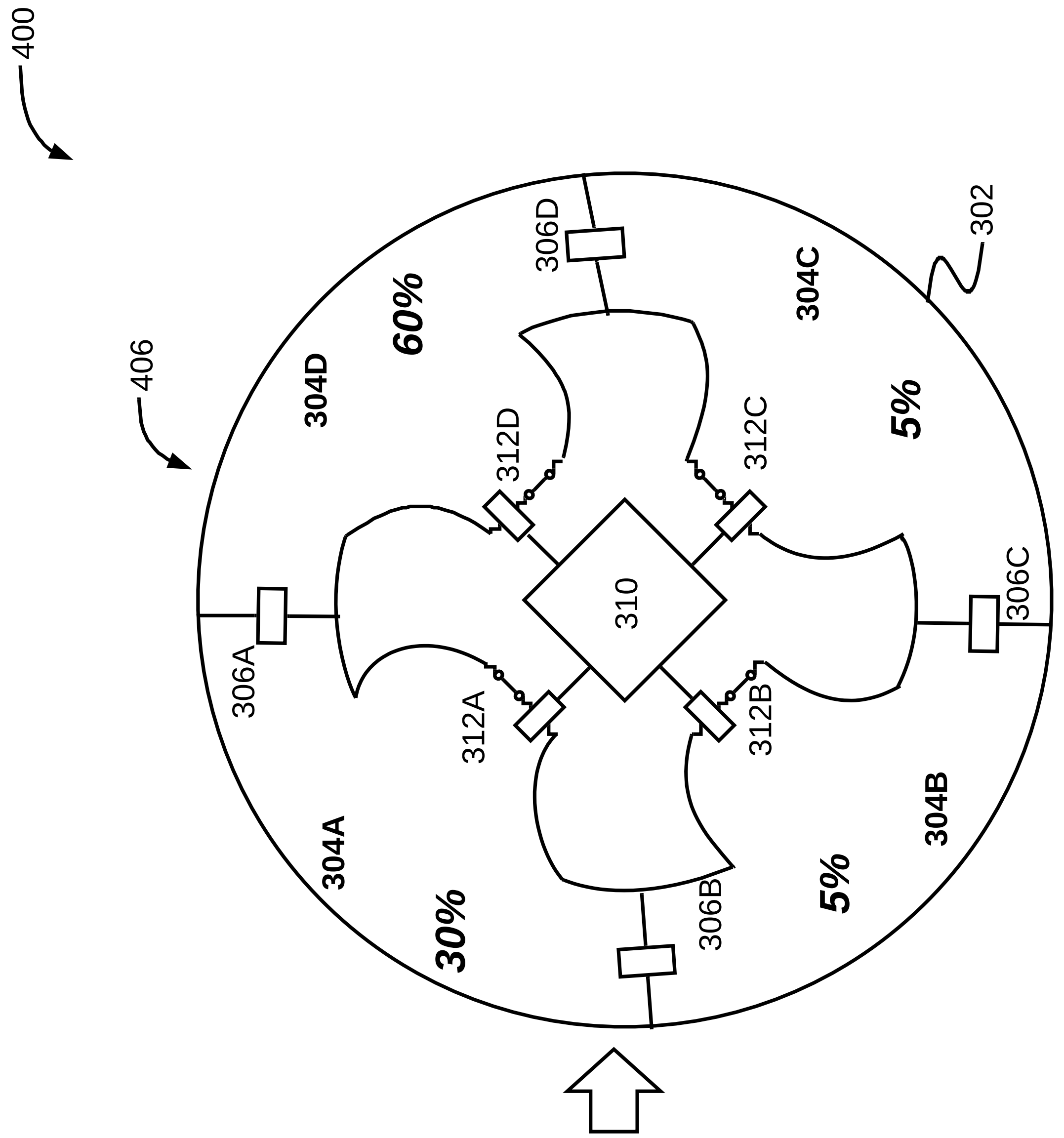

FIG. 4 contd.

Mohammed Faisal (INPA No: 1941)
Head, IPR Dept.,
L&T Technology Services Limited,
DLF 3rd Block, 2nd Floor,
Manapakkam, Chennai - 600089.