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(72) Inventors:
• **HUI, Wing-kin, Unit A, Kwun Tong, HONG KONG (CN)**
• **HUI, Fong-man, Unit A Kwun Tong, HONG KONG (CN)**

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(71) Applicant: **Spa Motion Limited Kwun Tong Hong Kong (CN)**

(74) Representative: **Chaillot, Geneviève et al Cabinet Chaillot 16-20, avenue de L'Agent Sarre B.P. 74 92703 Colombes Cédex (FR)**

(54) **Pool cleaner with contoured base**

(57) Disclosed herein is a swimming pool cleaner vehicle. The pool cleaner includes a body, which defines a hollow interior. The body has at least one intake port. The body has at least one outlet port. The pool cleaner includes various wheels and rollers and various combinations of wheels and rollers for moving the vehicle. The vehicle includes a bottom and the bottom is concave inwards. This invention describes a swimming pool cleaner with bottom concave inwards towards the hollow interior

for overcoming swimming pool floor obstacles when it runs in a swimming pool. The pool cleaning vehicle improves cleaning efficiency without affecting swimming pool cleaner reliability and cost of maintenance, or affecting the required partial vacuum and water flow rate. Additionally, having the intake port(s) at appropriate location(s) such as at close proximity to the wheels and/or rollers or combinations ensures water containing dirt and debris is sucked into the pool cleaner.

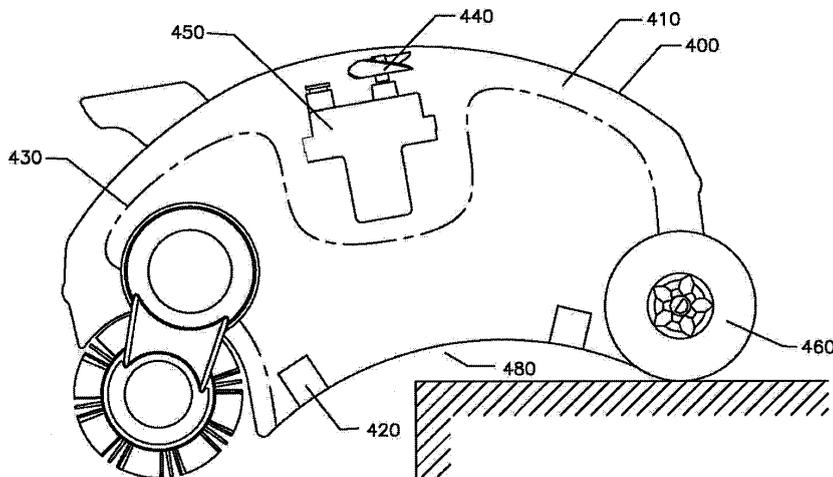


FIG 4

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Description

Field of the Invention

[0001] This invention is in the field of swimming pool cleaning vehicles, and more particularly the invention relates to improvement on its bottom design for preventing the swimming pool cleaning vehicle from becoming stuck or hung as it runs along the floor of the swimming pool from various floor obstacles.

Background of the Invention

[0002] Existing swimming pool cleaner can be classified as wheel, roller, belt or hydraulic propulsion type. Prior art construction is illustrated in Fig. 1 which consists of the following: an exterior body (100) which forms a hollow interior (110), at least one intake port (120) located on the said body (100); at least one filter bag (130) filtering water receiving from intake port (120). The filter bag is located inside the hollow interior (110) of the body (100); at least one outlet port (140) located on the body(100) and at least one water pump (150) placed under the said water outlet port (140) for pumping water out from the body (100), creating the partial vacuum and water flow inside the body (100) required in order to pull up dirt and debris at swimming pool floor, ensure water with debris could enter the body (100) through the intake port (120), a filter bag (130) which secured by the inside edge of intake port (120), filtering the dirt and debris and clean the swimming pool water. Moreover, there are wheel and/or roller (160) placed at the corresponding body (100) bottom, this wheel and/or roller (160) is driven by motor inside/outside the body (100) or jet propelled, moving the unit around in a swimming pool.

[0003] As illustrated in Fig 1, existing swimming pool cleaner bottoms are flat. The bottom has at least one intake port. Since swimming pool cleaner has to suck water in through this intake port, intake port cannot have floor clearance too high. If it is too high, debris set at swimming pool floor cannot be picked up by the limited partial vacuum and water flow generated by the water pump. If it is too low, as illustrated in Fig. 2 which has the main drain on certain type of swimming pools, or naturally formed uneven obstacles. For example, a layer up to 2" thick sand is laid under PVC film liner for water proof purpose when a new swimming pool is constructed. After this type of swimming pool is used in a period of time, will have foot prints of different sizes by swimming pool users. That makes the swimming pool floor naturally uneven causing swimming pool cleaner stuck and cannot run normally or extra drive motor wear caused by slippage, prevents the swimming pool cleaner operate normally, even running the risk of being hit and damaged, causing higher defective rate and higher maintenance cost.

[0004] To handle the above mentioned problems, existing design is to raise the floor clearance as illustrated

in Fig. 3. By adding a skirt (300) at the intake port, stir up the segregated dirt when the swimming pool cleaner moves. The skirt (300) can be made of elastic material or make a hinge such as elastic axle between the skirt (300) and intake port, enable the skirt (300) swings when it meets dirt segregated and stir it up without affecting swimming pool cleaner motion. It is actually lower the effective floor clearance at the intake port. If the skirt (300) is lowered too far will only push dirt segregated around and therefore segregated dirt cannot be sucked up into the swimming pool cleaner body. Besides, such a skirt could be caught by uneven swimming pool floor. The skirt cannot remain closed or the cleaner cannot pass dirt through it to be sucked into the swimming pool cleaner body. On the other hand, a non-closed skirt cannot limit the water flow and therefore cannot generate enough partial vacuum and flow rate to bring debris and segregated dirt up.

[0005] Improvement is needed as existing swimming pool has shortcomings and limitations as explained above.

Summary of the Invention

[0006] Purpose of this invention is to make a swimming pool cleaner that can overcome obstacles when it runs in a swimming pool, operate normally but will not affect the partial vacuum and water flow required at water inlet port.

[0007] To achieve this purpose, this invention proposes a swimming pool cleaner consists of:

a body shell which has a hollow interior;

at least one inlet port on the body;

at least one outlet port on the body;

numbers of wheel or roller or combination of wheel and roller, located at the swimming pool cleaner bottom. The body has bottom concave bottom directed inwards toward the hollow interior.

[0008] According to swimming pool cleaner described in this invention, the body shell has symmetric concave inwards bottom.

[0009] According to swimming pool cleaner described in this invention, the body shell bottom has a number of wheel or roller. Either between front roller and rear wheel of said body shell bottom, or between front wheel and rear roller of said body shell bottom is a front to back symmetric concave inwards.

[0010] According to swimming pool cleaner described in this invention, said body shell has asymmetric concave inwards bottom.

[0011] According to swimming pool cleaner described in this invention, said body shell bottom has a number of wheel or roller. Either between front roller and rear wheel of said body shell bottom, or between front wheel and rear roller of said body shell bottom is a front to back asymmetric concave inwards

[0012] According to swimming pool cleaner described in this invention, said body shell bottom is significantly concave inwards.

[0013] According to swimming pool cleaner described in this invention, said water inlet port facing downwards, or said water inlet port close to wheel or roller.

[0014] According to swimming pool cleaner described in this invention, said water inlet port is located at the bottom and close to wheel and/or roller location.

[0015] According to swimming pool cleaner described in this invention, said water inlet port is located at the bottom and located at wheel and/or roller front, back or right under it.

[0016] This invention provides a swimming pool cleaner with concave inwards bottom that can overcome obstacles when it runs in a swimming pool, operate normally but will not affect the partial vacuum and water flow required at water inlet port, reduce the swimming pool cleaner defective rate and maintenance cost, improve the operating efficiency. Furthermore, by locating the water intake port at appropriate location such as close to wheel and/or roller can ensure water with dirt and debris be sucked into the swimming pool cleaner.

Brief Description of the Drawing

[0017] For a further understanding of the objects and advantages of the present invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawing, in which like parts are given like reference numerals and wherein:

Fig 1 shows the existing swimming pool cleaner construction.

Fig 2 shows existing swimming pool cleaner get stuck when it encounters obstacles.

Fig 3 shows existing swimming pool cleaner has skirt at water intake port.

Fig 4 shows construction of a swimming pool cleaner described in this invention at first application example.

Fig 5 shows construction of a swimming pool cleaner described in this invention at second application example.

Fig 6 shows construction of a swimming pool cleaner described in this invention at third application example.

Detailed Description of the Invention

[0018] To explain the purpose of this invention, technical aspect and advantage better, the following drawing and application example explains this invention in detail. Application example is used to explain this invention but should not be used to limit its scope.

[0019] Basically this invention is making a swimming pool cleaner with concave inwards bottom to ensure it can easily overcome obstacle. Furthermore, by locating

the water intake port at appropriate location such as close to wheel and/or roller can ensure water with dirt and debris be sucked into the swimming pool cleaner.

[0020] Fig 4 illustrates construction of a swimming pool cleaner described in this invention at first application example, consists of: an outer shell (400), forms a hollow interior (410). One or more water intake port (420) located on the outer shell (400). One or more filter bag (430) placed inside the hollow interior (410) or the outer shell (400) filters water from water intake port (420) and traps the debris. One or more water outlet port (440) located on the outer shell (400). One or more water pump (450) placed under the corresponding water outlet port (440), pumps water from outer shell (400) to outside.

[0021] Swimming pool cleaner also consists of certain number of wheel or roller or combination of wheel and roller (460) (this disclosure assign 460 on both wheel and roller), placed at the bottom (480) of the outer shell (400) correspondingly. If only wheels (460) are used, said wheel (460) will be generally 2 pairs, placed at the both ends of bottom(480) of the outer shell(400) correspondingly. It is obvious that 3 pairs or more wheels (460) could be placed at the bottom (480) of the outer shell (400). If only rollers (460) are used, said roller (460) will be generally 2 pieces, placed at the both ends of bottom (480) of the outer shell (400) correspondingly. It is obvious that 3 pieces or more rollers (460) could be placed at the bottom (480) of the outer shell (400). If wheel and roller (460) are used at the same time, normally one pair of wheel and 1 piece of roller, placed at the both ends of bottom (480) of the outer shell (400) correspondingly. It is obvious that more wheels and rollers (460) could be placed at the bottom (480) of the outer shell (400). Said wheel and/or roller (460) can be driven by motor placed inside/outside the outer shell (400). Said wheel and/or roller (460) can also be water jet propelled by pressurized water generated by water pump placed inside/outside the outer shell (400). (Not shown in the illustration).

[0022] One of the application examples shown here describes how a swimming pool cleaner can run around without affected by swimming pool floor obstacles. Said outer shell (400) bottom (480) is made to be concave inwards. This allows the swimming pool cleaner easily overcome swimming pool floor obstacles such as main drain cover or steps. Outer shell (400) bottom (480) could be symmetric concave or asymmetric concave. In the first application example, outer shell (400) bottom (480) has either 2 pairs of wheel (460) or 2 pieces of roller (460). Said body shell (400) bottom (480) is a front to back symmetric concave inwards either between front wheel and rear wheel, or between front roller and rear roller. If more than 3 pairs of wheel or 3pieces or more rollers are used, said body shell (400) bottom (480) is a front to back symmetric concave inwards between 2 adjacent wheels or rollers. Furthermore, amount of body shell (400) bottom (480) concave inwards could be increased to accommodate greater swimming pool floor obstacles.

[0023] Since body shell (400) bottom (480) concave inwards, most part of the bottom (480) has high floor clearance. In order to ensure water intake port (420) can suck in water with dirt and debris, swimming pool cleaner intake port can be relocated to closer to the swimming pool floor. Since those areas close to wheel and/or roller are closer to floor and during normal operation the floor clearance remains unchanged. Application example #1 shows water intake port (420) is placed on the outer shell (400) bottom (480) and is close to the wheel and/or roller. That will not affect the required partial vacuum and water flow at the water intake port (420). Dirt and debris could then easily suck up into the swimming pool cleaner. Water intake port (420) described here could points downwards, or water intake port (420) placed close to the wheel and/or roller (460). Number of water intake port (420) could vary according to the cleaning need. It could be one or more.

[0024] Fig 5 shows the construction of swimming pool cleaner in application example #2. Difference between this application example #2 and application example #1 is the outer shell (400) bottom (480) is asymmetric concave inwards. Its outer shell (400) bottom (480) has a number of wheel and roller (460). Said outer shell (400) bottom (480) is asymmetric concave inwards between front roller and rear wheel, or between front wheel and rear roller. Said asymmetric concave inwards could be formed by more than one curved surfaces. Said water intake port (420) is placed on the outer shell (400) bottom (480), and at wheel/roller front and/or rear side.

[0025] Fig 6 shows the construction of swimming pool cleaner in application example #3. In this application example, said water intake port (420) is placed on outer shell (400) bottom (480) and at right under the wheel/roller. That location has the lowest clearance between swimming pool cleaner and swimming pool floor. Place the water intake port (42) here could make the dirt and debris be suck up into the swimming pool cleaner easier. Said water intake port (420) has opening downwards.

[0026] In conclusion, this invention having the swimming pool cleaner bottom is concave inwards which allows it overcomes swimming pool floor obstacles when it runs in a swimming pool. It can improve the swimming pool cleaner cleaning efficiency, reliability and lower the cost of maintenance.

[0027] It is understood that any person with decent technical skills in this field could change or alter part of the design disclosed here. All these change and alteration are covered by this invention claims.

Claims

1. A swimming pool cleaner, comprising:

an outer shell, forms a hollow interior
at least one water intake port on the outer shell
at least one outlet port on the outer shell

a plurality of wheels or rollers or a combination thereof connected to the outer shell bottom, the bottom being concaved inwards.

2. The swimming pool cleaner outer shell bottom of claim 1 wherein the bottom is symmetrically concaved inwards.
3. The swimming pool cleaner outer shell bottom of claim 1 has a plurality of wheels or rollers. Either between front roller and rear wheel of said body shell bottom or between front wheel and rear roller of said body shell bottom is a front to back symmetric concave inwards.
4. The swimming pool cleaner outer shell bottom of claim 1 is asymmetrically concave inwards.
5. The swimming pool cleaner outer shell bottom of claim 4 has a number of wheel or roller. Either between front roller and rear wheel of said body shell bottom or between front wheel and rear roller of said body shell bottom is a front to back asymmetric concave inwards.
6. The swimming pool cleaner outer shell bottom of claim 1 is concave inwards and greater curvature magnitude
7. The swimming pool cleaner water intake port of claim 1 has opening points downwards, or said water intake port opening close to wheel and/or roller.
8. The swimming pool cleaner of claims 1-7 which has a water intake port located on the outer shell bottom and close to wheel and/or roller.
9. The swimming pool cleaner of claim 8 which has a water intake port located on the outer shell bottom and is placed at front side, rear side or right under the wheel and/or roller.

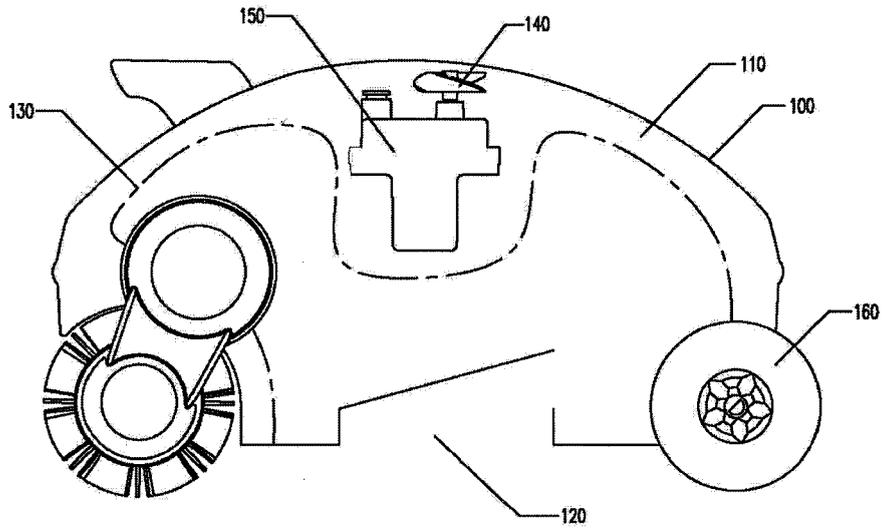


FIG 1

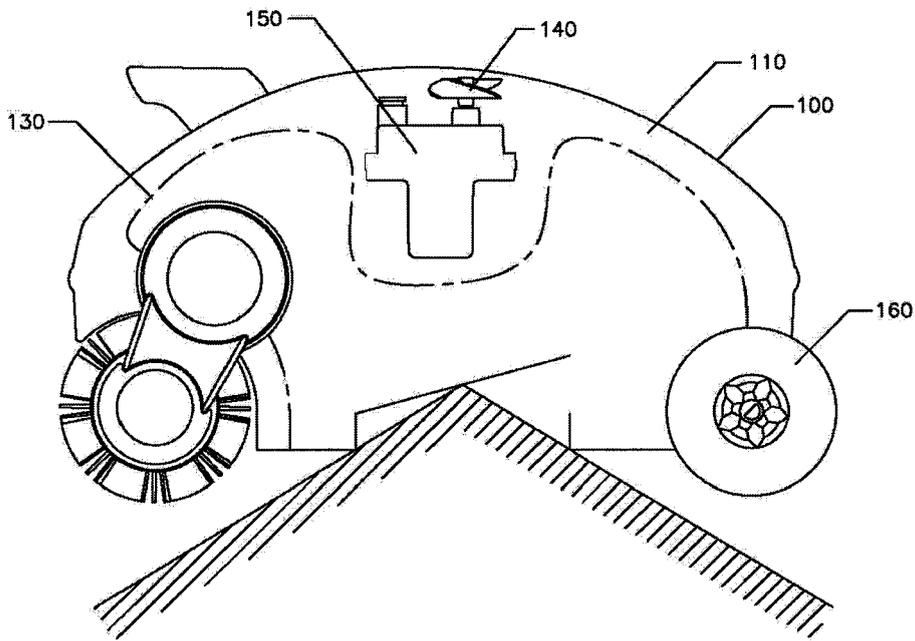


FIG 2

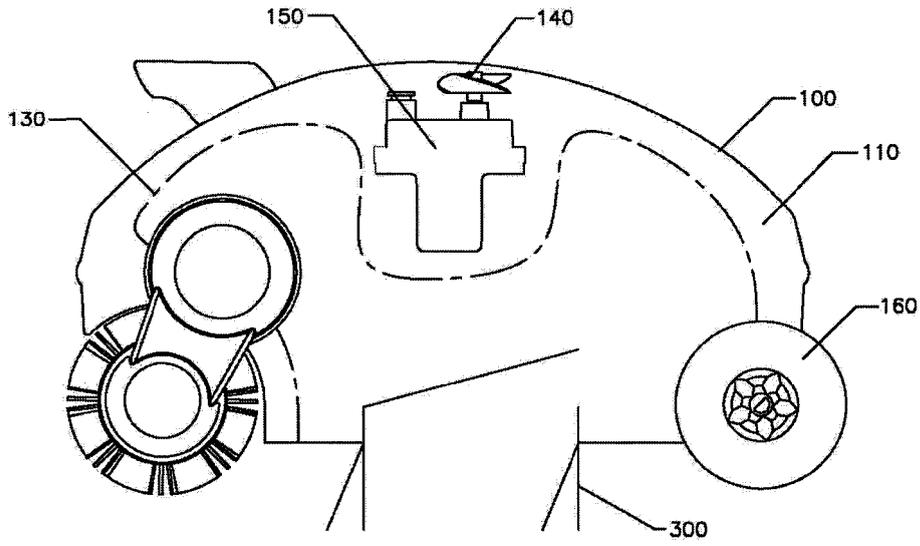


FIG 3

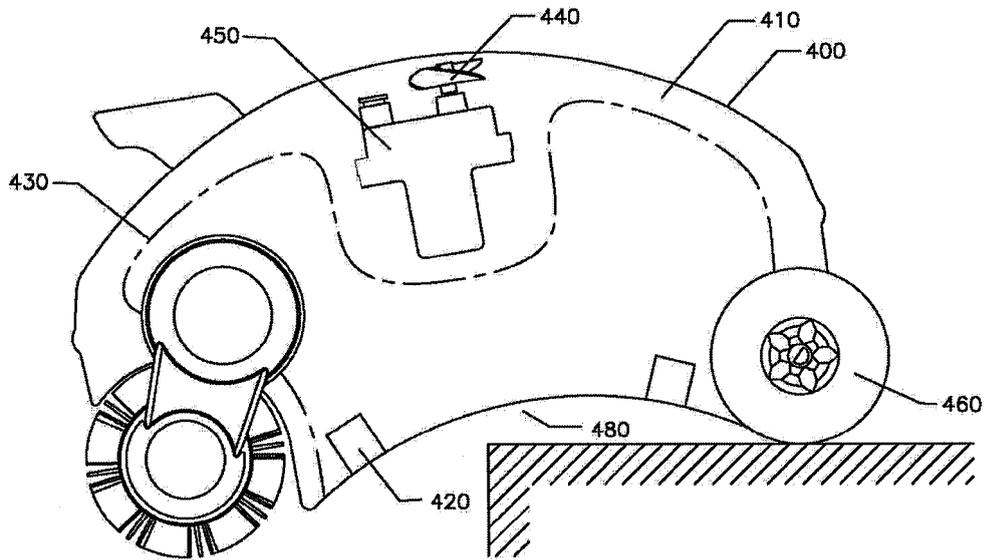


FIG 4

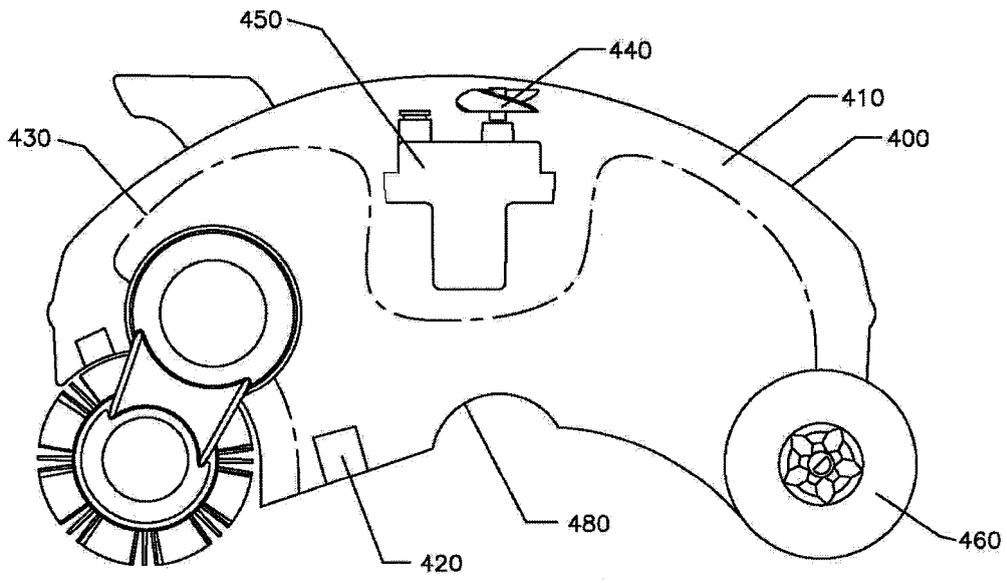


FIG 5

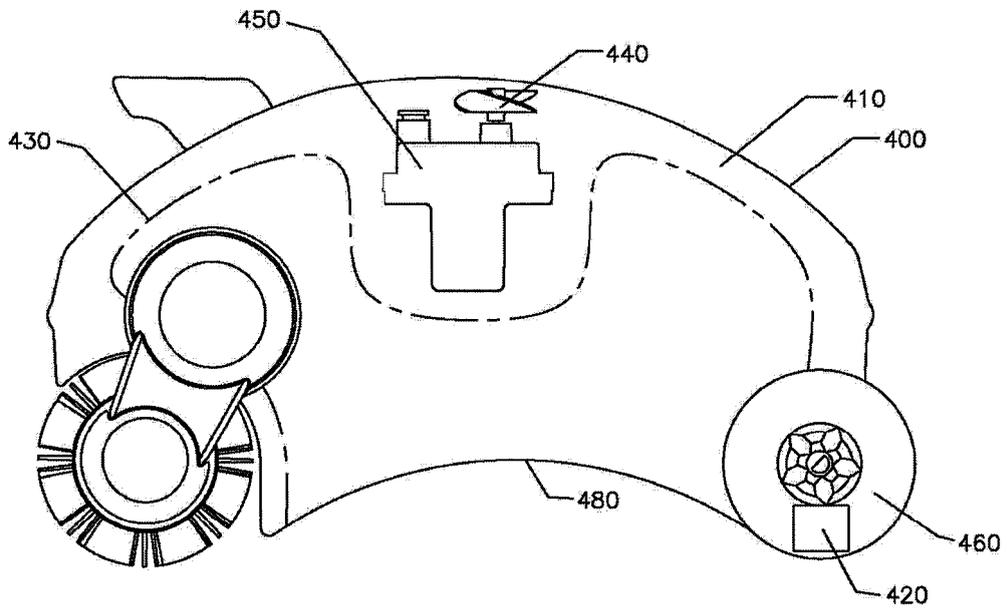


FIG 6